

Product Catalogue

MANOCOMB®

Switches, Monitors and (Safety) Limiters
for Pressure, Vacuum and Differential Pressure

SIL

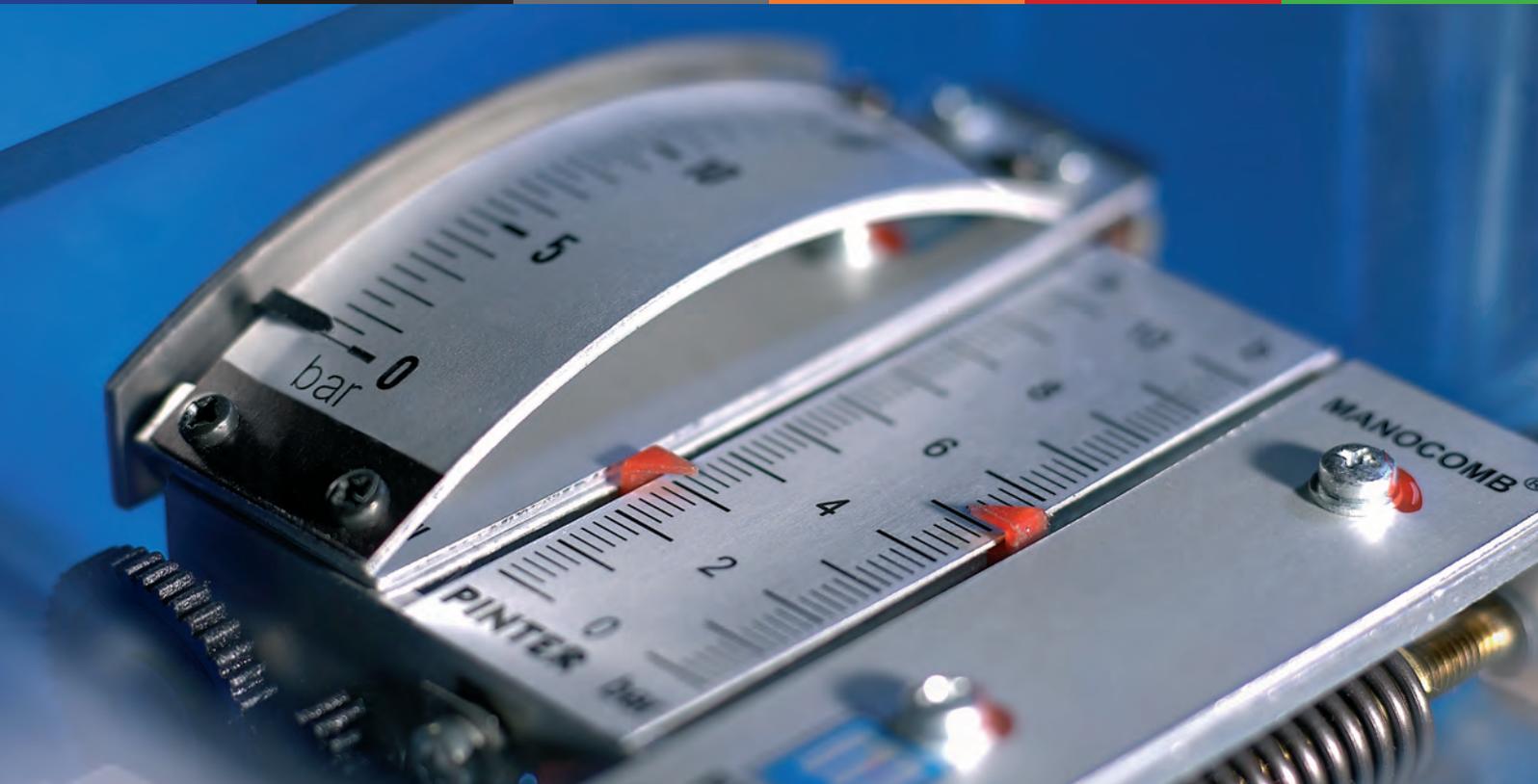
VdTÜV

PED

DVGW

ATEX

GOST



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.

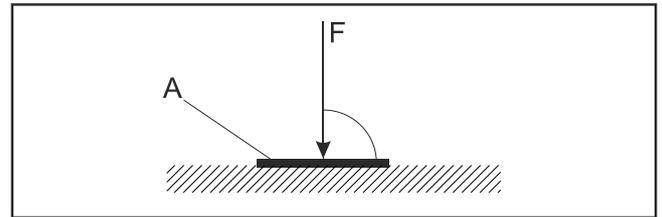
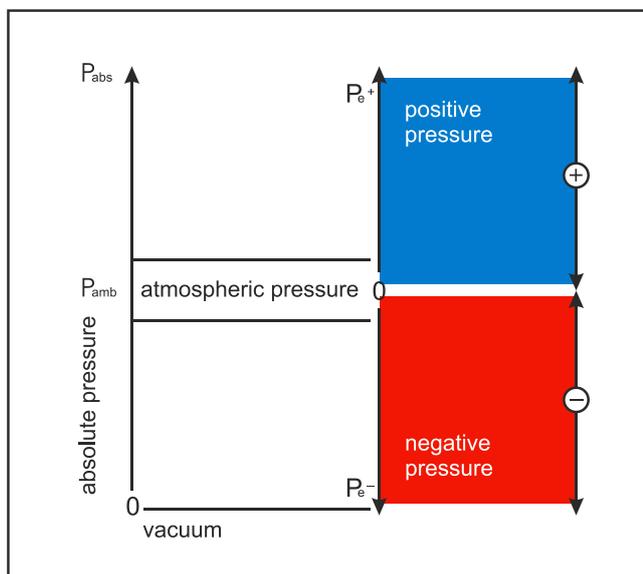
$$1 \text{ bar} = 0,1 \text{ MPa} = 0,1 \text{ N/m}^2 = 10^5 \text{ Pa}$$

