

Product Catalogue

MINICOMB® Switches for Pressure and Vacuum

PL

ATEX



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.

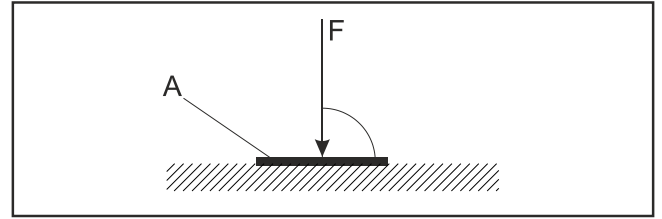
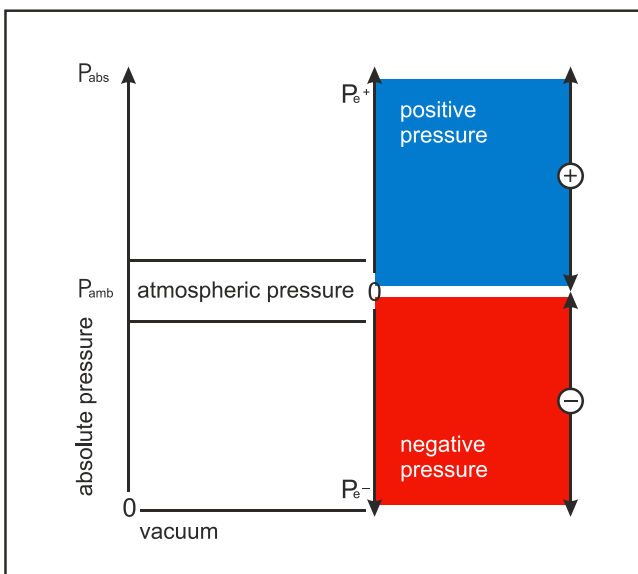
$$1 \text{ bar} = 0,1 \text{ MPa} = 0,1 \text{ N/m}^2 = 10^5 \text{ Pa}$$

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).

$$P_e = P_{abs} - P_{amb}$$

Pe becomes positive when the absolute pressure is higher than the atmospheric 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 (ΔP) between two measured pressures (P1, P2).

$$\Delta P = P_1 - P_2$$

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

WHAT IS A PRESSURE SWITCH ?

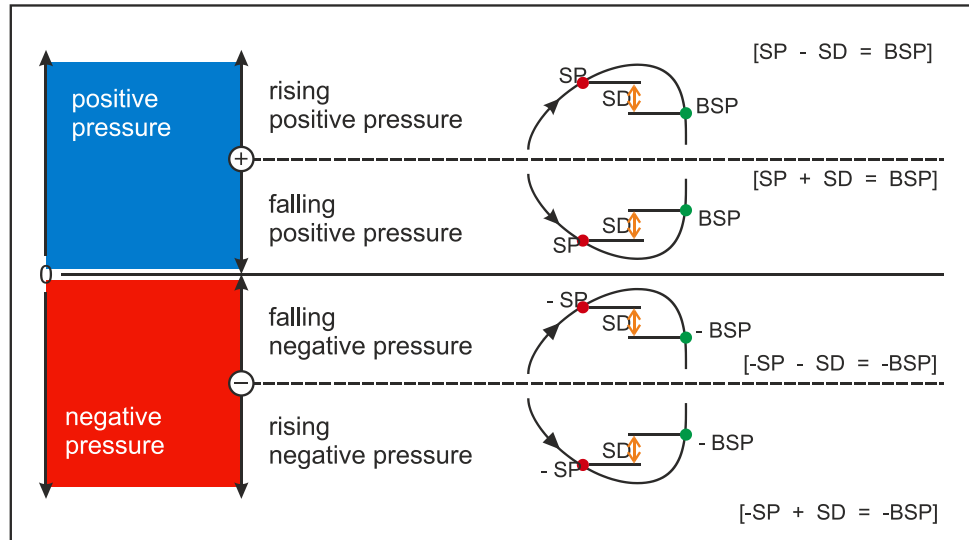
Pressure switches are signal elements, that can be used for measuring pressure in pressure lines for gases, vapours or liquids.

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.

Once the switching contact is triggered, setted pressure values are transformed into electrical or pneumatic signals which are necessary for the



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** (↕ **SD**).

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

WHAT IS A MINICOMB® PRESSURE SWITCH?

