

# Product Catalogue

## **MANOCOMB®**

**Precision Pressure Switch**  
**Differential Pressure Switch**  
**Pressure Monitor**  
**Safety Pressure Limiter**



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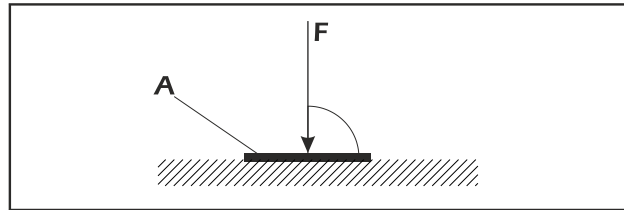
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**Definition of pressure**

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

$$p = F / A$$

**(pressure = force / area)**

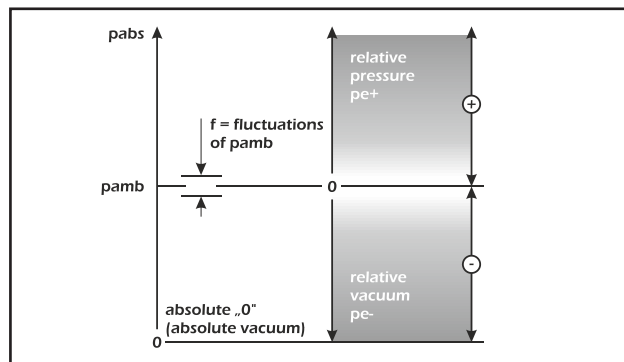


Pressure (p) besides temperature is one of the most frequently measured physical units. The unit „Pascal“ (Pa) is the SI unit of pressure within the metric unit system. In Europe „bar“ is the most commonly used (SI) unit. It roughly equals with the magnitude of the atmospheric pressure: **1 bar = 0,1 MPa = 0,1 N/m<sup>2</sup> = 10<sup>5</sup> 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 explicitly clear!**

In technical communication different types of pressure are used, which in general linguistic are all called pressure. To avoid misunderstandings, the different types of pressure are differentiated by their reference point:



Designation	Abbreviation	Description
absolute pressure	pabs	pressure above absolute „0“, i.e. absolute vacuum
ambient pressure	pamb	ambient pressure corresponds to the atmospheric pressure
relative pressure	pe	pressure (pe+) or vacuum (pe-) relative to atmospheric pressure
differential pressure	dp (also Δp)	differential pressure between two measured pressures: dp = p1 - p2

**Other useful information about pressure**

Designation	Description
atmospheric pressure	the mean atmospheric pressure of the Earth’s at sea level is 1013.25 hPa (= 1,01325 bar)
atmospheric pressure fluctuation	influenced by i.a. distance to sea level and weather conditions, the atmospheric pressure fluctuates. Examples: 100 m below sea level the atmospheric pressure is around 1026,3 hPa 100 m above sea level the atmospheric pressure is around 1000,3 hPa



In this document, all product related information about pressure, such as pressure ranges always refer to relative pressure, unless not clearly marked differently. Even though we use the metric system (e.g. units mbar and bar) throughout most of our documents, all pressure instruments are available with scales in most internationally common units.

**Definition of pressure monitoring / set point / re-set point / hysteresis**

Designation	Abbreviation	Description
set point	SP	value when the pressure switch triggers its switching contact(s)
reset point	RP	value when the pressure switch resets its switching contact(s)
switching differential (hysteresis)	SD	inaccuracy due to components' tolerances

**Designation Description**

<p>Maximum Pressure Monitoring</p> <p>Maximum pressure monitoring is used to protect e.g. steam boilers from too high pressure.</p> <p>The pressure switch switches once the adjusted set-point (SP) is reached. The reset point (RP) is lower by the amount of the switching differential (SD - also called hysteresis).</p>	
<p>Minimum Pressure Monitoring</p> <p>Minimum pressure monitoring is used to e.g. make sure that a minimum amount of pressure is available.</p> <p>The pressure switch switches once the adjusted set-point (SP) is reached. The reset point (RP) is higher by the amount of the switching differential (SD - also called hysteresis).</p>	
<p>Maximum Vacuum Monitoring</p> <p>Maximum vacuum monitoring is used to protect e.g. vessels from excessive vacuum.</p> <p>The pressure switch switches once the adjusted set-point (SP) is reached. The reset point (RP) is lower by the amount of the switching differential (SD - also called hysteresis).</p>	
<p>Minimum Vacuum Monitoring</p> <p>Minimum vacuum monitoring is used to e.g. make sure that a minimum vacuum is available.</p> <p>The pressure switch switches once the adjusted set-point (SP) is reached. The reset point (RP) is higher by the amount of the switching differential (SD - also called hysteresis).</p>	



In general all our mechanical pressure switches can be used for maximum or minimum pressure monitoring - or even both on our models with 2 switching contacts. Only exception is our range of safety pressure limiters with internal interlock, where maximum or minimum pressure is preset by the type of construction.

**The MANOCOMB® - General description**

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

These switching contacts can be easily and comfortably adjusted on a calibrated set point scale (class 1.0). For set point protection against unwanted changes it is possible to lead-seal each setting.

Optionally the MANOCOMB® Precision Pressure Switch can be equipped with additional integrated pressure gauge (actual value indicator, class 1.0) and/or pressure transmitter (analogue signal 4 - 20 mA or 0 - 10 V, 0.5% FS).

Due to the modular design, a variety of enclosure variants, switching contact types, pressure and differential pressure measuring ranges, process connections and electrical or pneumatic connection variants are available.

These versatile possibilities qualify the MANOCOMB® Precision Pressure Switch for almost every measuring point and operating condition.

Also safety critical pressure monitoring is covered. Depending on model and/or configuration, the MANOCOMB® Precision Pressure Switch features following approvals:

- Safety Integrity Level (IEC 61508/61511): SIL2 / SIL3
- VdTÜV leaflet Druck 100
- DIN EN 12952-11
- DIN EN 12953-9
- Pressure Equipment Directive 2014/68/EU Kategorie IV
- ATEX-Directive 2014/34/EU: Zone 1/21 and/or 2/22



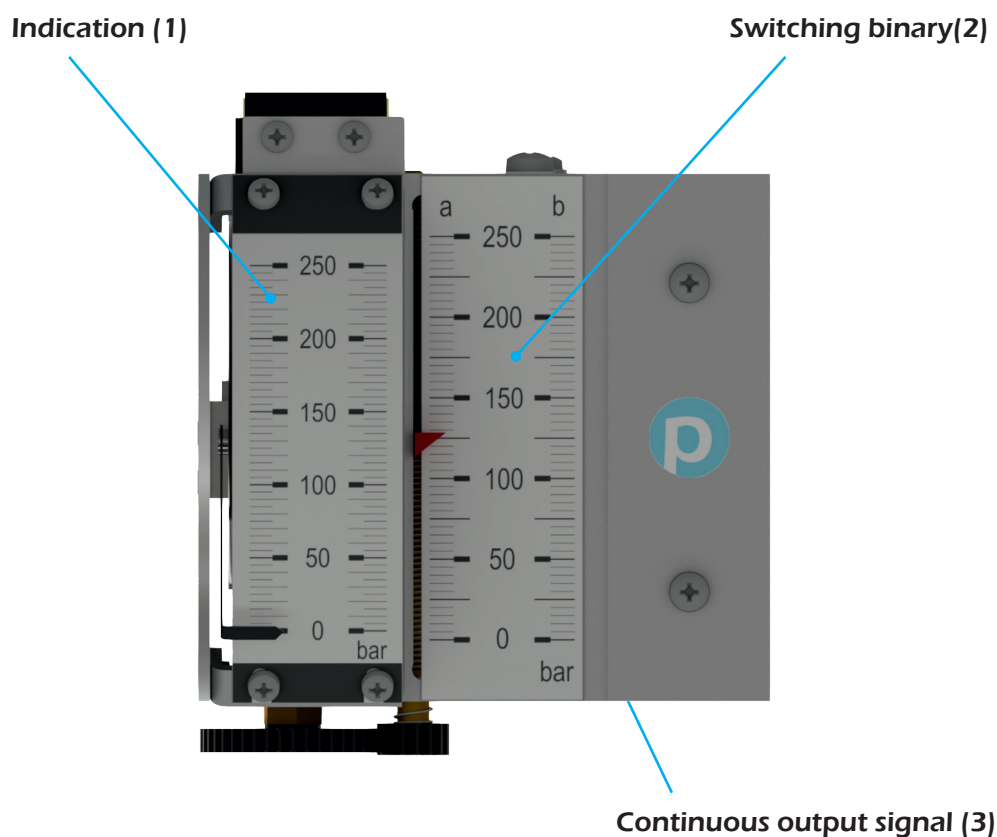
If the standard versions do not meet your requirements, cost-efficient tailor-made solutions can be developed at short hand.



### The MANOCOMB® - Functions

Besides to the usual function of a pressure switch, to transmit an electrical or pneumatic signal at a certain set value, the MANOCOMB® has further functions.

In summary, the MANOCOMB® is a multifunction pressure instrument with the following functions:



#### Indication (1)

the optional "actual value indicator" is an integrated pressure gauge with accuracy class 1.0, that visualizes the actual system pressure.

#### Switching binary (2)

choose from one or two electric or pneumatic (or combined) switching contacts that suit your requirements.

