

# **Product Catalogue**

# **MINICOMB®**

Switches for Pressure and Vacuum





# **DEFINITION OF PRESSURE**

A force applied uniformly over a certain area is called **pressure**:

$$p = F / A$$

#### (pressure = force / area)

Pressure (P) besides temperature is one of the most frequently measured physical units.

The unit "Pascal" (Pa) is the SI unit of pressure within the metric unit system.

In Europe "bar" is the most commonly used (SI) unit. It roughly equals with the magnitude of the atmospheric pressure.

Particularly in the anglo-american influenced region "psi" (pounds per square inch) is the most common unit.

The general term "pressure" is not always very clear:

In technical usage several types of pressure are differentiated, mainly differences between two pressure points, which in general linguistic usage all are called pressure.

To avoid confusion, the various types of pressure are distinguished according to their point of reference:





#### Absolute Pressure (Pabs)

Absolute pressure always refers to the absolute vacuum, i.e. the zero-point is the absolute vacuum.

A pressure gauge with measuring range 0 - 10 bar absolute shows the current ambient pressure (Pamb) when in nonoperating state/not installed.

#### **Ambient Pressure (Pamb)**

The atmospheric pressure is the ambient pressure.

#### **Atmospheric Pressure Difference (Pe)**

The atmospheric pressure difference, also called positive pressure (Pe+) respectively negative pressure (Pe-) is the most commonly measured type of pressure in the technical field.

It refers to atmospheric pressure (Pamb) and is the difference between the atmospheric pressure (Pamb) and absolute pressure (Pabs).

#### Pe = Pabs - Pamb

Pe becomes positive when the absolute pressure is higher than the athmospheric pressure; Pe becomes negative when the absolute pressure is lower than the atmospheric pressure.

A pressure gauge with measuring range 0 - 10 bar relative shows 0 bar when in nonoperating state/ not installed.

#### **Differential Pressure (DP)**

Differential pressure is the pressure difference  $(\Delta P)$  between to measured pressures (P1, P2).

#### $\Delta P = P1 - P2$

Differential pressure instruments are universal, as they can be used to as a relative pressure instrument or for **hydrostatic level measurement**.



[SP - SD = BSP]

[SP + SD = BSP]

[-SP - SD = -BSP]

[-SP + SD = -BSP]

# WHAT IS A PRESSURE SWITCH ?

Pressure switches are signal elements, that can be used for measuring pressure in pressure lines for gases, vapours or liquids. Once the switching contact is triggered, setted pressure values are transformed into electrical or pneumatic signals which are necessary for the

BSP

BSP

BSP

- BSP

SD

SD

SD

SD

rising

falling

falling

rising

positive pressure

positive pressure

negative pressure

negative pressure

positive

pressure

negative

pressure

In general pressure switches have one or more fixed or adjustable switching contacts.

Each switching contact has a **setpoint** (• SP). This setpoint corresponds to a pressure value setted on the pressure switch.

When rising above or falling below this value the switching contact within the pressure switch is triggered.

Due to inaccuracy the **re-set point** (• BSP) does not exactly match the setpoint.

The difference between setpoint and re-setpoint is called hysteresis or **switching differential** (1 SD)

control and regulation of processes, e.g. safety and alarm devices.

## WHAT IS A MINICOMB® PRESSURE SWITCH?

The MINICOMB® pressure switch series is a very compact-sized pressure switch for measuring compressed air, low-viscous media and non-ag-gressive gases.

It is based on a force-balance measuring system with bellows sensors actuating one switching contact.

The force-balance measuring system with bellows sensors is friction-free and features high repeatability and very good longterm-stability.

The MINICOMB<sup>®</sup> is available with pressure range 0,2 - 16 bar, -0,9 - 0 bar or -0,9...+1 bar. Sub-base mounting or female threads are availbe for connecting to the process, while 4-pin plug according to ISO 4400 or plug M12x1 are available for electrical connection.







## **MINICOMB®** Pressure Switch



MINICOMB with sub-base mounting

- friction-free force-balance measuring system
- high repeatability
- very good longterm stability
- pressure ranges -0,9... 0 (+1) bar or 0,2 16 bar
- process connection 1/4" ISO 228 female or subbase mounting
- electrical connection plug ISO 4400 or plug M12x1
- approved for applications with PLr = PLc
- approved for ATEX zones 2 / 22



MINICOMB with 1/4" female ISO 228 thread

#### Description

The MINICOMB® Series is a very compact-sized pressure switch for measuring compressed air, low-viscous media and non-aggressive gases.

#### **Operating Principle**

The principle of operation is the balance of forces. The working force within each bellow is counter-balanced by adjustable steel springs.

This system actuates a microswitch when the working pressure overcomes the opposing force.

The measuring system operates without any pistons or diaphragms, thus completly friction-free, resulting in minimal wear and no maintenance.