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 ?

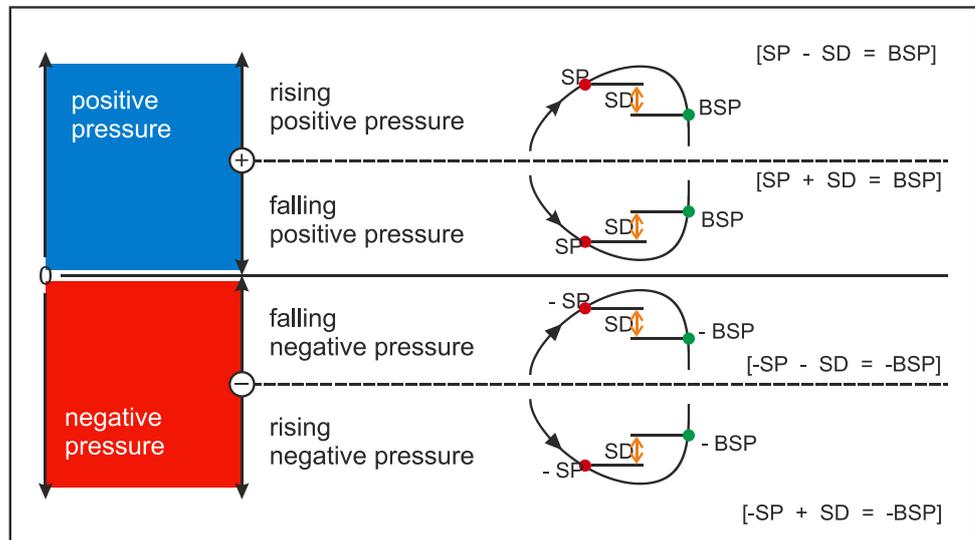
Pressure switches are signal elements, that can be used for measuring pressure in pressure lines for gases, vapours or liquids.

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 MANOCOMB® PRESSURE SWITCH ? Not only a pressure switch!

The MANOCOMB® pressure switch is a modular precision pressure instrument based on a force-balance measuring system, that actuates either one or two switching contacts.

rential pressure and vacuum ranges, process connections and electrical / pneumatic connections is available.

These switching contacts can be comfortably adjusted on a calibrated set value input scale (class 1.0). To protect adjusted setpoint from readjusting, a sealable version is available.

Optionally the MANOCOMB® precision pressure switch can be equipped with an integrated pressure gauge (actual value indicator, class 1.0) and/or integrated pressure transducer (analogue signal 4 - 20 mA or 0 - 10 V, 0,5% FS) inside the same housing.

Based on the modular system an enormous number of housing types, switching contact types, pressure, diffe-

This great variety qualifies the MANOCOMB® precision pressure switch for all measuring points and operating conditions.

The MANOCOMB® is also suitable for critical applications, e.g. as safety pressure limiter with internal interlock. Approvals cover SIL, VdTÜV leaflet 100, Pressure Equipment Directive, Gas Appliances Directive and/or ATEX.

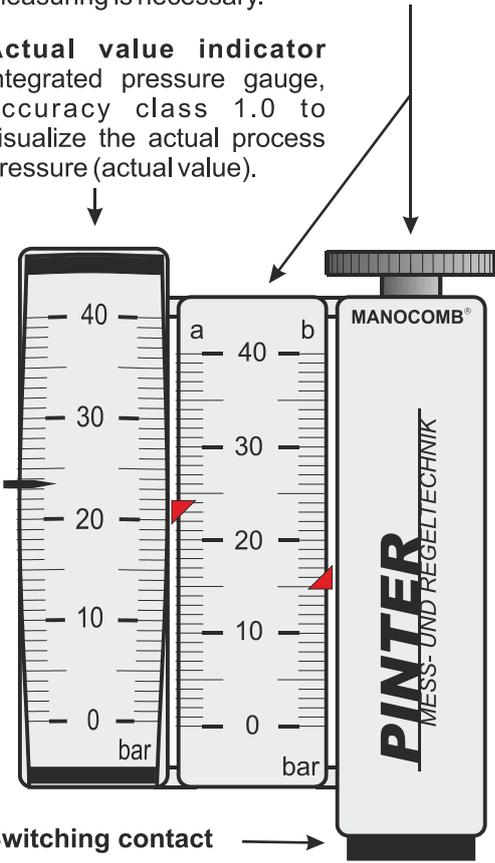
Discover more about the different models and options as well as its versatile utilization on the following pages.