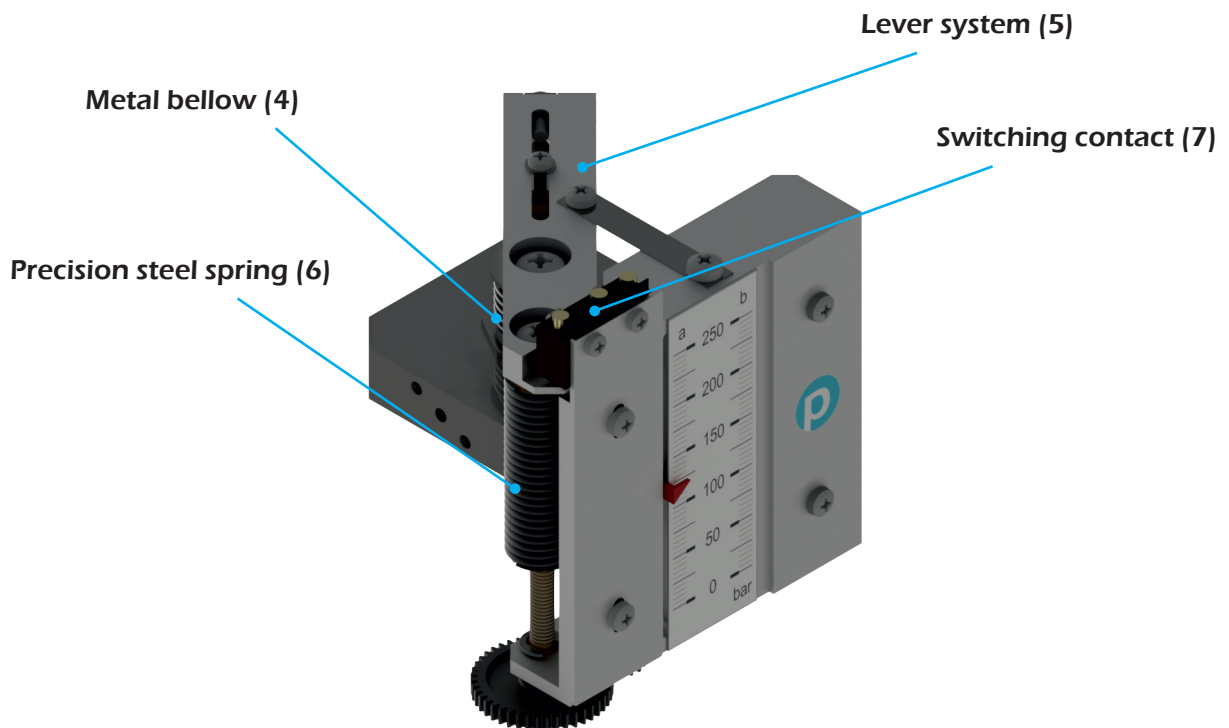
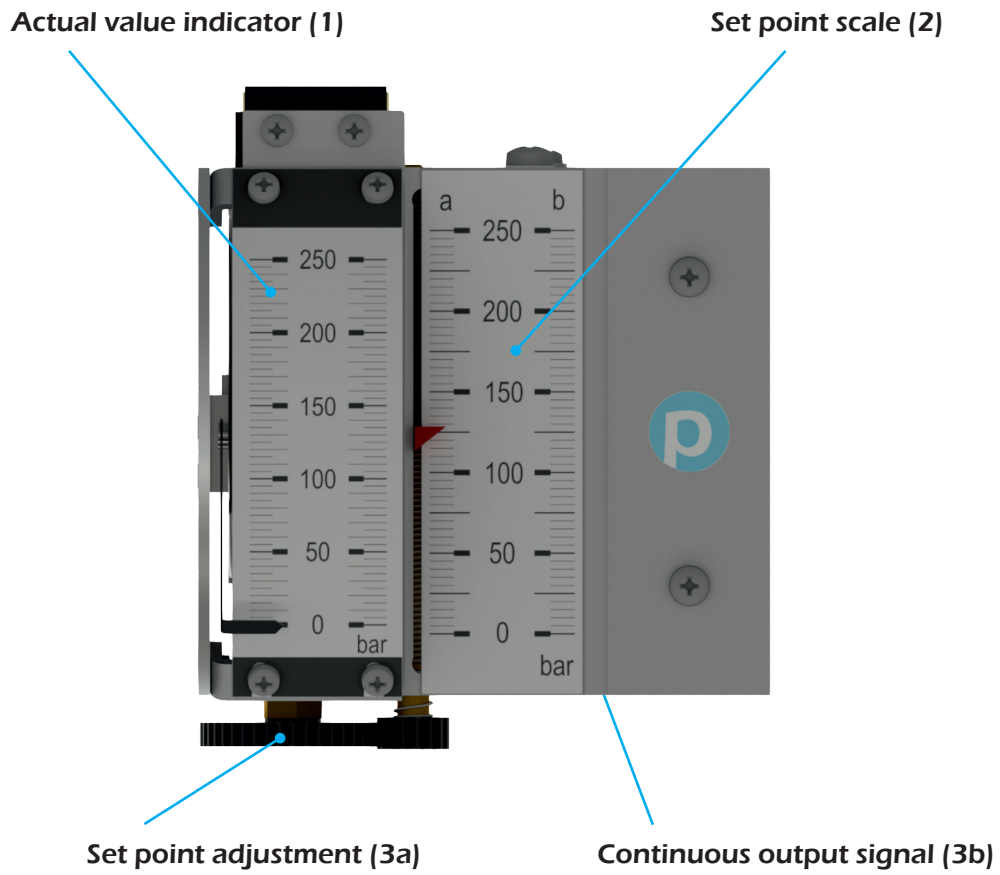
#### Continuous output signal (3)

the optionally integrated pressure transmitter provides a continuous electrical signal proportional to the system pressure.



With the unique modular design of the MANOCOMB® Precision Pressure Switch it's easy to have a pressure instrument featuring e.g. both an electrical switching contact as well as a pneumatic switching contact, analogue output and also pressure gauge integrated in one handy instrument.

**The MANOCOMB® - Technical design and operating principle**





## The MANOCOMB® - Technical design and operating principle

### **Actual value indicator (1)**

optionally integrated pressure gauge with accuracy class 1.0 to visualize the actual system pressure. Corresponds to the technical design of a P1 series bourdon tube pressure gauge.

### **Set point scale (2)**

the setpoint scale is used to adjust the set point. The red pointer shows the currently adjusted set point. In general no reference measuring device or tool is required for the setting.

### **Set point adjustment (3a)**

the set point adjustment is made without tools - also while in operation - via the setting gear and can be read on the setpoint scale.

For set point protection against unwanted changes it is possible to lead-seal each setting (optional).

### **Continuous output signal (3)**

optionally integrated pressure transmitter to provide a continuous electrical signal proportional to the system pressure.

Corresponds to the technical design of a INDUSENS®-100 series pressure transmitter.

### **Measuring system**

The measuring system has no wearing parts, is extremely precise, insensitive to pressure surges, shocks as well as vibration and has an almost unlimited life span.

#### **Metal bellow (4)**

via the process connection the medium flows into the metal bellow.

As a result of the pressure applied, the bellow expands in a defined manner - the higher the pressure, the greater the lifting movement of the bellow.

#### **Lever system (5)**

The lever system reverses the lifting movements of the metal bellows.

The precision spring counteracts the lever system.

#### **Precision steel spring (6)**

The precision spring is designed according to the pressure range and the bellows used.

By means of the precision spring, an adjustable force is set against the bellow/lever system; this corresponds to the set point adjustment.

#### **Switching contact (7)**

once the pressure applied on the metal bellow reaches or exceeds the set point set adjusted via the precision spring, the switching contact is triggered via the lever system.

The large selection of switching contacts offers a variety of options for optimizing the control or switching task, e.g. high electrical switch load capacity, intrinsically safe circuit, pneumatic output signal.

**The MANOCOMB® - Product Overview / Selection Matrix**

Model	MANOCOMB®	IP65	IP65/CV	IP65/XI	IP65/XD	IP65/PN
Pressure Ranges	Vacuum	•		•	•	•
Pressure Ranges	Pressure ≥ 60 mbar	•				
Pressure Ranges	Pressure ≥ 1 bar	•	•	•	•	•
Pressure Ranges	Pressure ≥ 60 bar	•	•	•	•	•
Pressure Ranges	Differential Pressure	•		•	•	•
wetted parts	brass, FKM	•	•	•	•	•
wetted parts	stainless steel, FKM	•	•	•	•	•
wetted parts	stainless steel, w/o gasket	•	•	•	•	•
wetted parts	brass, FKM, Al2O3					
wetted parts	stainless steel, FKM, Al2O3					
Material enclosure	off-shore suitable plastics	•	•	•	•	•
Material enclosure	aluminium	•	•	•	•	•
Material enclosure	stainless steel	•	•	•	•	•
Material enclosure	sheet steel					
Switching contact	quantity	1 or 2	1	1 or 2	1 or 2	1 or 2
Switching contact	micro switch	•	•	•	•	
Switching contact	inductive contact	•		•		
Switching contact	micro switch, Ex d				•	
Switching contact	3/2-way valve, pneumatic					•
Switching contact	air gap contact, pneumatic					
Analogue output	4 - 20 mA or 0 - 10 V					
actual value indicator	integrated pressure gauge	•	•	•	•	•
Process connection	threaded connection	•	•	•	•	•
Electrical connection	terminal blocks	•	•	•		
Electrical connection	plug connector	•				
Electrical connection	cable	•	•		•	
Pneumatic connection	quick plug hose connector					•
Protection	IP65	•	•	•	•	•
Temperature range	-20...+85°C	•	•	•	•	•
Temperature range	-20...+130°C	•	•	•	•	•
Weight	[kg]	1,0 - 1,5	1,0 - 1,5	1,0 - 1,5	1,0 - 1,5	1,0 - 1,5
Specialties	Switch State Interlock	external	internal	external	external	external
Specialties	cleaned for O2 service	•	•	•	•	•
Specialties	nonferrous metal free	•	•	•	•	•
Specialties	OEM-Version	•	•	•	•	•
Approvals	Pressure Equipment Directive	•	•	•	•	•
Approvals	VdTÜV leaflet Druck 100	•	•	•	•	•
Approvals	DIN EN 12952-11 / 12953-9	•	•	•	•	•
Approvals	ATEX-Directive			•	•	•
Approvals	SIL2 / SIL3	•	•	•		
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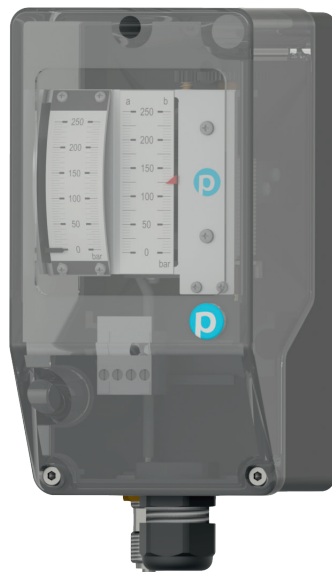


this Product Overview / Selection Matrix shows most common variants and options. Options are listed that are not combinable or mutually exclusive or require other options. Options you might be looking for, may not be listed. For details on possible configurations and options, please refer to the model-specific catalogue pages or contact our sales team for support.

TM	IP54	IP54/L	96x96	MANOCOMB®	Model
•	•	•	•	Vacuum	Pressure Ranges
	•	•	•	Pressure ≥ 10 mbar	Pressure Ranges
•	•	•	•	Pressure ≥ 1 bar	Pressure Ranges
•	•	•	•	Pressure ≥ 60 bar	Pressure Ranges
	•	•	•	Differential Pressure	Pressure Ranges
	•	•	•	brass, FKM	wetted parts
	•	•	•	stainless steel, FKM	wetted parts
	•	•	•	stainless steel, w/o gasket	wetted parts
•				brass, FKM, Al2O3	wetted parts
•				stainless steel, FKM, Al2O3	wetted parts
•	•	•		off-shore suitable plastics	Material enclosure
				aluminium	Material enclosure
•				stainless steel	Material enclosure
			•	sheet steel	Material enclosure
1 or 2	1 or 2	1 or 2	1 or 2	quantity	Switching contact
•	•	•	•	micro switch	Switching contact
	•		•	inductive contact	Switching contact
				micro switch, Ex d	Switching contact
				3/2-way valve, pneumatic	Switching contact
		•		air gap contact, pneumatic	Switching contact
•				4 - 20 mA or 0 - 10 V	Analogue output
•	•	•	•	integrated pressure gauge	actual value indicator
•	•	•	•	threaded connection	Process connection
			•	terminal blocks	Electrical connection
•	•			plug connector	Electrical connection
	•			cable	Electrical connection
		•		quick plug hose connector	Pneumatic connection
•	•	•	•	IP65	Protection
•	•	•	•	-20...+85°C	Temperature range
•				-20...+130°C	Temperature range
1,0 - 1,5	1,0 - 1,5	1,0 - 1,5	1,0 - 1,5	[kg]	Weight
				Switch State Interlock	Specialties
•	•	•	•	cleaned for O2 service	Specialties
	•	•		nonferrous metal free	Specialties
•	•	•	•	OEM-Version	Specialties
				Pressure Equipment Directive	Approvals
				VdTÜV leaflet Druck 100	Approvals
				DIN EN 12952-11 / 12953-9	Approvals
				ATEX-Directive	Approvals
				SIL2 / SIL3	Approvals
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\* please contact our sales team for information

**MANOCOMB® Precision Pressure Switch Model IP65**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with 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/or vacuum of gaseous and liquid, also crystallizing or highly viscous media.

**operating principle**

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.