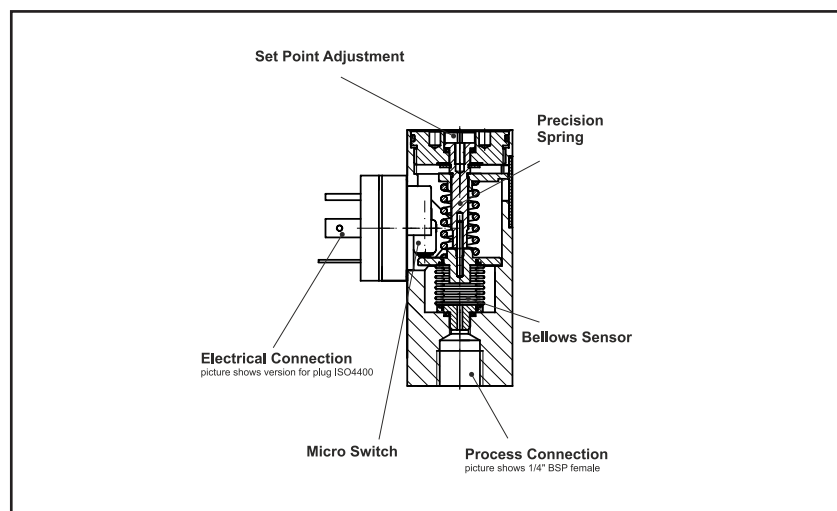
The MINICOMB® pressure switch series is a very compact-sized pressure switch for measuring compressed air, low-viscous media and non-aggressive gases.

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® 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 available for connecting to the process, while 4-pin plug according to ISO 4400 or plug M12x1 are available for electrical connection.

The MINICOMB® pressure switch series is approved for applications where PLc (Performance Level according to ISO 13849) is at least required (PLr) as well as for applications within hazardous area (zone 2 / 22 according to ATEX Directive 94/9/EC).



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 sub-base mounting**
- **electrical connection plug ISO 4400 or plug M12x1**
- **approved for applications with PLr = PLc**
- **approved for ATEX zones 2 / 22**

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 completely friction-free, resulting in minimal wear and no maintenance.



MINICOMB with 1/4" female ISO 228 thread

Approvals

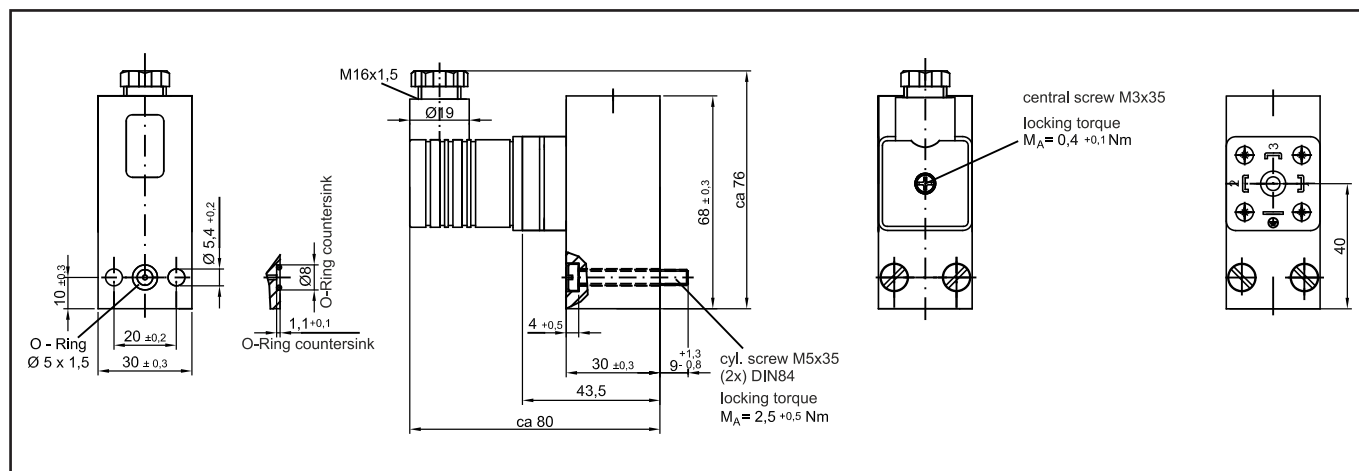
PL	Performance Level (ISO 13849) PLc
ATEX	ATEX-Directive 94/9/EC Zone 2 / Zone 22