ADVANTAGES OF MANOCOMB® PRECISION PRESSURE SWITCHES

Set point and set point adjustment
 Adjusting the set point(s) is done with a small cogwheel.
 The values are clearly visible on the calibrated set point scale (class 1.0)
 Due to this very precise possibility to adjust the set point, no tools or reference measuring is necessary.

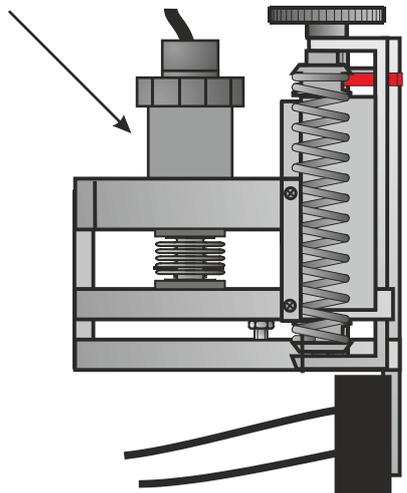
Actual value indicator
 integrated pressure gauge, accuracy class 1.0 to visualize the actual process pressure (actual value).



The diagram shows a vertical pressure switch with two scales. The left scale is labeled 'bar' and ranges from 0 to 40. The right scale is labeled 'bar' and also ranges from 0 to 40. A red arrow points to the set point on the right scale, which is marked with 'a' and 'b'. A small cogwheel is shown at the top of the switch, used for adjusting the set point. The brand name 'PINTER MESS- UND REGELTECHNIK' is visible on the side of the switch.

Switching contact

Pressure transducer
 The integrated pressure transducer (0,5% FS) transforms the actual value into a linear 4 - 20 mA or 0 - 10 V analogue signal, which itself can be utilized by e.g. PLC.



The cross-section diagram shows the internal components of the pressure transducer, including a bellows, a spring, and a piston mechanism. A red arrow points to the set point adjustment mechanism, which is a small cogwheel. The diagram illustrates how the pressure is transmitted through the bellows and spring to the piston, which then triggers the switching contact.

Differences between MANOCOMB® precision pressure switches and conventional pressure switches:

- high precision and extremely robust force-balance measuring system with bellows and calibrated spring. Without moving axes, turning motions, rotations, hinges or pistons the measuring systems works completely friction free!
- the measuring system is mounted free of tension or torsion in the housing!
- each switch contact has its own measurement system!
- very comfortable switching point adjustment with calibrated reference scale (class 1.0) without tools or reference instruments!
- large selection of switching contacts, for example micro switches, inductive contacts, air cutting contacts, pneumatic valves!
- optionally integrated pressure gauge (class 1.0)!
- optionally integrated pressure transmitter (analogue signal 4 - 20 mA or 0 - 10 V, 0.5% FS)!

Technical advantages of MANOCOMB® precision pressure switches ?

- The measuring system has no parts subject to wear and tear and is exceptionally precise:
 hysteresis: depending on contact approx. 0,5 - 3,5%
 repeatability: depending on contact approx. 0,03%
- virtually unlimited life span!
- insensitive to pressure surges, shock and vibration!
- the adjusted switching point is not affected by body tension!
- High accuracy. Each contact is adjustable independently over the entire measuring range (0 - 100%) and does not interfere with the other!

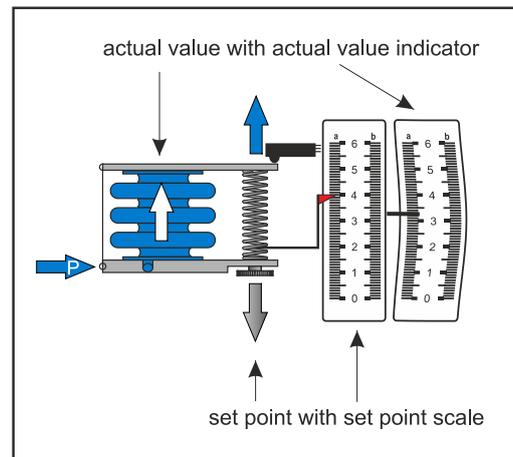
- For adjusting the switch point no reference instrument is needed. Settings can be comfortably made on-site without affecting safety. Adjusted values can be clearly read from the setpoint scale and compared to the actual pressure value!
- Large selection of switch contacts to optimize the control/switching performance, eg high switching capacity, intrinsically safe circuit, pneumatic output signal!
- Simplified installation arrangements by integrated instruments!

Economical advantages of MANOCOMB® precision pressure switches ?

- Lowest losses in uptime due to highly accurate set point adjustment!
- Compact design with small dimensions and simplified installation arrangements by integrating other instruments!
- Proven design without mechanical stress: you do not need any wear parts or spare parts!
- Exact reproducibility and long term stability, which saves you a lot of maintenance hours per year and corrections to the setting!