**approvals**

Safety Integrity Level (IEC61508/61511): SIL2 / SIL3  
 VdTUV leaflet Druck 100  
 DIN EN 12952-11  
 DIN EN 12953-9  
 Pressure Equipment Directive 2014/68/EU Category IV

### switching function

1K	1x SPDT
1KA	1x SPDT, 1x integrated pressure gauge
2K	2x SPDT
2KA	2x SPDT, 1x integrated pressure gauge
2KP	2x SPDT, separate measuring systems
2K2AP	2x SPDT, separate measuring systems with 1x integrated pressure gauge each
1KPDi	1x SPDT, differential pressure
1K2APDi	1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet

### technical data

### standard version

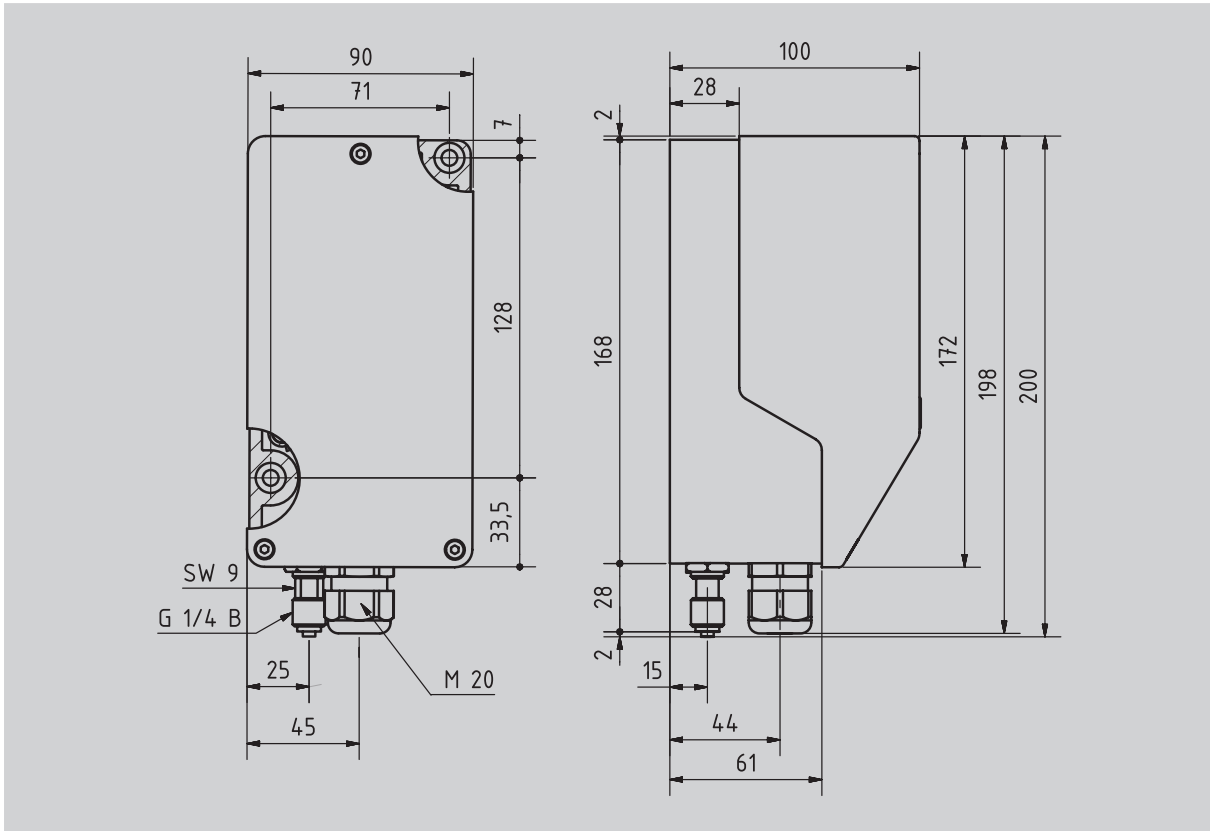
function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
low pressure ranges	0 - 60 mbar to 0 - 600 mbar
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar (requires wetted parts in stainless steel)
differential pressure	max. ration between static and differential pressure 10:1
vacuum ranges	-1...0 bar to -60...0 mbar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 switching contacts (for details please see electrical data)
adjustment accuracy	≤ 1,0% FS
switching accuracy	please see electrical data
repeatability	≤ 0,5% FS
switching differential (hysteresis)	please see electrical data
process connection	1/4" BSP male (EN837)
electrical connection	terminal blocks & M20 cable gland
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP65

### options & accessories

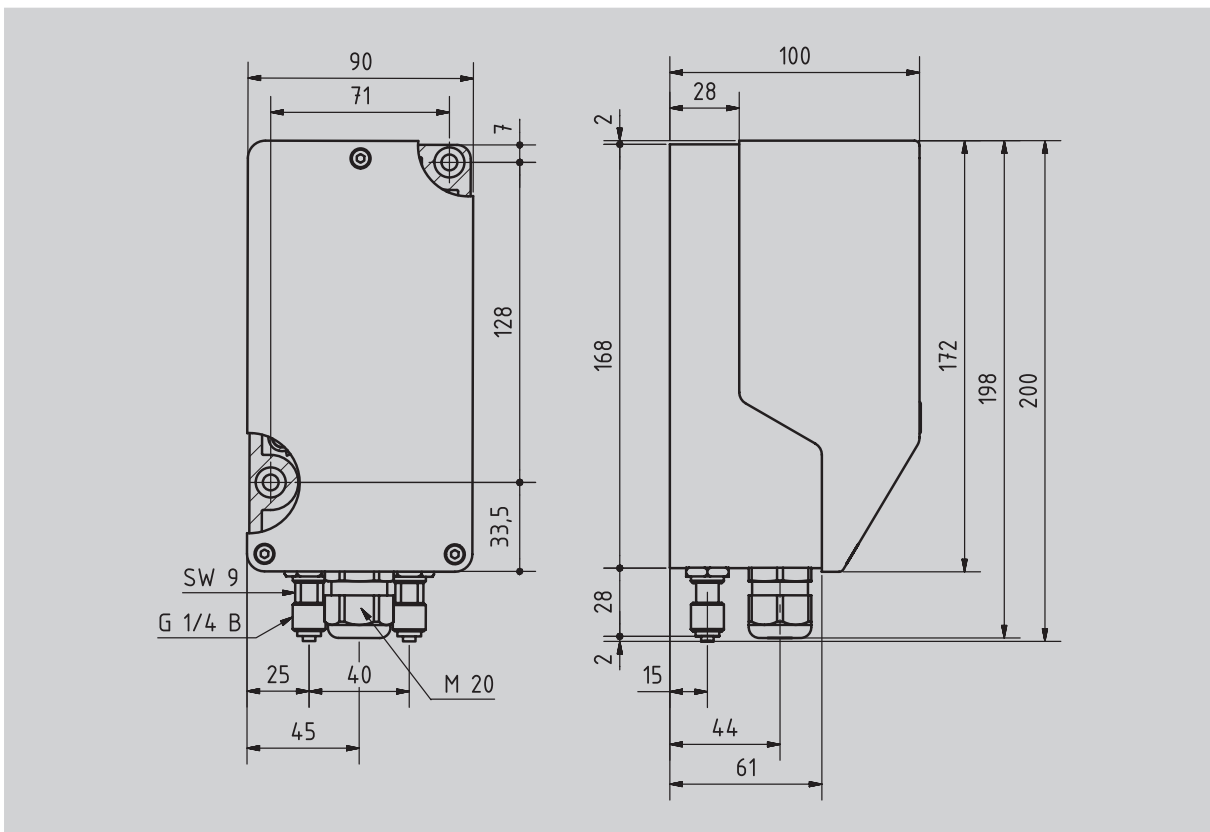
customer specific versions
special scales and units; extended overpressure safety
aluminium enclosure; stainless steel enclosure
special materials; cleaned for O2 service; nonferrous metal free version
process connection: all common threads; pipe fittings; flanges
electrical connection: ISO 4400 plug; M12 plug; Harting plug
accessories: see catalogue "accessories"

**Dimensions**

**Standard version(1K,1KA, 2K, 2KA)**



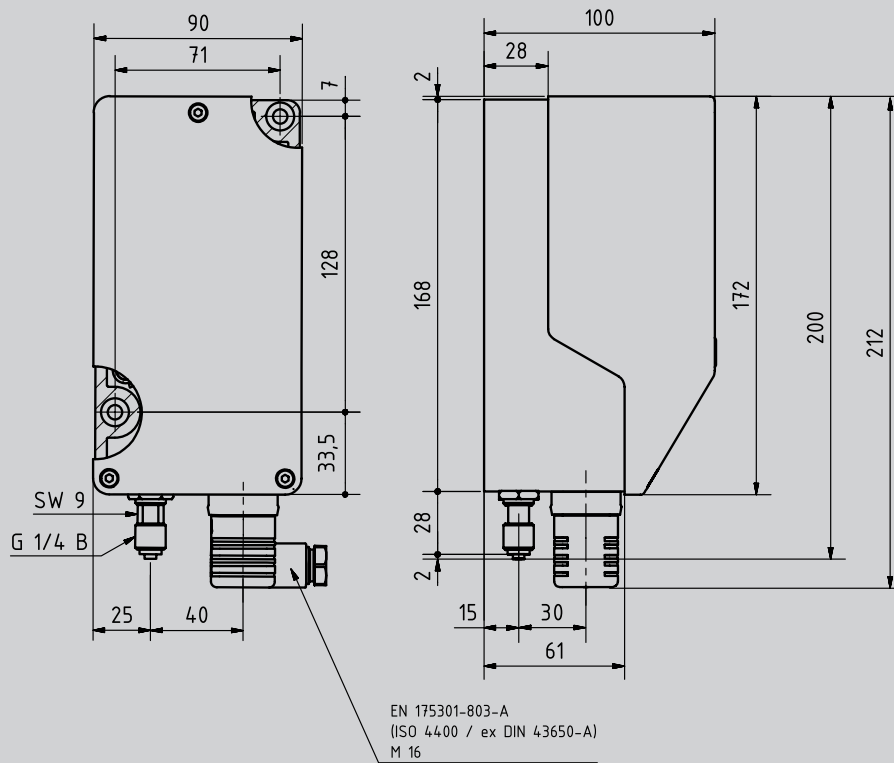
**Standard version (2KP, 2K2AP, 1KPDi, 1K2APDi)**





### Dimensions

Standard version with plug ISO 4400 (1K, 1KA, 2K, 2KA)



**Electrical data<sup>1</sup>**

**max. permissible steady current I max [A] - ohmic load**

reference switch cycle: 30/min; reference temperature: +30°C

micro switch	U [V]	24 V	48 V	60 V	110 V	240 V	SD [%] <sup>2</sup>
Standard	I [A] AC	5	5	5	5	5	1
Standard	I [A] DC	5	2	1	0,4	0,2	1
MG <sup>3</sup>	I [A] AC	1	1	1	1	—	1,5
MG <sup>3</sup>	I [A] DC	1	0,5	0,35	0,2	—	1,5
MH	I [A] AC	5	5	5	5	5	1,5
MH	I [A] DC	2	1	0,8	0,8	0,4	1,5
CS	I [A] AC	5	5	5	5	5	2
CS	I [A] DC	5	2	1	0,4	0,2	2
CH	I [A] AC	12	12	10	10	10	2
CH	I [A] DC	10	2	1	0,4	0,2	2

inductive contact	function	output polarity	SD [%] <sup>2</sup>
I-N	NAMUR NC	NAMUR	0,5
I-SN	NAMUR NC	safety function	0,5
I-S1N	NAMUR NO	safety function	0,5

**Remarks**

- 1 deviant with plug M12: 24 VDC/4A - 24 VAC/3A - 1A with micro switch MG
- 2 typical switching differential (hysteresis) in % of full scale
- 3 micro switch with gold-plated contacts

### Electrical connection

micro switch	assignment for all switching functions			additional assignment for 2K-versions			GND
El. connection	+Ub	NC	NO	+Ub	NC	NO	GND
terminal blocks	3	1	2	6	4	5	GND
ISO 4400	1	2	3				GND
HARTING H7 / H8	1	2	3	4	5	6	GND
plug SV-1	1	2	3	4	5	6	GND

### Utilization as Safety Pressure Limiter

#### description

With limiter functions, it is absolutely necessary to maintain the switch-off state and to lock it.  
Only after eliminating the cause that led to the shutdown, the lock may be released and the system again put into operation.