Technical Data	Standard	Options
Function	mechanical pressure switch; force-balance measuring system with bellows sensor	
Life Cycle	at least 10 mio switch cycles	
Pressure Range	0,2 - 16 bar	
Vacuum Range	-0,9 - 0 bar	
Pressure-/Vacuum Range)	-0,9...+1 bar	
Overpressure Safety	25 bar	
Vacuum Safety	-1 bar	
Enclosure Material	Aluminium	
Wetted Parts Material	Aluminium, Brass, NBR (Gasket)	FKM (Gasket)
Permissible Media Temperature	-10...+80°C	
Permissible Ambient Temperature	-20...+80°C	
Temperature Deviation	approx. 1% per 20°C	
Factory Adjustment Temperature	20°C	on request
Switching Contact	1 micro switch (SPDT)	
Adjustment Accuracy	≤ 1,0% FS	
Switching Accuracy	≤ 1,0% FS	
Repeatability	≤ 1,0% FS	
Switching Differential (Hysteresis)	≤ 4,0% FS	on request
Process Connection (alternatively)	sub-base mounting; sub-base mounting CNOMO; 1/4" female ISO 228 thread;	
Electrical Connection (alternatively)	Stecker EN175 301-803-A (ISO 4400); Stecker M12x1	
Weight	approx. 160 g	
Protection	IP65 (IP67 with plug M12x1)	
Schock Resistance (XYZ-Direction)	15 g (IEC 60068-2-64)	
Vibration Resistance (XYZ-Direction)	10 g (60 - 500 Hz) (IEC 60068-2-6)	

DIMENSIONS (VERSION WITH PLUG ISO 4400)