Which approvals features the MANOCOMB® precision pressure switch? (depending on model)

SIL	Safety Integrity Level (IEC 61508/61511) SIL 2 and SIL 3*
VdTÜV	VdTÜV-leaflet Druck 100 Pressure Monitor / Safety Pressure Limiter
PED	Pressure Equipment Directive 97/23/EG Modules B (type examination) and D (QA)
DVGW	Gas Appliances Directive 90/396/EEC, EN1854, DIN DVGW 3398 P3, P4
ATEX	ATEX-Directive 94/9/EC Zones 1 and 2 / Zones 21 and 22
GOST	GOST-R certification proof of conformity with Russian quality standards and regulations

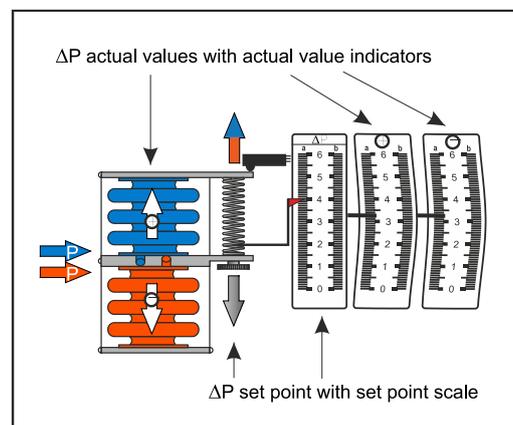


Force-balance measuring system

An adjustable tension or stress spring provides the set point.

The process pressure (actual value) acts on the bellows.

Once the actual value opposes the set point adjustment, force-balance-principle, a friction-free mounted lever triggers an electric or pneumatic switching contact.



Force-balance measuring system (ΔP)

An adjustable tension or stress spring provides the set point.

Two bellows working against each other build the differential pressure ΔP (actual differential value) from two process pressures (actual value).

Once the actual differential value opposes the set point adjustment, force-balance-principle, a friction-free double-lever triggers an electric or pneumatic switching contact.

PRODUCT MATRIX MANOCOMB® PRESSURE SWITCH

			
Model	MANOCOMB-IP65	MANOCOMB-IP65/CV	MANOCOMB-IP65/X...
Function	mech. Pressure Switch/Monitor/ Safety Pressure Limiter	mech. Safety Pressure Limiter with internal interlock	mech. ATEX- Pressure Switch/ Monitor/Safety Pressure Limiter
Media	Allfluid	Allfluid	Allfluid
Switch contacts	micro switch or inductive contact or pneumatic valve	micro switch	micro switch (IP65/XI) EExd-micro switch (IP65/XD) pneumatic valve (IP65/PN)
No. of contacts	1 or 2	1	1 or 2
Setpoint accuracy	≤ 1% FS	≤ 1% FS	≤ 1% FS
hysteresis	≤ 1% FS ¹	not applicable, manual reset	≤ 1% FS ¹
wetted parts	brass or stainless steel 1.4571 (316Ti)	brass or stainless steel 1.4571 (316Ti)	brass or stainless steel 1.4571 (316Ti)
Enclosure	offshore-compatible plastic housing or aluminum	offshore-compatible plastic housing or aluminum	offshore-compatible plastic housing or aluminum
Pressure Ranges	-1...0 bar ... -60...0 mbar; 0 - 60 mbar ... 0 - 400 bar	0 - 1 bar ... 0 - 400 bar	-1...0 bar ... -60...0 mbar; 0 - 60 mbar ... 0 - 400 bar
Overpressure Safety	at least 1,5x FS	at least 1,5x FS	at least 1,5x FS
Vacuum Safety	-1 bar	-1 bar	-1 bar
Process connection	BSP thread connection acc. to EN837 or NPT or pipe or flange or chemical seal	BSP thread connection acc. to EN837 or NPT or pipe or flange or chemical seal	BSP thread connection acc. to EN837 or NPT or pipe or flange or chemical seal
Electrical Connection	terminal blocks/cable gland or plug ISO4400 / M12 / Harting	terminal blocks/cable gland or plug ISO4400 / M12 / Harting	terminal blocks/cable gland or plug ISO4400 / M12 / Harting / cable (XD) / 1/4" BSP male (PN)
Protection	IP65	IP65	IP65 Zone 1 and 2 / 21 and 22
Approvals			
Options	• integrated gauge	• integrated gauge	• integrated gauge
Catalogue page	10	16	20 - 29