#### Safety Pressure Limiter with external interlock

on safety pressure limiters with external interlock, the switch-off state is realized for example via a next in line control.  
For suggestions on implementing an external interlock, please contact our sales team.

#### Safety Pressure Limiter with internal interlock

on safety pressure limiters with internal interlock, the switch-off state is locked within the pressure limiter.  
With the manual reset on the device, the locking state is released.  
An external lock is not necessary.

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

### Remarks

- 1 assignment NC & NO vice-versa for vacuum ranges

**part number codes**

**codes for most common options**

part number structure	M 0 a b c d - e (f) - g h i	
a / approvals	standard version (CE marking)	0
a / approvals	SIL, TÜV, PED approval	1
b / switching function	1K (1x SPDT)	0
b / switching function	1KA (1x SPDT, 1x integrated pressure gauge)	1
b / switching function	2K (2x SPDT)	2
b / switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
b / switching function	2KP (2x SPDT; seperate measuring systems)	4
b / switching function	2K2AP (2x SPDT; seperate measuring systems with 1x integrated pressure gauge each)	5
b / switching function	1KPDi (1x SPDT, differential pressure)	7
b / switching function	1K2APDi (1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet)	8
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	Standard micro switch	A
d / switching contact	MG (micro switch with gold-plated contacts)	B
d / switching contact	MH (for higher switch load at DC)	C
d / switching contact	CS (multi purpose micro switch)	H
d / switching contact	CH (for high switch load)	G
d / switching contact	I-N (inductive contact, NAMUR NC)	J
d / switching contact	I-SN (inductive contact, NAMUR NC, safety function)	K
d / switching contact	I-S1N (inductive contact, NAMUR NO, safety function)	W
e / pressure range	-1...0 bar	006
e / pressure range	-600...0 mbar	105
e / pressure range	-400...0 mbar	004
e / pressure range	-250...0 mbar	003
e / pressure range	-160...0 mbar	002
e / pressure range	-100...0 mbar	001
e / pressure range	-60...0 mbar	000
e / pressure range	0 - 60 mbar	010
e / pressure range	0 - 100 mbar	011
e / pressure range	0 - 160 mbar	012
e / pressure range	0 - 250 mbar	013
e / pressure range	0 - 400 mbar	014
e / pressure range	0 - 600 mbar	015
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar (requires wetted parts in stainless steel)	031
e / pressure range	0 - 160 bar (requires wetted parts in stainless steel)	032

## part number codes (continued)

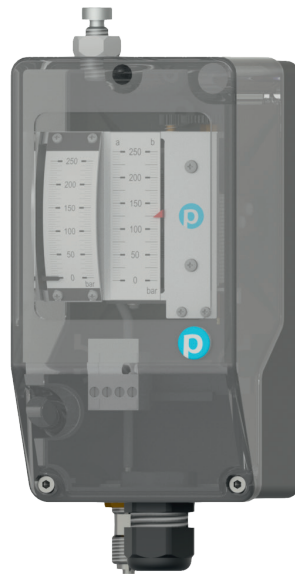
## codes for most common options

part number structure	M 0 a b c d - e (f) - g h i	
e / pressure range	0 - 250 bar (requires wetted parts in stainless steel)	033
e / pressure range	0 - 400 bar (requires wetted parts in stainless steel)	035
f / pressure range 2	differential pressure for switching functions: 1KPDi and 1K2APDi 2nd pressure range for switching functions: 2KP and 2K2AP leave blank for all other switching functions codes see „e / pressure range“	
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	M20 cable gland; terminal blocks	A
h / electrical connection	plug ISO 4400	B
h / electrical connection	Harting plug H7, metal	X
h / electrical connection	Harting plug H8, plastics	Z
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	enclosure equipped with Gore® Protective Vent	KH
i / further options	aluminium enclosure	G
i / further options	stainless steel enclosure	JY

## ordering example

part number structure	M 0 a b c d - e (f) - g h i	
<b>example part number</b>	<b>M0132A-025-DBW</b>	
ID for MANOCOMB-IP65		M0
a / approvals	SIL, TÜV, PED approval	1
b / switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
d / switching contact	Standard micro switch	A
-	dash	-
e / pressure range	0 - 6 bar	025
-	dash	-
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
h / electrical connection	plug ISO 4400	B
i / further options	cover lead-sealable	W

**MANOCOMB® Precision Pressure Switch Model IP65/CV**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- optionally integrated pressure gauge
- approved as Pressure Monitor / Pressure Limiter
- internal interlock for switch state
- for MAX pressure
- manual reset or tool reset

**description**

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

**operating principle**

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.

**approvals**

Safety Integrity Level (IEC61508/61511): SIL2 / SIL3  
 VdTUV leaflet Druck 100  
 DIN EN 12952-11  
 DIN EN 12953-9  
 Pressure Equipment Directive 2014/68/EU Category IV



### switching function

1K 1x NC, 1x NO

1KA 1x NC, 1x NO, 1x integrated pressure gauge

### technical data

#### standard version

function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar
over pressure safety	≤ 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 switching contact
adjustment accuracy	≤ 1,0% FS
switching accuracy	≤ 1,0% FS
repeatability	≤ 0,5% FS
switching differential (hysteresis)	manual reset (resettable approx. 2 bar below set point)
process connection	1/4" BSP male (EN837)
electrical connection	terminal blocks & M20 cable gland
weight	approx. 1,0 kg
protection	IP65

### options & accessories

customer specific versions

special scales and units; extended overpressure safety

special materials; cleaned for O2 service; nonferrous metal free version

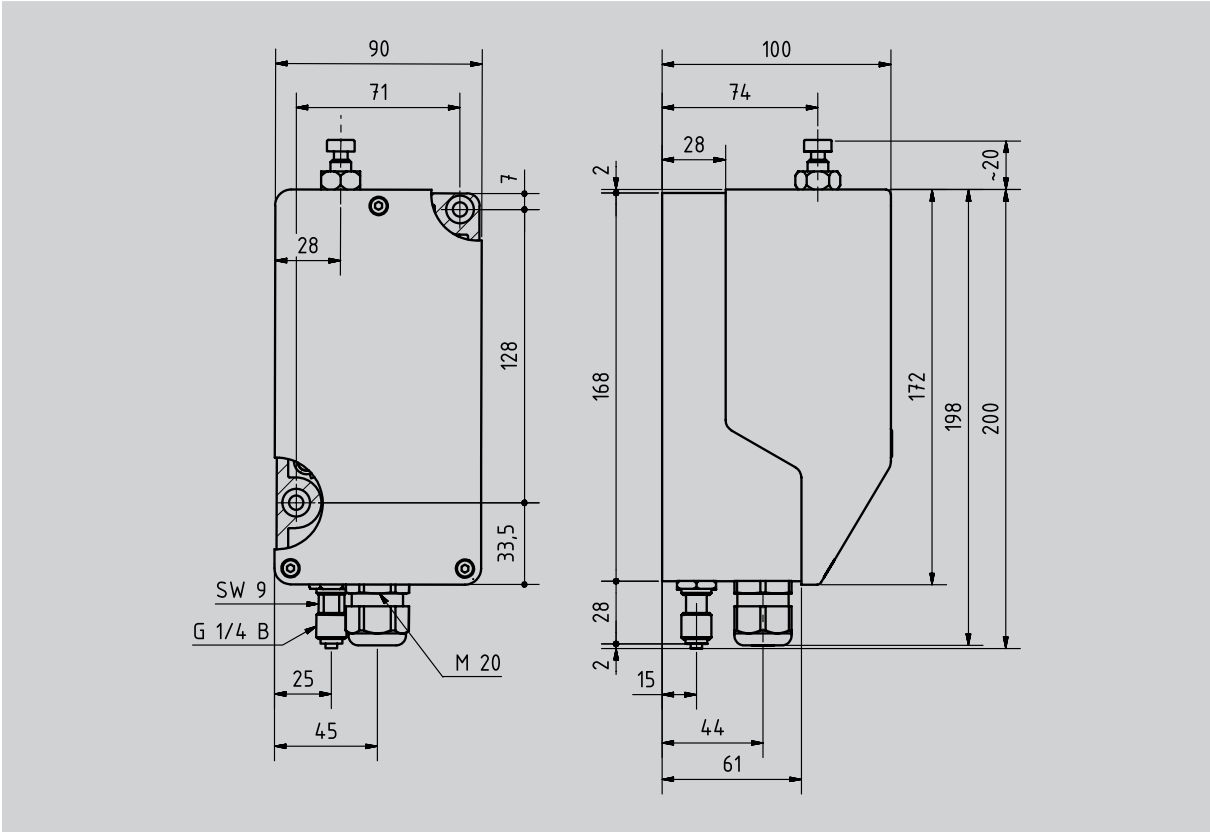
process connection: all common threads; pipe fittings; flanges

electrical connection: ISO 4400 plug; M12 plug; Harting plug

accessories: see catalogue "accessories"

**Dimensions**

**Standard version (1K,1KA)**



### Electrical data

max. permissible steady current I max [A] - ohmic load

reference switch cycle: 30/min; reference temperature: +30°C

	U [V]	24 V	48 V	60 V	110 V	240 V
CV	I [A] AC	5	5	5	5	5
CV	I [A] DC	5	2	1	0,4	0,2

### Electrical connection

El. connection	+Ub	NC	+Ub	NO	GND
terminal blocks	2	1	4	3	GND

### Utilization as Safety Pressure Limiter

#### description

with limiter functions, it is absolutely necessary to maintain the switch-off state and to lock it.  
Only after eliminating the cause that led to the shutdown, the lock may be released and the system again put into operation.

#### Safety Pressure Limiter with internal interlock

with the MANOCOMB-IP65/CV the switch state is locked within the pressure limiter - a manual reset releases the switch-off state.  
An external lock is not necessary.