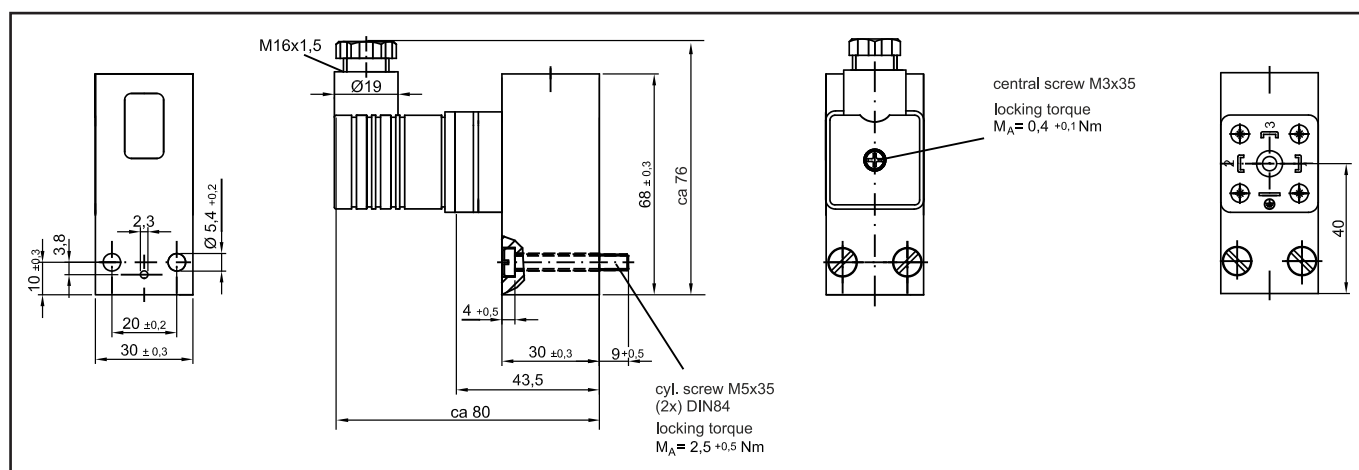
MINICOMB

sub-base mounting and plug ISO 4400



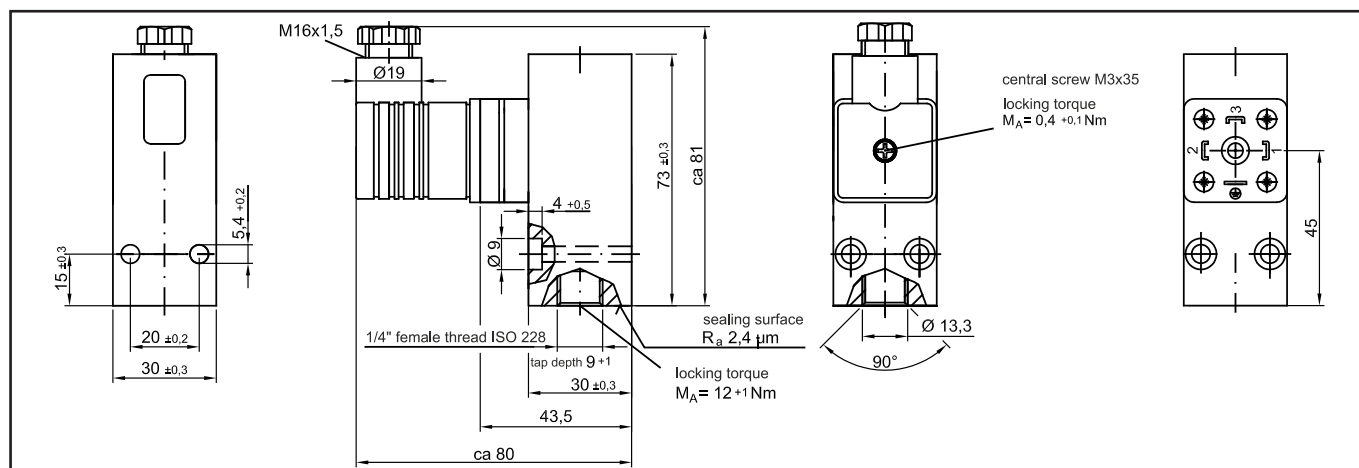
MINICOMB

sub-base mounting CNOMO and plug ISO 4400



MINICOMB

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



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 with plug ISO4400	I [A] AC	3	3	3	3	3
	I [A] DC	2	0,55	0,4	0,15	---
version with plug M12x1	I [A] AC	3	---	---	---	---
	I [A] DC	2	---	---	---	---
reference switch cycle: 30/min reference temperature: +30°C AC = cos phi ca. 0,7° DC = L/R ca 10ms						

Switching Capacity

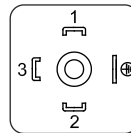
 max. steady current I max [A] on **ohmic** load

	U [V]	30V	48V	60V	125V	250V
version with plug ISO4400	I [A] AC	5	3	5	5	5
	I [A] DC	3	1,2	0,8	0,4	---
version with plug M12x1	I [A] AC	4	---	---	---	---
	I [A] DC	3	---	---	---	---
reference switch cycle: 30/min reference temperature: +30°C						

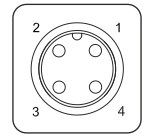
Electrical Connection

shown in zero pressure condition

plug ISO 4400



plug M12



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

ORDER-CODES

most common options

Pressure Range	Electrical Connection	Process Connection	Remarks	Order-Code
0,2 - 16 bar	ISO 4400	Sub-base mounting	1	C0011F-199-PAO
			ATEX, 1	C0111F-199-PAO
		Sub-base mounting CNOMO	1	C0011F-199-CAO
		1/4" female ISO 228 thread	2	C0051F-199-4AO
			ATEX, 2	C0151F-199-4AO
	M12	Sub-base mounting	1	C0011F-199-PDO
			ATEX, 1	C0111F-199-PDO
		Sub-base mounting CNOMO	1	C0011F-199-CDO
		1/4" female ISO 228 thread	2	C0051F-199-4DO
			ATEX, 2	C0151F-199-4DO
-0,9...0 bar	ISO 4400	Sub-base mounting	1	C0011F-300-PAO
			ATEX, 1	C0111F-300-PAO
		1/4" female ISO 228 thread	2	C0051F-300-4AO
			ATEX, 2	C0151F-300-4AO
	M12	Sub-base mounting	1	C0011F-300-PDO
			ATEX, 1	C0111F-300-PDO
		1/4" female ISO 228 thread	2	C0051F-300-4DO
-0,9...+1 bar	ISO 4400	Sub-base mounting	1	C0011F-301-PAO
			ATEX, 1	C0111F-301-PAO
		1/4" female ISO 228 thread	2	C0051F-301-4AO
			ATEX, 2	C0151F-301-4AO
	M12	Sub-base mounting	1	C0011F-301-PDO
			ATEX, 1	C0111F-301-PDO
		1/4" female ISO 228 thread	2	C0051F-301-4DO
			ATEX, 2	C0151F-301-4DO