¹ refers to standard micro switch - see catalogue page for further information

			
Model	MANOCOMB-TM	MANOCOMB-IP54	MANOCOMB-96x96
Function	mech. Pressure Switch/Monitor/ Safety Pressure Limiter	mech. Pressure Switch	mech. Pressure Switch for panel mounting
Media	Allfluid	Allfluid	Allfluid
Switch contacts	micro switch and analogue output	micro switch or inductive contact or air gap contact	micro switch or inductive contact
No. of contacts	1 or 2 (+1 Analogue output)	1 or 2	1 or 2
Setpoint accuracy	≤ 1% FS (analogue output: ≤ 0,5% FS)	≤ 1% FS	≤ 1% FS
hysteresis	≤ 1% FS ¹	≤ 1% FS ¹	≤ 1% FS ¹
wetted parts	ceramics (Al ₂ O ₃) and brass or stainless steel 1.4571 (316Ti)	brass or stainless steel 1.4571 (316Ti)	brass or stainless steel 1.4571 (316Ti)
Enclosure	offshore-compatible plastic housing or aluminum	offshore-compatible plastic housing	steel sheet, black
Pressure Ranges	-1...0 bar; 0 - 1 bar ... 0 - 400 bar	-1...0 bar ... -60...0 mbar; 0 - 60 mbar ... 0 - 400 bar	-1...0 bar ... -60...0 mbar; 0 - 60 mbar ... 0 - 400 bar
Overpressure Safety	at least 1,5x FS	at least 1,5x FS	at least 1,5x FS
Vacuum Safety	-1 bar	-1 bar	-1 bar
Process connection	BSP thread connection acc. to EN837 or NPT or pipe or flange or chemical seal	BSP thread connection acc. to EN837 or NPT or pipe or flange or chemical seal	BSP thread connection acc. to EN837
Electrical Connection	plug ISO4400	cable or plug ISO4400 / M12 / Harting / 1/4" BSP male (with air gap contact)	terminal blocks
Protection	IP65	IP65	IP65 (front facing)
Approvals	  		
Options	• integrated gauge	• integrated gauge	• integrated gauge
Catalogue page	30	36	40

MANOCOMB® Precision Pressure Switch Model IP65



- friction-free force-balance measuring system
- very high repeatability
- extraordinary long-term stability
- measuring ranges from -1... 0 bar up to 0 - 400 bar
- comfortable setpoint adjustment on calibrated scale
- **optionally integrated pressure gauge**
- **approved as Pressure Monitor / Pressure Limiter**

Description

The MANOCOMB®-IP65 is a precision pressure switch for measuring pressure, differential pressure and vacuum of gaseous or liquid, also aggressive, crystallizing and highly viscous media.

Operating Principal

The operation is based on force-balance - per change-over contact a metal bellows is available, which is opposed by a precision spring with an adjustable force.

Once the process pressure overcomes the set force the change-over is triggered.

The contact adjustment is done by removing the cover and turning the thumb wheel to the desired set point.

The set point adjustment can be comfortably read from the set point scale. No reference instrument is needed.

The measuring system, which actuates the switching contact works friction-free, resulting in minimal wear. No maintenance or spare parts are needed!

Integrated Pressure Gauge

The optionally integrated pressure gauge (class 1.0) visualizes the actual process pressure right next to the set point indicator.

Approvals

SIL	Safety Integrity Level (IEC 61508/61511) SIL 2 and SIL 3*
VdTÜV	VdTÜV-leaflet Pressure 100 Pressure Monitor / Safety Pressure Limiter
DGR	Pressure Equipment Directive 97/23/EC Module B (test type approval) and D (QA)
DVGW	Gas Appliances Directive 90/396/EEC, EN1854, DIN DVGW 3398 P3, P4
GOST	GOST-R Certification Proof of Conformity with russian quality standards and regulations

* SIL2: as a single device
SIL3: in combination of 2 devices

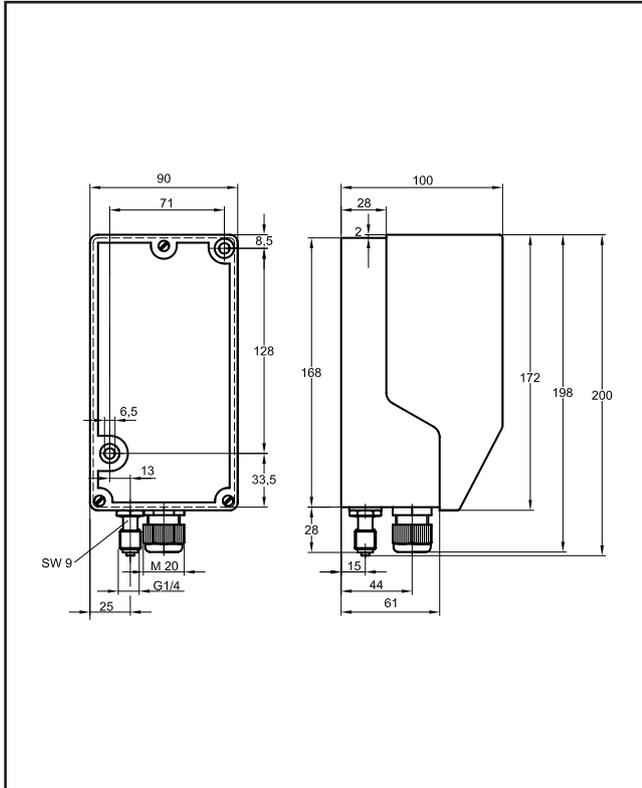
Switching Function	Description
1K	1x change-over contact
1KA	1x change-over contact, 1x integrated gauge
2K	2x change-over contact
2KA	2x change-over contact, 1x integrated gauge
2KP	2x change-over contact, separate measuring systems
2K2AP	2x change-over contact, separate measuring systems with 1x integrated gauge each
1KPDi	1x change-over contact, differential pressure
1K2APDi	1x change-over contact, differential pressure, 2x integrated gauge - 1x for + und - inlet