**part number codes**

**codes for most common options**

<b>part number structure</b>	<b>M O V b c d - e - g h i</b>	
approvals	SIL, TÜV, DGR Zulassung	
b / switching function	1K (1x NC, 1x NO)	0
b / switching function	1KA (1x NC, 1x NO, 1x integrated pressure gauge)	1
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact & interlock	MAX pressure with internal interlock; manual reset	A
d / switching contact & interlock	MIN pressure with internal interlock; manual reset	B
d / switching contact & interlock	MAX pressure with internal interlock; tool reset	D
d / switching contact & interlock	MIN pressure with internal interlock; tool reset	E
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar	031
e / pressure range	0 - 160 bar	032
e / pressure range	0 - 250 bar	033
e / pressure range	0 - 400 bar	035
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	M20 cable gland; terminal blocks	A
h / electrical connection	5m cable	K
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	enclosure equipped with Gore® Protective Vent	KH

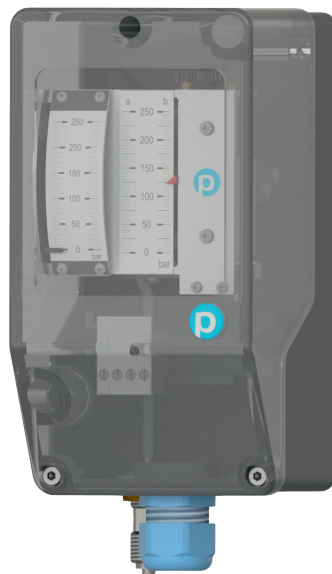
### ordering example

**part number structure**      **M 0 V b c d - e - g h i**

**example part number**      **M0V02A-033-DKW**

ID for MANOCOMB-IP65/CV		M0V
b / switching function	1K (1x NC, 1x NO)	0
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
d / switching contact & interlock	MAX pressure with internal interlock; manual reset	A
-	Bindestrich	-
e / pressure range	0 - 250 bar	033
-	Bindestrich	-
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
h / electrical connection	5m cable	K
i / further options	cover lead-sealable	W

**MANOCOMB® Precision Pressure Switch Model IP65/XI**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- optionally integrated pressure gauge
- approved as Pressure Monitor / Pressure Limiter
- ATEX approved (protection type Ex i)

**description**

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

**operating principle**

The operation is based on force-balance - per change-over contact a metal bellow 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.

**approvals**

Safety Integrity Level (IEC61508/61511): SIL2 / SIL3  
 VdTUV leaflet Druck 100  
 DIN EN 12952-11  
 DIN EN 12953-9  
 Pressure Equipment Directive 2014/68/EU Category IV  
 ATEX Directive 2014/34/EU: Zones 1/21 and/or 2/22



### switching function

1K	1x SPDT
1KA	1x SPDT, 1x integrated pressure gauge
2K	2x SPDT
2KA	2x SPDT, 1x integrated pressure gauge
2KP	2x SPDT, separate measuring systems
2K2AP	2x SPDT, separate measuring systems with 1x integrated pressure gauge each
1KPDi	1x SPDT, differential pressure
1K2APDi	1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet

### technical data

#### standard version

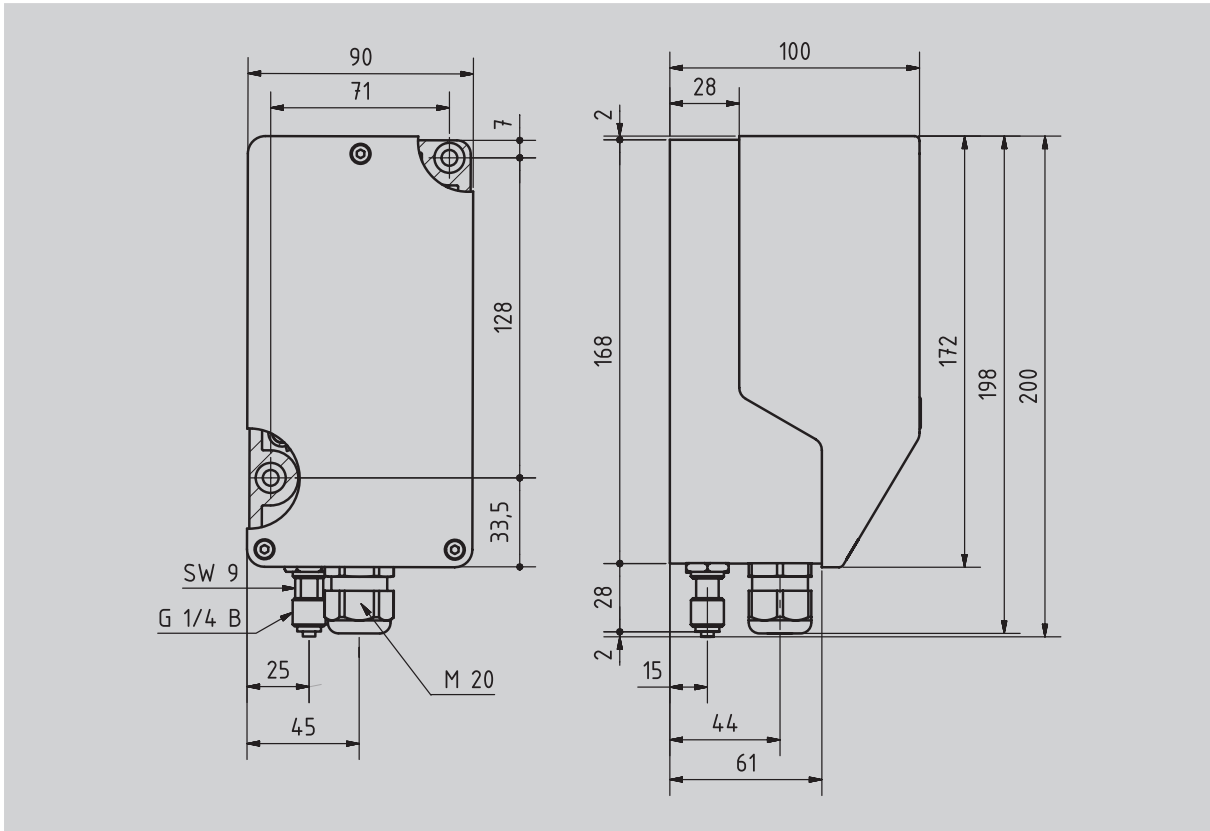
function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
low pressure ranges	0 - 60 mbar to 0 - 600 mbar
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar
differential pressure	max. ration between static and differential pressure 10:1
vacuum ranges	-1...0 bar to -60...0 mbar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 switching contacts (for details please see electrical data)
adjustment accuracy	≤ 1,0% FS
switching accuracy	please see electrical data
repeatability	≤ 0,5% FS
switching differential (hysteresis)	please see electrical data
process connection	1/4" BSP male (EN837)
electrical connection	terminal blocks & M20 cable gland
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP65
ATEX	Zones 1/21 and/or 2/22

### options & accessories

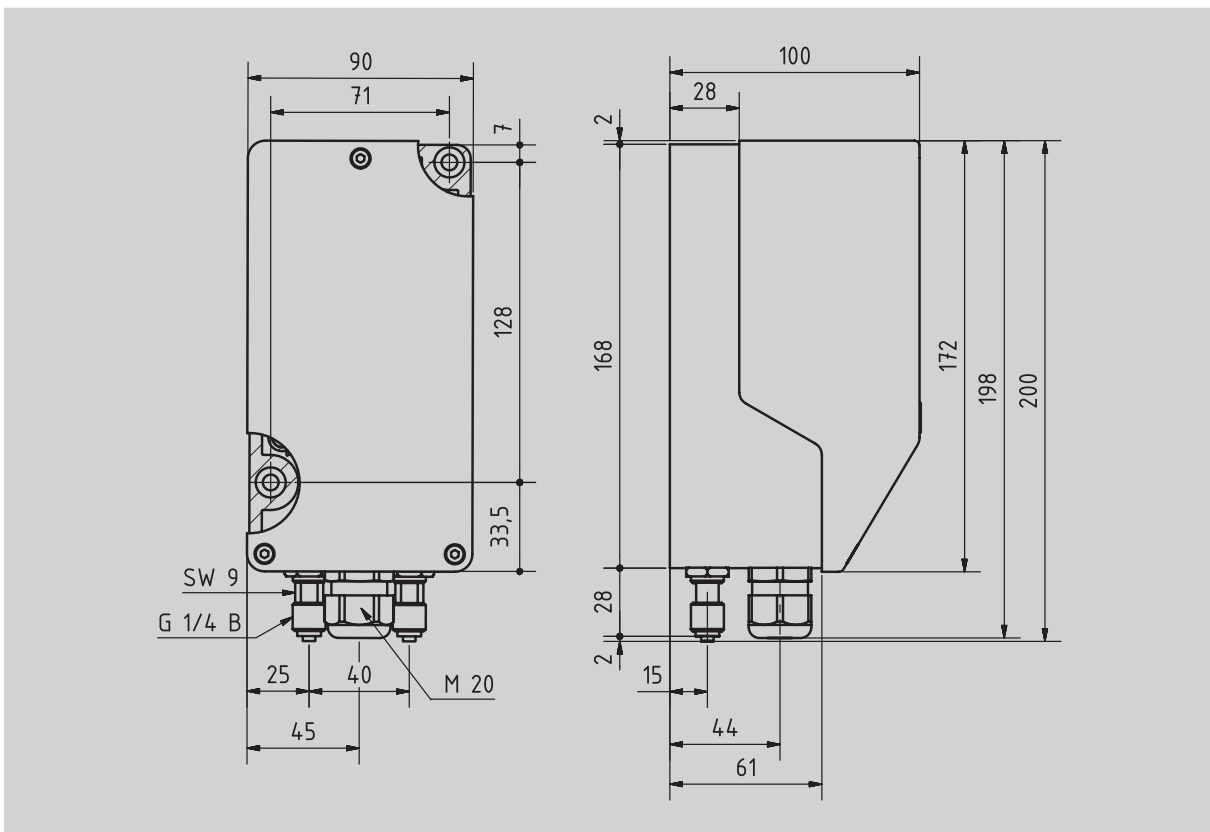
customer specific versions
special scales and units; extended overpressure safety
aluminium enclosure; stainless steel enclosure
special materials; cleaned for O2 service; nonferrous metal free version
process connection: all common threads; pipe fittings; flanges
accessories: see catalogue "accessories"

**Dimensions**

**Standard version (1K, 1KA, 2K, 2KA)**



**Standard version (2KP, 2K2AP, 1KPDi, 1K2APDi)**





**Electrical data<sup>1</sup>**

max. permissible steady current I max [A] - ohmic load

reference switch cycle: 30/min; reference temperature: +30°C

micro switch	U [V]	24 V	48 V	60 V	110 V	240 V	SD [%] <sup>1</sup>
MG <sup>2</sup>	I [A] AC	1	1	1	1	—	1,5
MG <sup>2</sup>	I [A] DC	1	0,5	0,35	0,2	—	1,5

inductive contact	function	output polarity	SD [%] <sup>1</sup>
I-N	NAMUR NC	NAMUR	0,5
I-SN	NAMUR NC	safety function	0,5
I-S1N	NAMUR NO	safety function	0,5

**Remarks**

1 typical switching differential (hysteresis) in % of full scale

2 micro switch with gold-plated contacts

### Electrical connection

micro switch	assignment for all switching functions			additional assignment for 2K-versions			GND
El. connection <sup>1</sup>	+Ub	NC	NO	+Ub	NC	NO	GND
terminal blocks	3	1	2	6	4	5	GND

### Utilization as Safety Pressure Limiter

**description** With limiter functions, it is absolutely necessary to maintain the switch-off state and to lock it. Only after eliminating the cause that led to the shutdown, the lock may be released and the system again put into operation.

**Safety Pressure Limiter with external interlock** on safety pressure limiters with external interlock, the switch-off state is realized for example via a next in line control. For suggestions on implementing an external interlock, please contact our sales team.

**Safety Pressure Limiter with internal interlock** on safety pressure limiters with internal interlock, the switch-off state is locked within the pressure limiter. With the manual reset on the device, the locking state is released. An external lock is not necessary.