1) Counter plug and installation screws within scope of delivery

2) Counter plug within scope of delivery

CONVERSION TABLE FOR PRESSURE UNITS

	Standard International Units					Technical Units					
	mbar	bar	Pa	kPa	MPa	mm WC	m WC	kp/cm ²	atm	Torr	psi
Standard International Units	mbar	•	100	0,1	0,0001	10,197	10,197 x 10 ⁻³	1,0197 x 10 ⁻³	0,98692 x 10 ⁻³	0,75006	14,504 x 10 ⁻³
	bar	1.000	100.000	100	0,1	10,197 x 10 ³	10,197	1,0197	0,9869	750,06	14,504
	Pa	0,01	•	0,001	0,000001	0,10197	0,10197 x 10 ⁻³	0,10197 x 10 ⁻⁶	9,8692 x 10 ⁻⁶	7,5006 x 10 ⁻³	0,14504 x 10 ⁻³
	kPa	10	1.000	•	0,001	0,10197 x 10 ³	0,10197	10,197 x 10 ⁻³	9,8692 x 10 ⁻³	7,5006	0,14504
	MPa	10.000	1.000.000	1.000	•	0,10197 x 10 ⁶	0,10197 x 10 ³	10,197	9,8692	7,5006 x 10 ³	0,14504 x 10 ³
Technical Units	mm WS	98,067 x 10 ⁻³	98,067 x 10 ⁻⁶	9,8067 x 10 ⁻³	9,8067 x 10 ⁻⁶	•	10 ⁻³	10 ⁻⁴	96,784 x 10 ⁻⁶	73,556 x 10 ⁻³	1,4223 x 10 ⁻³
	m WS	98,067	98,067 x 10 ⁻³	9,8067 x 10 ⁻³	9,8067 x 10 ⁻³	10 ³	•	10 ⁻¹	96,784 x 10 ⁻³	73,556	1,4223
	kp/cm ²	0,98067 x 10 ³	0,98067	98,067	98,067 x 10 ⁻³	10 ⁴	10	•	0,96784	735,56	14,223
	atm	1,0133 x 10 ³	0,10133 x 10 ³	0,10133 x 10 ³	0,10133	10,332 x 10 ³	10,332	1,0332	•	760	14,693
	Torr	1,3332	1,3332 x 10 ⁻³	0,10133 x 10 ³	0,13332 x 10 ⁻³	13,595	13,595 x 10 ⁻³	1,3595 x 10 ⁻³	1,3158 x 10 ⁻³	•	19,34 x 10 ⁻³
	psi	68,948	68,948 x 10 ⁻³	6,8948	6,8948 x 10 ⁻³	0,70307 x 10 ³	0,70307	0,70307 x 10 ³	0,70307 x 10 ⁻⁶	51,715	•

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

Company's name and address	contact person
	telephone, fax
inquiry no. / project no.	E-Mail
application	measured media
wetted parts material	housing material
media temperature T_{min} T_{max}	environmental temperatur T_{min} T_{max}
pressure load static: dynamic: from to	vacuum ☐ Yes ☐ No
special requirements	

Design pressure switch

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

PINTER Mess- und Regeltechnik GmbH
Kraichgaublick 17
Technologiepark Neckartal-Odenwald
74847 Obrigheim, Germany

Phone +49-6262-92670-0
Fax +49-6262-92670-99
E-Mail info@pinter-gmbh.de
Internet www.pinter-gmbh.com

All given information and/or technical data in this document have been prepared very carefully and reflect the state of the art when printed. Information and/or technical data may change without prior notice.

All given information and/or technical data in this document are not binding and for information purposes only. Binding information and/or technical data can be obtained from our quotations and/or order confirmations. Please understand that we cannot be held responsible for the correctness of any given information and/or technical data in this document.

When installing or maintaining PINTER products always refer to the corresponding operating manual and technical data sheet.

All mentioned product names, product designations, product descriptions and logos are trademarks and property of their respective owners. CHEMSEAL, DIMIO, INDUSSENS, INDUSWITCH, INTELLICOMB, MANOCOMB, MINICOMB are trademarks and/or registered trademarks of the PINTER Mess- und Regeltechnik GmbH and/or their affiliated companies in Germany, the European Union, Switzerland and/or other countries. The use of PINTER trademarks is prohibited if not clearly agreed otherwise.