Technical Data	Standard	Option
Function	mechanical pressure switch; force-balance measuring systems with bellows sensor	
Life Cycle	at least 10 Mio switch cycles	
Low Pressure Ranges	0 - 60 mbar; 0 - 100 mbar; 0 - 160 mbar; 0 - 250 mbar; 0 - 400 mbar; 0 - 600 mbar	
Pressure Ranges	0 - 1 bar; 0 - 1,6 bar; 0 - 2,5 bar; 0 - 4 bar; 0 - 6 bar; 0 - 10 bar; 0 - 16 bar; 0 - 25 bar; 0 - 40 bar; 0 - 60 bar	
High Pressure Ranges	0 - 100 bar; 0 - 160 bar; 0 - 250 bar; 0 - 400 bar	
Vacuum Ranges	-1...0 bar; -600...0 mbar; -400...0 mbar; -250...0 mbar; -160...0 mbar; -100...0 mbar; -60...0 mbar	
Over Pressure Safety	1,5x FS	
Vacuum Safety	-1 bar	
Housing Material	enhanced plastics with transparent cover	
Wetted Parts Material	brass	Stainless Steel 1.4571 (AISI 316Ti)
Permissible Media Temperature	-20...+80°C (+130°C in stainless steel version)	
Permissible Ambient Temperature	-20...+80°C	
Temperature Deviation	approx. 1% per 20°C	
Adjustment Temperature	20°C	on request
Switching Contact	1 or 2 switching contacts (SPDT) - for details see switching contacts overview	
Contact Adjustment Accuracy	≤ 1,0% FS	
Switching Differential (Hysteresis)	see switching contacts overview	
Repeatability	≤ 0,5% FS	
Accuracy of integrated Gauge	Class 1.0 (available for pressure range -1...0 bar / 0 - 1 bar...0 - 250 bar)	
Process Connection	1/4" BSP male (EN837)	1/2" BSP male (EN 837); others on request
Electrical Connection	M20 cable gland; terminal blocks inside housing for cable 2,5mm ²	ISO 4400 plug; Harting HAN7D/8U plug
Weight	approx. 1.5 kg (depending on switching function)	
Protection	IP65	
Other Options		
Scales in different units (e.g. MPa, kPa, psi, etc.); Dual Scale; Customer specific Scales		
silicone free version; version for O2 service		

DIMENSIONS

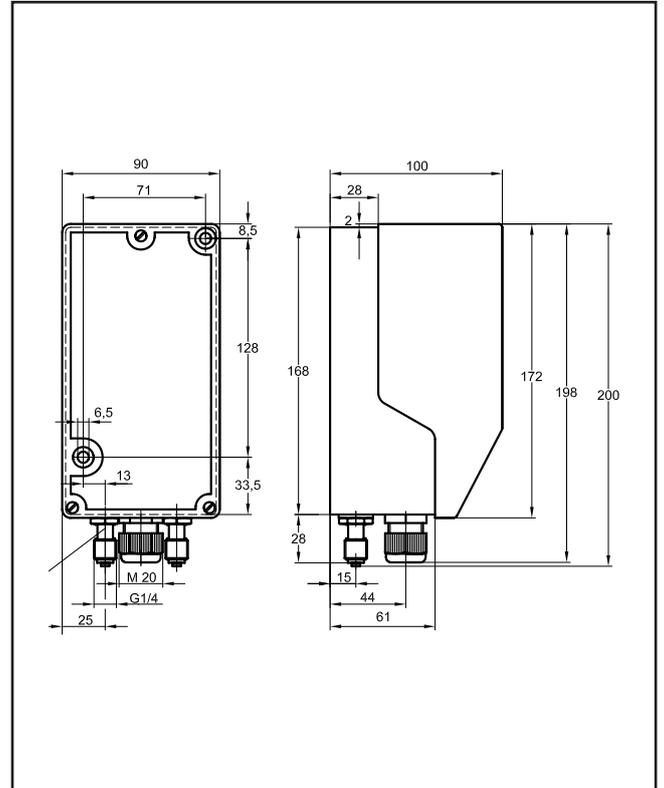
MANOCOMB-IP65

Standard Version (1K, 1KA, 2K, 2KA)



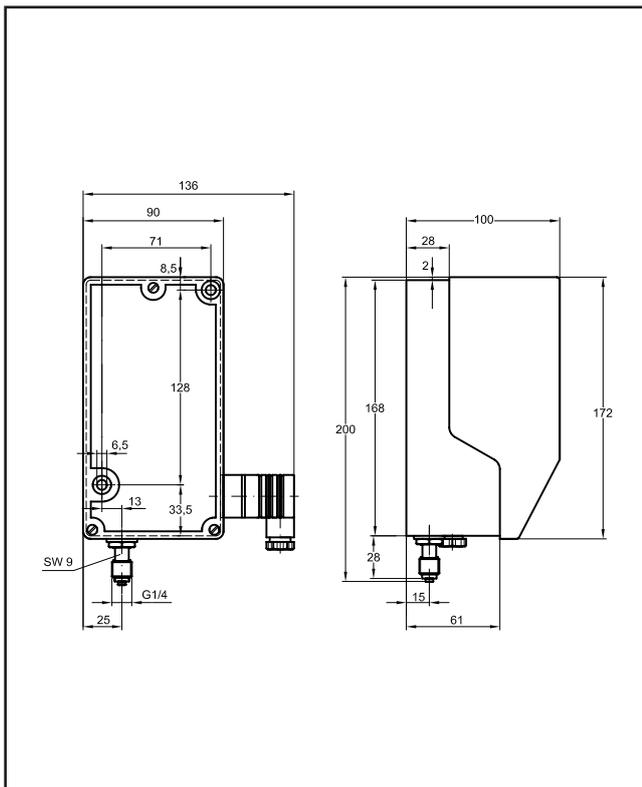
MANOCOMB-IP65

Standard Version (2KP, 2K2AP, 1KPDi, 1K2APDi)