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

### Remarks

1 assignment NC & NO vice-versa for vacuum ranges

**part number codes**

**codes for most common options**

<b>part number structure</b>	<b>M O I b c d - e (f) - g L i</b>	
approvals	SIL, TÜV, DGR, ATEX	
b / switching function	1K (1x SPDT)	0
b / switching function	1KA (1x SPDT, 1x integrated pressure gauge)	1
b / switching function	2K (2x SPDT)	2
b / switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
b / switching function	2KP (2x SPDT; seperate measuring systems)	4
b / switching function	2K2AP (2x SPDT; seperate measuring systems with 1x integrated pressure gauge each)	5
b / switching function	1KPDi (1x SPDT, differential pressure)	7
b / switching function	1K2APDi (1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet)	8
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	MG (micro switch with gold-plated contacts)	B
d / switching contact	I-N (inductive contact, NAMUR NC)	J
d / switching contact	I-SN (inductive contact, NAMUR NC, safety function)	K
d / switching contact	I-S1N (inductive contact, NAMUR NO, safety function)	W
e / pressure range	-1...0 bar	006
e / pressure range	-600...0 mbar	005
e / pressure range	-400...0 mbar	004
e / pressure range	-250...0 mbar	003
e / pressure range	-160...0 mbar	002
e / pressure range	-100...0 mbar	001
e / pressure range	-60...0 mbar	000
e / pressure range	0 - 60 mbar	010
e / pressure range	0 - 100 mbar	011
e / pressure range	0 - 160 mbar	012
e / pressure range	0 - 250 mbar	013
e / pressure range	0 - 400 mbar	014
e / pressure range	0 - 600 mbar	015
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar	031
e / pressure range	0 - 160 bar	032
e / pressure range	0 - 250 bar	033
e / pressure range	0 - 400 bar	035

f / pressure range 2      differential pressure for switching functions: 1KPDi and 1K2APDi  
 2nd pressure range for switching functions: 2KP and 2K2AP  
 leave blank for all other switching functions  
 codes see „e / pressure range“



## part number codes (continued)

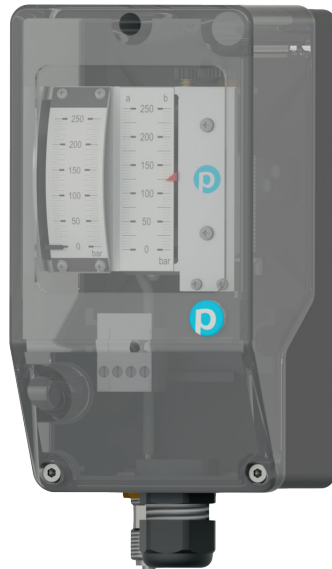
## codes for most common options

part number structure	M O a b c d - e (f) - g L i	
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	M20 cable gland blue; terminal blocks	L
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	enclosure equipped with Gore® Protective Vent	KH
i / further options	aluminium enclosure	G
i / further options	stainless steel enclosure	JY

## ordering example

part number structure	M O I b c d - e (f) - g L i	
<b>example part number</b>	<b>M0I0GB-025-BLO</b>	
ID for MANOCOMB-IP65/XI		M0I
b / switching function	1K (1x SPDT)	0
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	MG (micro switch with gold-plated contacts)	B
-	dash	-
e / pressure range	0 - 6 bar	025
-	dash	-
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
h / electrical connection	M20 cable gland blue; terminal blocks	L
i / further options	no further options	O

**MANOCOMB® Precision Pressure Switch Model IP65/XD**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- optionally integrated pressure gauge
- approved as Pressure Monitor / Pressure Limiter
- ATEX approved (protection type Ex d)

**description**

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

**operating principle**

The operation is based on force-balance - per change-over contact a metal bellow 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.

**approvals**

Safety Integrity Level (IEC61508/61511): SIL2 / SIL3  
 VdTUV leaflet Druck 100  
 DIN EN 12952-11  
 DIN EN 12953-9  
 Pressure Equipment Directive 2014/68/EU Category IV  
 ATEX-Directive 2014/34/EU: Zone 1/21 and 2/22

### switching function

1K	1x SPDT
1KA	1x SPDT, 1x integrated pressure gauge
2K	2x SPDT
2KA	2x SPDT, 1x integrated pressure gauge
2KP	2x SPDT; separate measuring systems
2K2AP	2x SPDT; separate measuring systems with 1x integrated pressure gauge each
1KPDi	1x SPDT, differential pressure
1K2APDi	1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet

### technical data

### standard version

function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
low pressure ranges	0 - 60 mbar to 0 - 600 mbar
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar (requires wetted parts in stainless steel)
differential pressure	max. ration between static and differential pressure 10:1
vacuum ranges	-1...0 bar to -60...0 mbar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 switching contacts (for details please see electrical data)
adjustment accuracy	≤ 1,0% FS
switching accuracy	please see electrical data
repeatability	≤ 0,5% FS
switching differential (hysteresis)	please see electrical data
process connection	1/4" BSP male (EN837)
electrical connection	3m cable
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP65
ATEX	Zone 1/21 and 2/22

### options & accessories

low temperature version for ambient temperature -55...+70°C

customer specific versions

special scales and units; extended overpressure safety

aluminium enclosure; stainless steel enclosure

special materials; cleaned for O2 service; nonferrous metal free version

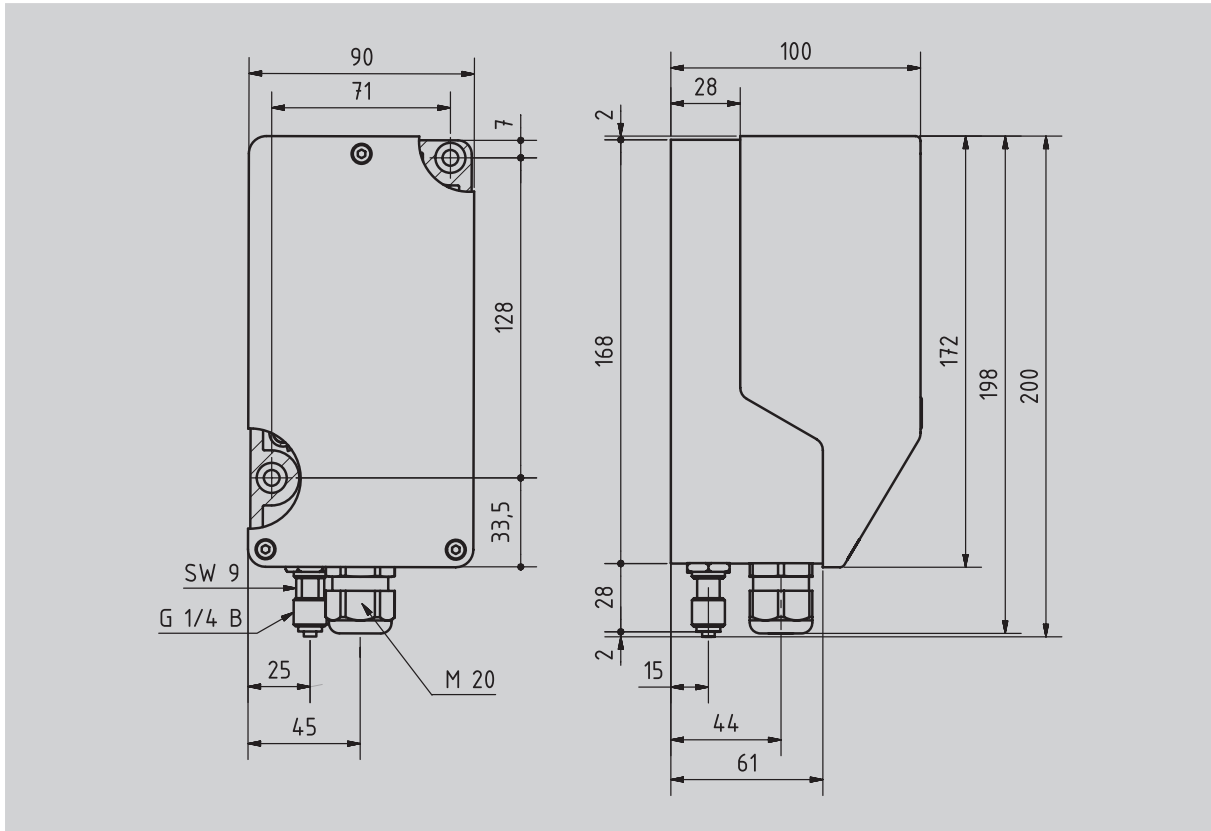
process connection: all common threads; pipe fittings; flanges

electrical connection: ISO 4400 plug; M12 plug; Harting plug

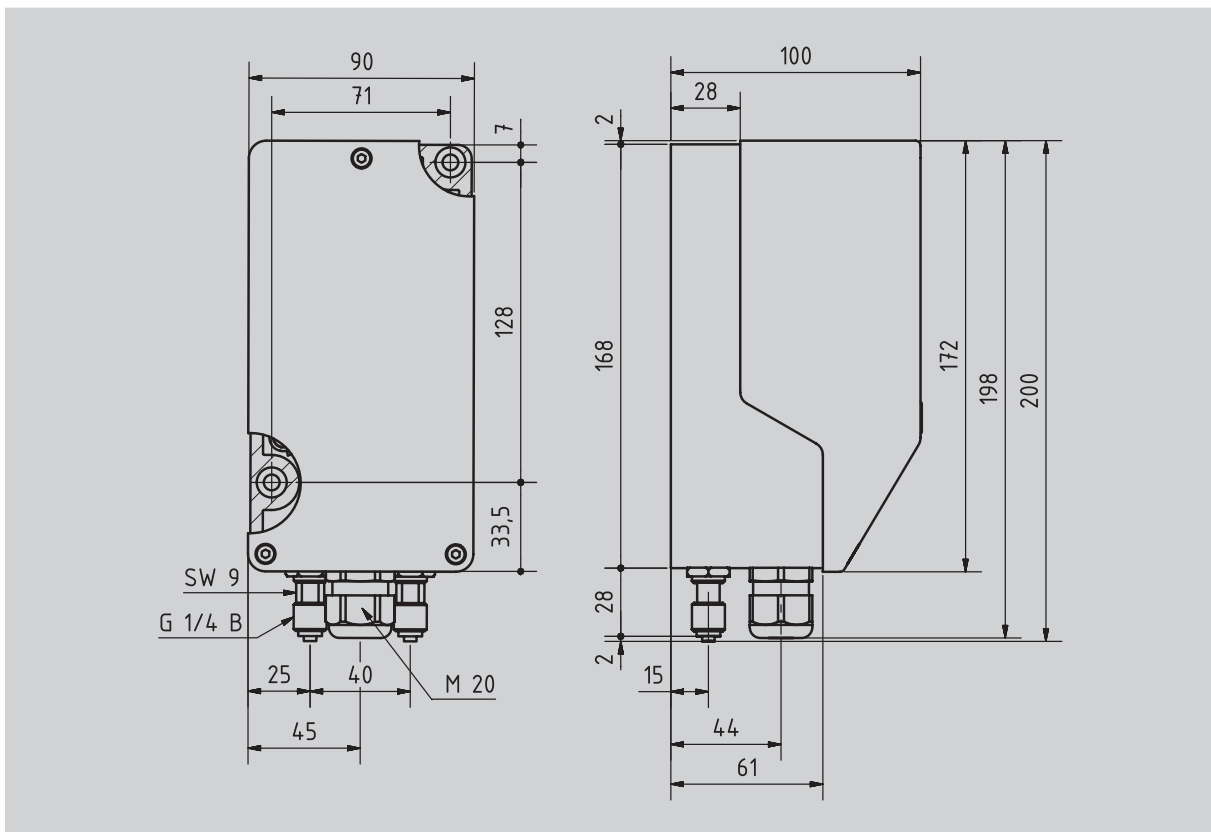
accessories: see catalogue "accessories"