**Approvals** 





Technical Data	Standard	Options
Function	mechanical pressure switch; force-balance	e measuring system with bellows sensor
Life Cycle	at least 10 mic	switch cycles
Pressure Range	0,2 - 1	l6 bar
Vacuum Range	-0,9 -	0 bar
Pressure-/Vacuum Range)	-0,9	+1 bar
Overpressure Safety	25	bar
Vacuum Safety	-1	bar
Enclosure Material	Alum	inium
Wetted Parts Material	Aluminium, Brass, NBR (Gasket)	FKM (Gasket)
Permissalbe Media Temperature	-10	+80°C
Permissable Ambient Temperature	-20	+80°C
Temperature Deviation	approx. 1%	6 per 20°C
Factory Adjustment Temperature	20°C	on request
Switching Contact	1 micro swi	tch (SPDT)
Adjustment Accuracy	<u>≤</u> 1,0	% FS
Switching Accuracy	<u>≤</u> 1,0	% FS
Repeatability	≤ 1,0	% FS
Switching Differential (Hysteresis)	≤4,0% FS	on request
Process Connection (alternatively)	sub-base sub-base mou 1/4" female IS	mounting; nting CNOMO; O 228 thread;
Electrical Connection (alternatively)	Stecker EN175 301-803-A (ISO 4400); Stecker M12x1	
Weight	approx	. 160 g
Protection	IP65 (IP67 wit	h plug M12x1)
Schock Resistance (XYZ-Direction)	15 g (IEC 6	0068-2-64)
Vibration Resistance (XYZ-Direction)	10 g (60 - 500 Hz	) (IEC 60068-2-6)



# **DIMENSIONS (VERSION WITH PLUG ISO 4400)**

#### **MINICOMB**

sub-base mounting and plug ISO 4400



#### MINICOMB

sub-base mounting CNOMO and plug ISO 4400



### MINICOMB

1/4" female ISO 228 thread mounting and plug ISO 4400





# **DIMENSIONS (VERSION WITH PLUG M12X1)**

#### MINICOMB

sub-base mounting and plug M12x1



### MINICOMB

sub-base mounting CNOMO and plug M12x1



### MINICOMB

1/4" female ISO 228 thread mounting and plug M12x1





# **ELECTRICAL DATA**

Category AC-12 / DC-12

Switching Capacity max. steady current I max [A] on inductive load

	U [V]	30V	48V	60V	125V	250V
version	I [A] AC	3	3	3	3	3
ISO4400	I [A] DC	2	0,55	0,4	0,15	
version	I [A] AC	3				
M12x1	I [A] DC	2				
reference sw reference ter AC = cos phi DC = L/R ca	itch cycle nperature ca. 0,7° 10ms	: 30/min :: +30°C				

Switching Capacity max. steady current I max [A] on ohmic load

	U [V]	30V	48V	60V	125V	250V
version	I [A] AC	5	3	5	5	5
ISO4400	I [A] DC	3	1,2	0,8	0,4	
version	I [A] AC	4				
M12x1	I [A] DC	3				
reference sw reference ten	itch cycle nperature	: 30/min : +30°C				

#### **Electrical Connection**

shown in zero pressure condition



		plug ISO4400	plug M12
	+UB	1	1
micro	normally closed	2	2
switch	normally open	3	4
	GND	4	



# **ORDER-CODES**

most common options

Pressure Range	Electrical Connection	Process Connection	Remarks	Order-Code
		Sub base mounting	1	C0011F-199-PAO
		Sub-base mounting	ATEX, 1	C0111F-199-PAO
	ISO 4400	Sub-base mounting CNOMO	1	C0011F-199-CAO
		1/4" fomale ISO 228 throad	2	C0051F-199-4AO
0.2 - 16 bar		1/4 Terriale 130 220 tillead	ATEX, 2	C0151F-199-4AO
0,2 - 10 bai		Sub-base mounting	1	C0011F-199-PDO
		Sub-base mounting	ATEX, 1	C0111F-199-PDO
	M12	Sub-base mounting CNOMO	1	C0011F-199-CDO
		1///" female ISO 228 thread	2	C0051F-199-4DO
			ATEX, 2	C0151F-199-4DO
	ISO 4400	Sub-base mounting	1	C0011F-300-PAO
		Sub-base mounting	ATEX, 1	C0111F-300-PAO
		1/4" fomale ISO 228 throad	2	C0051F-300-4AO
-0.9.0 bar		1/4 Terriale 130 220 tillead	ATEX, 2	C0151F-300-4AO
-0,90 bai		Sub base mounting	1	C0011F-300-PDO
	M12	Sub-base mounting	ATEX, 1	C0111F-300-PDO
		1/4" fomale ISO 228 thread	2	C0051F-300-4DO
			ATEX, 2	C0151F-300-4DO
		Sub base mounting	1	C0011F-301-PAO
	ISO 4400	Sub-base mounting	ATEX, 1	C0111F-301-PAO
		1/4" female ISO 228 thread	2	C0051F-301-4AO
$-0.0 \pm 1$ her			ATEX, 2	C0151F-301-4AO
-0,9+ i bai		Sub-base mounting	1	C0011F-301-PDO
	M12		ATEX, 1	C0111F-301-PDO
		1/1" fomale ISO 229 thread	2	C0051F-301-4DO
		ATEX, 2	C0151F-301-4DO	