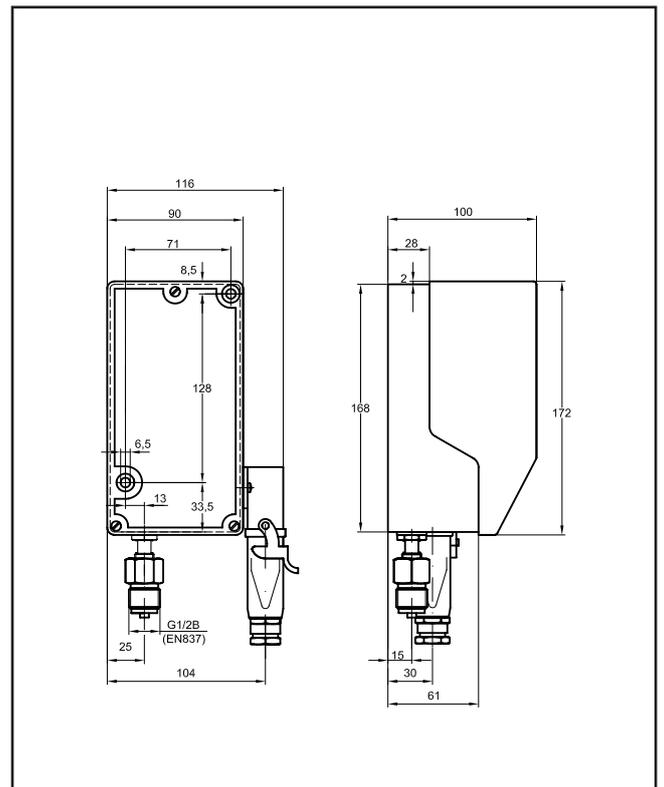
MANOCOMB-IP65

with ISO 4400 (DIN 43650) plug



MANOCOMB-IP65

process connection 1/2" BSP male and Harting plug



SWITCHING CONTACTS

Micro Switches

Type		24V	48V	110V	240V	SD ¹
Standard	A (AC)	5	5	5	5	≤ 1,0 %
	A (DC)	1	0,5	-	-	
MG ²	A (AC)	1	1	1	-	≤ 1,5 %
	A (DC)	1	0,5	0,2	-	
MH	A (AC)	5	5	5	5	≤ 1,5 %
	A (DC)	1	0,5	-	-	
CS	A (AC)	5	5	5	5	≤ 2,0 %
	A (DC)	5	2	0,4	0,2	
CH	A (AC)	12	12	10	10	≤ 2,0 %
	A (DC)	10	2	0,4	0,2	
CZ ³	A (AC)	5	5	5	5	≤ 2,0 %
	A (DC)	5	2	0,4	0,2	

Inductive Contacts

Type	Function	Output polarity	SD ¹
I-N	NAMUR NC	NAMUR	≤ 1,0 %
I-SN	NAMUR NC	safety function	≤ 1,0 %
I-S1N	NAMUR NO	safety function	≤ 1,0 %

¹ typical switching differential (hysteresis) from 1 - 250 bar; Deviation in % of FS

² micro switch with gold-plated contacts

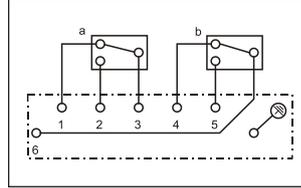
³ micro switch with forced circuit opening

ELECTRICAL CONNECTION¹

shown in zero pressure condition

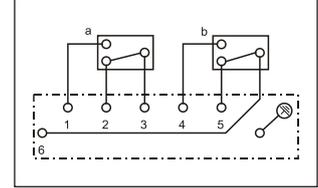
Terminal Blocks

Pressure, Differential P.



Terminal Blocks

Vacuum



¹ standard wiring - customer specific wiring on request

PRESSURE LIMITER

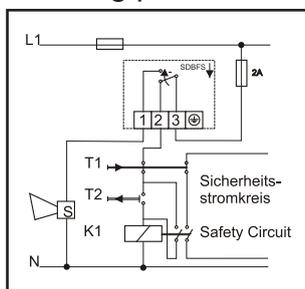
External interlock

When used as a pressure limiter acc. to Vd-TÜV leaflet Pressure 100/1 the switch condition must be locked once the the pressure rises beyond the adjusted setpoint.

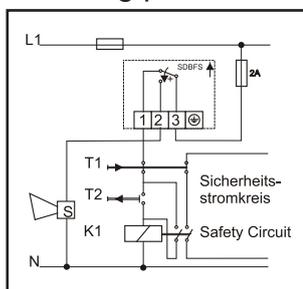
Before unlocking the interlock the reason for the pressure rise must be clarified and corrected.