**dimensions**

**standard version (1K, 1KA, 2K, 2KA)**



**standard version (2KP, 2K2AP, 1KPDi, 1K2APDi)**



### electrical data

#### max. permissible steady current I max [A] - ohmic load

reference switch cycle: 30/min; reference temperature: +30°C

	U [V]	24 V	48 V	60 V	110 V	240 V	400 V	SD [%] <sup>1</sup>
BT	I [A] AC	5	5	5	5	5	—	1,0
BT	I [A] DC	5	1	0,75	0,5	0,25	—	1,0
ST	I [A] AC	7	5	5	5	5	3	2,0
ST	I [A] DC	7	0,4	0,4	0,4	0,4	—	2,0

### electrical connection

el. connection <sup>2</sup>	assignment for all switching functions				additional assignment for 2K-versions			
	+Ub	NC	NO	GND	+Ub	NC	NO	GND
cable	blue	brown	black	green/yellow	blue	brown	black	green/yellow

### remarks

1 typical switching differential (hysteresis) in % of full scale

2 assignment for NC & NO vice versa on vacuum ranges

**part number codes**

**codes for most common options**

part number structure	M O D b c d - e (f) - g h i	
approvals	SIL, TÜV, PED, ATEX	
b / switching function	1K (1x SPDT)	0
b / switching function	1KA (1x SPDT, 1x integrated pressure gauge)	1
b / switching function	2K (2x SPDT)	2
switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
b / switching function	2KP (2x SPDT; seperate measuring systems)	4
b / switching function	2K2AP (2x SPDT; seperate measuring systems with 1x integrated pressure gauge each)	5
b / switching function	1KPDi (1x SPDT, differential pressure)	7
b / switching function	1K2APDi (1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet)	8
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	BT (Standard)	4
d / switching contact	ST (for high switching capacity)	X
e / pressure range	-1...0 bar	006
e / pressure range	-600...0 mbar	105
e / pressure range	-400...0 mbar	004
e / pressure range	-250...0 mbar	003
e / pressure range	-160...0 mbar	002
e / pressure range	-100...0 mbar	001
e / pressure range	-60...0 mbar	000
e / pressure range	0 - 60 mbar	010
e / pressure range	0 - 100 mbar	011
e / pressure range	0 - 160 mbar	012
e / pressure range	0 - 250 mbar	013
e / pressure range	0 - 400 mbar	014
e / pressure range	0 - 600 mbar	015
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar (requires wetted parts in stainless steel)	031
e / pressure range	0 - 160 bar (requires wetted parts in stainless steel)	032
e / pressure range	0 - 250 bar (requires wetted parts in stainless steel)	033
e / pressure range	0 - 400 bar (requires wetted parts in stainless steel)	035

f / pressure range 2

differential pressure for switching functions: 1KPDi and 1K2APDi  
 2nd pressure range for switching functions: 2KP and 2K2AP  
 leave blank for all other switching functions  
 codes see „e / pressure range“

### part number codes (continued)

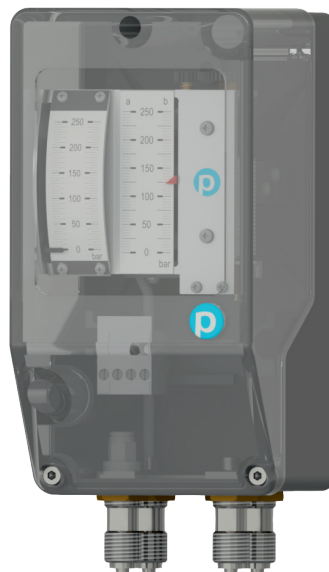
#### codes for most common options

part number structure	M O D b c d - e (f) - g h i	
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	3m cable	K
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	aluminium enclosure	G
i / further options	stainless steel enclosure	JY

### ordering example

part number structure	M O D b c d - e (f) - g h i	
<b>example part number</b>	<b>M0D0GX-031-VKO</b>	
ID for MANOCOMB-IP65/XD		M0D
b / switching function	1K (1x SPDT)	0
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	ST (for high switching capacity)	X
-	dash	-
e / pressure range	0 - 100 bar	031
-	dash	-
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
h / electrical connection	3m cable	K
i / further options	no further options	O

**MANOCOMB® Precision Pressure Switch Model IP65/PN**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- with pneumatic contact
- optionally integrated pressure gauge
- approved as Pressure Monitor / Pressure Limiter
- ATEX approved (protection type Ex c)

**description**

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

**operating principle**

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.

**approvals**

Safety Integrity Level (IEC61508/61511): SIL2 / SIL3  
 VdTÜV leaflet Druck 100  
 DIN EN 12952-11  
 DIN EN 12953-9  
 Pressure Equipment Directive 2014/68/EU Category IV  
 ATEX-Directive 2014/34/EU: Zone 1/21 and 2/22



### switching function

1K	1x pneumatic valve
1KA	1x pneumatic valve, 1x integrated pressure gauge
2K	2x pneumatic valve
2KA	2x pneumatic valve, 1x integrated pressure gauge
2KP	2x pneumatic valve; separate measuring systems
2K2AP	2x pneumatic valve; separate measuring systems with 1x integrated pressure gauge each
1KPDi	1x pneumatic valve, differential pressure
1K2APDi	1x pneumatic valve, differential pressure, jewels 1x integrated pressure gauge for each + & - pressure inlet

### technical data

### standard version

function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar
differential pressure	max. ration between static and differential pressure 10:1
vacuum ranges	-1...0 bar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 pneumatic valves (for details please see switching contacts)
adjustment accuracy	≤ 1,0% FS
switching accuracy	ca. 3% - 4% FS (depending on supply air pressure)
repeatability	≤ 0,5% FS
switching differential (hysteresis)	ca. 3% - 4% FS (depending on supply air pressure)
process connection	1/4" BSP male (EN 837)
pneumatic connection	1/4" BSP male (EN 837)
supply air pressure	2 - 8 bar (4 bar recommended)
supply media	5 µm, lubricated or filtered non-lubricated compressed air or any other according to ISO-VG 10
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP65
ATEX	Zone 1/21 and 2/22

### options & accessories

customer specific versions

special scales and units; extended overpressure safety

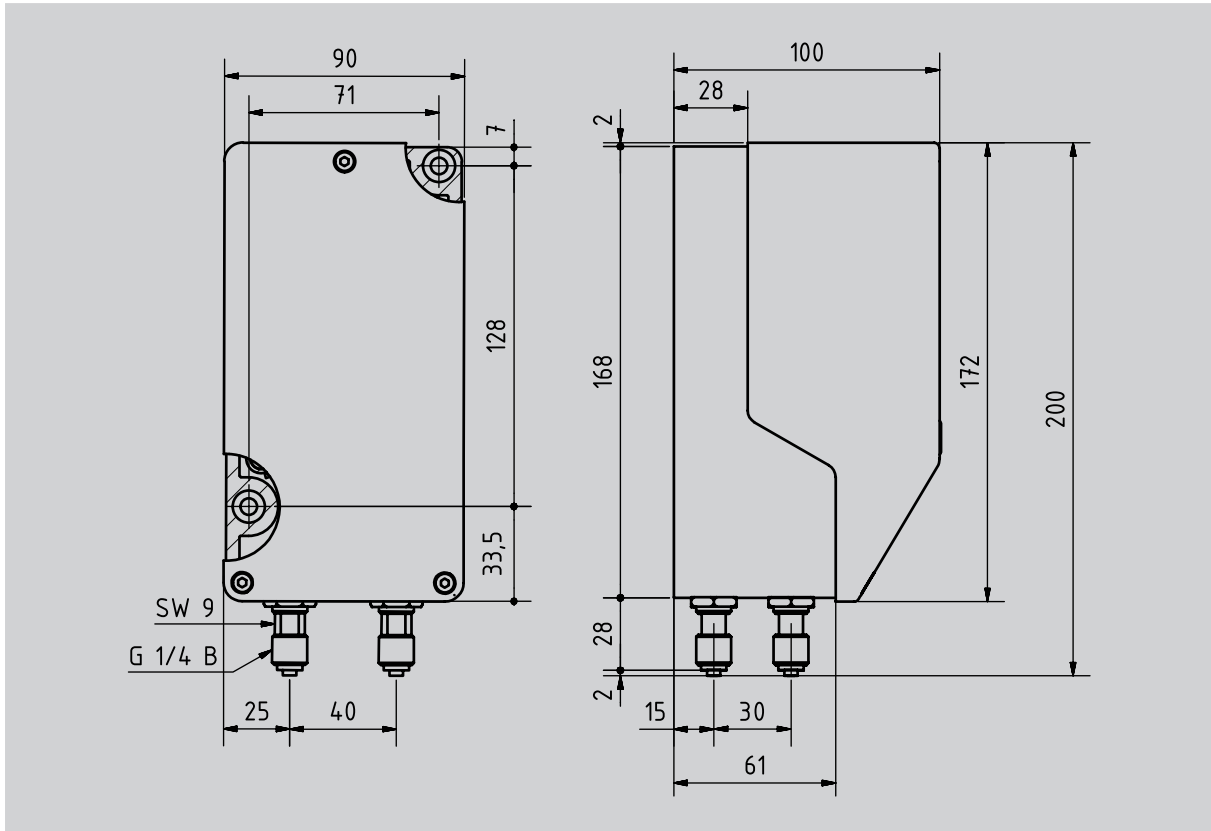
special materials; cleaned for O2 service; nonferrous metal free version

process connection: all common threads; pipe fittings; flanges

accessories: see catalogue "accessories"

**dimensions**

**standard version**



### pneumatic data

description	3/2-way poppet valve, open centre between actuations, servo controlled
switching function	normally open or normally closed
supply air pressure	2 - 8 bar (4 bar recommended)
supply media	5 µm, lubricated or filtered non-lubricated compressed air or any other according to ISO-VG 10
consumption	approx. 0,7 l/min

### pneumatic connection

$P / P_{(+)}$	process connection / process connection + for differential pressure
$P_{(-)}$	process connection - (only for differential pressure)
1	supply air inlet
2	control air outlet a
4	control air outlet b <sup>1</sup>

### remarks

- control air outlet b only for 2K models

**part number codes**

**codes for most common options**

part number structure	M O P b c d - e (f) - g h i	
approvals	SIL, TÜV, DGR, ATEX Zulassung	
b / switching function	1K (1x pneumatic valve)	0
b / switching function	1KA (1x pneumatic valve, 1x integrated pressure gauge)	1
b / switching function	2K (2x pneumatic valve)	2
b / switching function	2KA (2x pneumatic valve, 1x integrated pressure gauge)	3
b / switching function	2KP (2x pneumatic valve; separate measuring systems)	4
b / switching function	2K2AP (2x pneumatic valve; separate measuring systems with 1x integrated pressure gauge each)	5
b / switching function	1KPDi (1x pneumatic valve, differential pressure)	7
b / switching function	1K2APDi (1x pneumatic valve, differential pressure, jeweils 1x integrated pressure gauge for each + &- pressure inlet)	8
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	NO (normally open)	Q
d / switching contact	NC (normally closed)	R
d / switching contact	1x NO+ 1x NC (only 2K models)	6
e / pressure range	-1...0 bar	006
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar	031
e / pressure range	0 - 160 bar	032
e / pressure range	0 - 250 bar	033
e / pressure range	0 - 400 bar	035
f / pressure range 2	differential pressure for switching functions: 1KPDi and 1K2APDi 2nd pressure range for switching functions: 2KP and 2K2AP leave blank for all other switching functions codes see „e / pressure range“	
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G