Counter plug and installation screws within scope of delivery
Counter plug within scope of delivery

		Standard	I Internation	onal Units			Technica	al Units				
		mbar	bar	Ра	кРа	MPa	mm WC	m WC	kp/cm <sup>2</sup>	atm	Torr	psi
	mbar	•	0,001	100	0,1	0,0001	10,197	10,197 x 10 <sup>-3</sup>	1,0197 x 10 <sup>-3</sup>	0,98692 x 10 <sup>-3</sup>	0,75006	14,504 x 10 <sup>-3</sup>
Innoit	bar	1.000	•	100.000	100	0,1	10,197 x 10 <sup>3</sup>	10,197	1,0197	0,9869	750,06	14,504
rerna	Ра	0,01	0,00001	•	0,001	0,000001	0,10197	0,10197 x 10 <sup>-3</sup>	0,10197 x 10 <sup>-⁵</sup>	9,8692 x 10 <sup>€</sup>	7,5006 x 10 <sup>-3</sup>	0,14504 x 10 <sup>3</sup>
ard Ir	кРа	10	0,01	1.000	•	0,001	0,10197 x 10 <sup>3</sup>	0,10197	10,197 x 10 <sup>-3</sup>	9,8692 x 10 <sup>°3</sup>	7,5006	0,14504
Stance StinU	MPa	10.000	10	1.000.000	1.000	•	0,10197 x 10 <sup>6</sup>	0,10197 x 10 <sup>3</sup>	10,197	9,8692	7,5006 x 10 <sup>3</sup>	0,14504 x 10 <sup>3</sup>
	mm WS	98,067 x 10 <sup>-3</sup>	98,067 x 10 <sup>-</sup> ő	9,8067	9,8067 x 10 <sup>-3</sup>	9,8067 x 10⁵	•	10 <sup>-3</sup>	10 <sup>-4</sup>	96,784 x 10 <sup>-6</sup>	73,556 x 10 <sup>-3</sup>	1,4223 x 10 <sup>-3</sup>
	m WS	98,067	98,067 x 10 <sup>-3</sup>	9,8067 x 10 <sup>3</sup>	9,8067	9,8067 x 10 <sup>-3</sup>	10 <sup>3</sup>	•	10 <sup>-1</sup>	96,784 x 10 <sup>-3</sup>	73,556	1,4223
	kp/cm²	0,98067 x 10 <sup>3</sup>	0,98067	98,067 x 10 <sup>3</sup>	98,067	98,067 x 10 <sup>-3</sup>	104	10	•	0,96784	735,56	14,223
stinU	atm	1,0133 x 10 <sup>3</sup>	1,0133	0,10133 x 10 <sup>6</sup>	0,10133 x 10 <sup>3</sup>	0,10133	10,332 x 10 <sup>3</sup>	10,332	1,0332	•	760	14,693
lsoini	Torr	1,3332	1,3332 x 10 <sup>-3</sup>	0,10133 x 10 <sup>3</sup>	0,10133	0,13332 x 10 <sup>-3</sup>	13,595	13,595 x 10 <sup>-3</sup>	1,3595 x 10 <sup>-3</sup>	1,3158 x 10 <sup>-3</sup>	•	19,34 x 10 <sup>-3</sup>
ləəT	psi	68,948	68,948 x 10 <sup>-3</sup>	6,8948 x 10 <sup>³</sup>	6,8948	6,8948 x 10 <sup>-3</sup>	0,70307 x 10 <sup>3</sup>	0,70307	0,70307 x 10 <sup>-3</sup>	0,70307 x 10 <sup>-6</sup>	51,715	•

# **CONVERSION TABLE FOR PRESSURE UNITS**



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# INQUIRY CHECKLIST PRESSURE SWITCHES (BY FAX TO +49-6262-92670-99)

Company's name and addre	288		contact person	
			telephone, fax	
inquiry no. / project no.			E-Mail	
application			measured media	
wetted parts material			housing material	
media temperature			environmental temperatur	
$T_{min}$	$T_{max}$		T <sub>min</sub>	T <sub>max</sub>
pressure load			vacuum	
static:	dynamic: from	to	☐ Yes	No
special requirements				

### Design pressure switch

model	explosion proof version
	□ No □ EExi □ EExd □
number of switching contacts	set point(s) - falling /rising?
1 2	
switching contact type	switching performance (mech. and electr. for micro switch)
micro switch inductive pneumatic	
actual value indicator (integrated pressure gauge)	analogue signal (integrated pressure transducer 4 - 20mA)
Yes No	Yes No
pressure range	differential pressure range
process connection     BSP   NPT     1/4   1/2     male   female	others
electrical connection     M20/terminal blocks     plug ISO4400     Harting plug	others
approvals / certificates	
other	
Quotation for pieces	annual demandsingle demandproject demandspare parts



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