Recommondations for an external interlock in a control cabinet or PLC:

interlock on rising pressure



interlock on falling pressure



PRESSURE LIMITER

Internal interlock

Pressure limiters with internal interlock feature an integrated interlock.

With a manual reset on the device the interlock is re-opened

An external interlock is not necessary.

For pressure limiters with internal interlock please see MANOCOMB-IP65/CV on page 22.

EXAMPLE CONFIGURATIONS

(pictures may show options)

MANOCOMB-IP65 0 - 10 bar
with ISO 4400 (DIN 43650) plug



MANOCOMB-IP65 0 - 10 bar
with Harting plug H8U + Diaphragm Seal Type FT



ORDER CODES

(with most common options)

Order Code		M	0	x	x	x	x	-	x	(x)	-	x	x	x
Approvals	Standard			0										
	PED, TÜV, SIL, DVGW, GOST			1										
Switching Function	1K				0									
	1KA				1									
	2K				2									
	2KA				3									
	2KP				4									
	2K2AP				5									
	1KPDi				7									
	1K2APDi				8									
Material	brass													1
	Stainless Steel 1.4571 (AISI 316Ti)													2
Switching Contact	Standard													A
	MG													B
	MH													C
	CS													H
	CH													G
	CZ													3
	I-N													J
	I-SN													K
	I-S1N													W
Pressure Range	-1...0 bar													006
	-60...0 mbar													000
	0 - 60 mbar													010
	0 - 100 mbar													011
	0 - 160 mbar													012
	0 - 250 mbar													013
	0 - 400 mbar													014
	0 - 600 mbar													015
	0 - 1 bar													020
	0 - 1,6 bar													022
	0 - 2,5 bar													023
	0 - 4 bar													024
	0 - 6 bar													025
	0 - 10 bar													026
	0 - 16 bar													027
	0 - 25 bar													028
	0 - 40 bar													029
	0 - 60 bar													030
	0 - 100 bar													031
	0 - 160 bar													032
0 - 250 bar													033	
0 - 400 bar													035	
2. Pressure Range	differential pressure range or 2. pressure range on switching function 2K(2A)P codes as above; leave empty on other models													
Process Connection	G 1/4 B, brass													A
	G 1/4 B, Stainless Steel 1.4571 (AISI 316Ti)													B
	G 1/2 B, brass													C
	G 1/2 B, Stainless Steel 1.4571 (AISI 316Ti)													D
Electr. Connection	M20 cable gland; terminal blocks													A
	ISO 4400 plug													B
	Harting HAN7D plug													X
	Harting HAN8U plug													Z
Further Options	no further options													O
	cleaned for O2 service													A
	cover lead-sealable													W

PINTER • PRODUCTS • PRACTISE
MANOCOMB-TM special version
 with overpressure safety valve

MANOCOMB-IP65
 with Harting plug H8U + chemical seal CHEMSEAL® Type FT

MANOCOMB-IP65
 Pressure Monitor and Safety Pressure Limiter (with manual reset)

MANOCOMB-IP65
 chemical seal CHEMSEAL® Type MT


MANOCOMB with pneumatic switch contacts

special design for 3-way redundant monitoring



Special version of the MANOCOMB® pressure switch as the maximum pressure limiter with pneumatic switch contacts for safety valve control devices.

These control devices are used to control spring-loaded safety valves with a pneumatic drive for loading and lifting air.

The controller operates according to the principle of quiescent with the external medium air. The associated safety valves operate on the principle of relief.

Safety valves are used to protect the system against excessive pressure by a very large discharge capacity and controlled opening in the sliding operation; in power plant operation as well as for processes in the chemical and petrochemical industry.

For more information about this design, please contact our sales team.

MANOCOMB-IP65/PN

MIN and MAX monitoring of the process pressure



MANOCOMB® pressure switches in pneumatic version for monitoring of MIN and MAX switching points in pneumatic „safety device for natural gas production“

The MIN and MAX switching points are adjustable from 0 to 160 bar and monitor the stable supply of the gas pipeline. The built-in pressure gauge shows the current process pressure.

For additional security, a second MANOCOMB® pressure switch both indicates and monitors the control air supply.

Read more about this version and the safety equipment in our ENGINEERING REPORT „safety device for natural gas production“ or contact our sales team.

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	•	0,001	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	0,00001	•	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	0,01	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	10	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	9,8067 x 10 ⁻³	9,8067 x 10 ⁻⁶	•	10 ⁻³	10 ⁻¹	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	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 x 10 ³	98,067	98,067 x 10 ⁻³	10 ⁴	10	•	0,96784	735,56	14,223
	atm	1,0133 x 10 ³	1,0133	0,10133 x 10 ⁵	0,10133 x 10 ⁵	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	0,10133	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 x 10 ⁷	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 <input type="checkbox"/> Yes <input type="checkbox"/> No
special requirements	

Design pressure switch

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

PINTER Mess- und Regeltechnik GmbH
Kraichgaublick 17
Technologiapark 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, INDUSENS, 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.