### part number codes (continued)

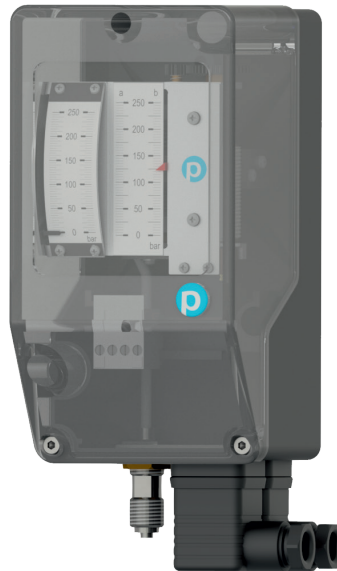
#### codes for most common options

part number structure	M O P b c d - e (f) - g h i	
h / pneumatic connection	push-in fitting for pipe Ø4	T
h / pneumatic connection	push-in fitting for pipe Ø6	5
h / pneumatic connection	1/4" BSP male (EN 837)	6
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	enclosure equipped with Gore® Protective Vent	KH
i / further options	aluminium enclosure	G
i / further options	stainless steel enclosure	JY

### ordering example

part number structure	M O P b c d - e (f) - g h i	
<b>example part number</b>	<b>MOP01Q-027-A5O</b>	
ID for MANOCOMB-IP65/PN		MOP
b / switching function	1x pneumatic valve	0
c / material wetted parts	brass, FKM	1
d / switching contact	NO (normally open)	Q
-	dash	-
e / pressure range	0 - 16 bar	027
-	dash	-
g / process connection (wetted)	1/4" BSP male (EN 837), brass	A
h / pneumatic connection	push-in fitting for pipe Ø6	5
i / further options	no further options	O

**MANOCOMB® Precision Pressure Switch Model TM**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- integrated pressure transmitter
- optionally integrated pressure gauge

**description**

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

**operating principle**

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 transmitter**

The integrated pressure transmitter (0.5% FS) supplies a continuous analogue output signal 4 - 20 mA or 0 - 10 V.

**integrated pressure gauge**

The optionally integrated pressure gauge (class 1.0) visualizes the actual process pressure.

### switching function

1K	1x SPDT, 1x analogue output signal
1KA	1x SPDT, 1x analogue output signal, 1x integrated pressure gauge
2K	2x SPDT, 1x analogue output signal
2KA	2x SPDT, 1x analogue output signal, 1x integrated pressure gauge

### technical data

### standard version

function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar
vacuum ranges	-1...0 bar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	reinforced polycarbonate; transparent cover
material wetted parts	Al <sub>2</sub> O <sub>3</sub> and brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 switching contacts (for details please see electrical data)
adjustment accuracy	≤ 1,0% FS
switching accuracy	please see electrical data
repeatability	≤ 0,5% FS
switching differential (hysteresis)	please see electrical data
analogue output	4 - 20 mA (2-wire) or 0 - 10 V (3-wire)
supply for analogue output	12 - 32 VDC
accuracy for analogue output	≤ 0,5% FS
process connection	1/4" BSP male (EN837)
electrical connection	plug ISO 4400
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP65

### options & accessories

customer specific versions

special scales and units; extended overpressure safety

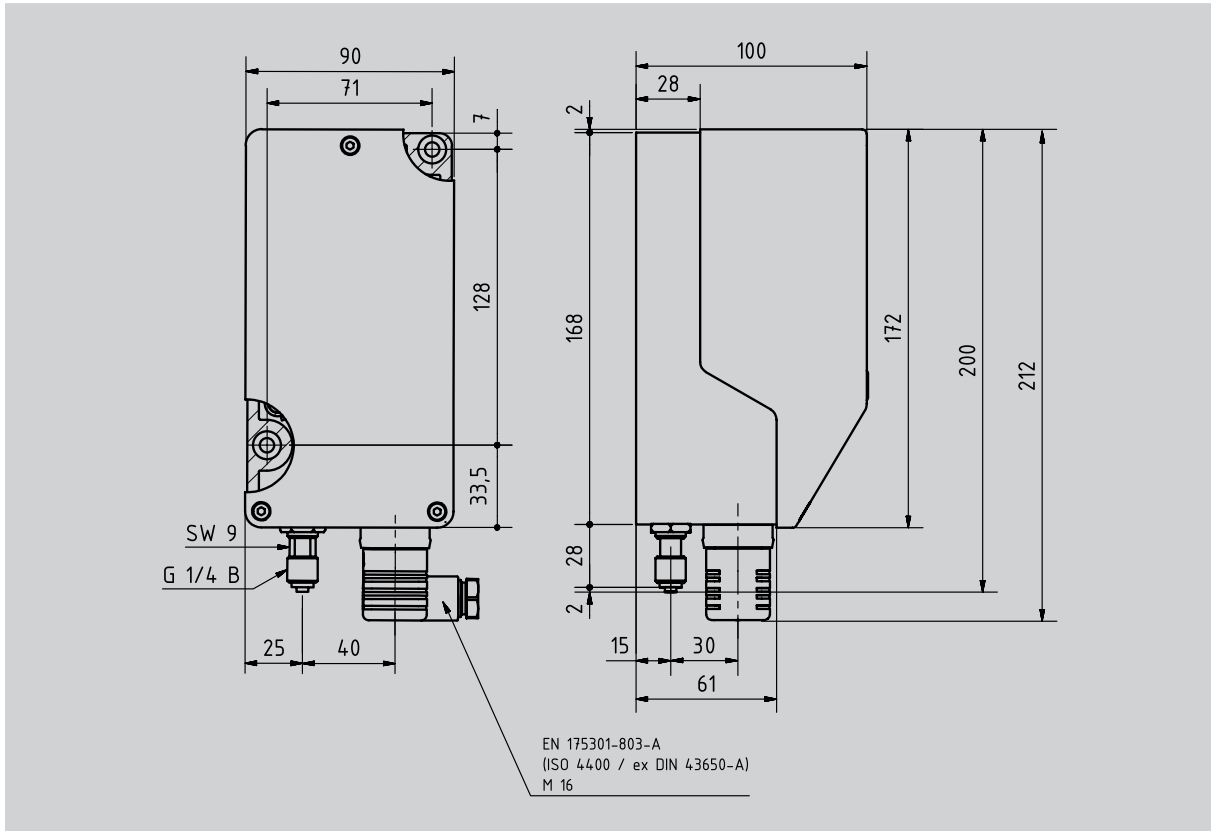
special materials; cleaned for O<sub>2</sub> service; nonferrous metal free version

process connection: all common threads; pipe fittings; flanges

accessories: see catalogue "accessories"

**Dimensions**

**Standard version (1K,1KA, 2K, 2KA)**





## Electrical data<sup>1</sup>

max. permissible steady current I max [A] - ohmic load

reference switch cycle: 30/min; reference temperature: +30°C

micro switch	U [V]	24 V	48 V	60 V	110 V	240 V	SD [%] <sup>2</sup>
Standard	I [A] AC	5	5	5	5	5	1
Standard	I [A] DC	5	2	1	0,4	0,2	1
MG <sup>3</sup>	I [A] AC	1	1	1	1	—	1,5
MG <sup>3</sup>	I [A] DC	1	0,5	0,35	0,2	—	1,5
MH	I [A] AC	5	5	5	5	5	1,5
MH	I [A] DC	2	1	0,8	0,8	0,4	1,5
CS	I [A] AC	5	5	5	5	5	2
CS	I [A] DC	5	2	1	0,4	0,2	2
CH	I [A] AC	12	12	10	10	10	2
CH	I [A] DC	10	2	1	0,4	0,2	2

## Electrical connection

	assignment for all switching functions			GND	analogue output 4 - 20 mA (2-wire)		
	+Ub	NC	NO	GND	+Ub	-S	
ISO 4400 <sup>4</sup>	3	1	2	GND	1	2	

	assignment for all switching functions			GND	analogue output 0 - 10 V (3-wire)		
	+Ub	NC	NO	GND	+Ub	-S/0V	+S
ISO 4400 <sup>4</sup>	3	1	2	GND	1	2	3

## Anmerkungen

1 deviant with plug M12: 24 VDC/4A - 24 VAC/3A - 1A with micro switch MG

2 typical switching differential (hysteresis) in % of full scale

3 micro switch with gold-plated contacts

4 2x ISO 4400 4-pin plug

**part number codes**

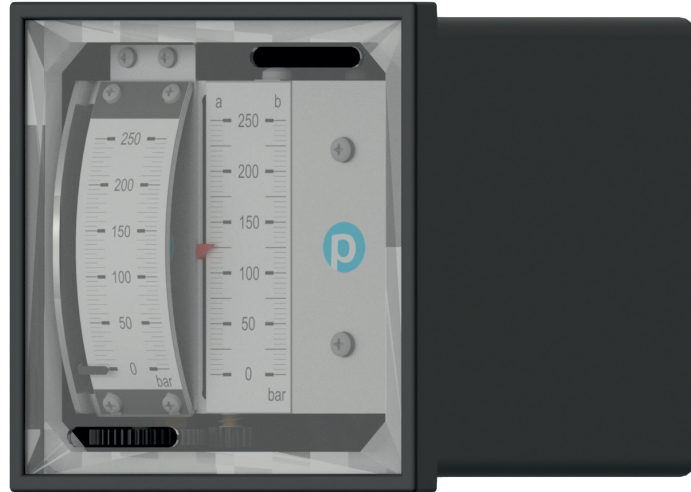
**codes for most common options**

part number structure	M 0 9 b c d - e - g h i	
b / switching function	1K (1x SPDT, 1x analogue output signal)	0
b / switching function	1KA (1x SPDT, 1x analogue output signal, 1x integrated pressure gauge)	1
b / switching function	2K (2x SPDT, 1x analogue output signal)	2
b / switching function	2KA (2x SPDT, 1x analogue output signal, 1x integrated pressure gauge)	3
c / material wetted parts	Al <sub>2</sub> O <sub>3</sub> , brass, FKM	1
c / material wetted parts	Al <sub>2</sub> O <sub>3</sub> , stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
d / switching contact	standard micro switch + 4 - 20 mA	1
d / switching contact	standard micro switch + 0 - 10 V	8
d / switching contact	MG (micro switch with gold-plated contacts) + 4 - 20 mA	2
d / switching contact	MG (micro switch with gold-plated contacts) + 0 - 10 V	9
e / pressure range	-1...0 bar	006
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar	031
e / pressure range	0 - 160 bar	032
e / pressure range	0 - 250 bar	033
e / pressure range	0 - 400 bar	035
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	2x ISO 4400 4-pin plug - only 1K(A)	A
h / electrical connection	7-pin plug & ISO 4400 4-pin plug	S
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	cover lead-sealable	W
i / further options	enclosure equipped with Gore® Protective Vent	KH

### ordering example

<b>part number structure</b>	<b>M 0 9 b c d - e - g h i</b>	
<b>example part number</b>	<b>M09111-030-CPKH</b>	
ID for MANOCOMB-IP65/ZM		M09
b / switching function	1KA (1x SPDT, 1x analogue output signal, 1x integrated pressure gauge)	1
c / material wetted parts	Al <sub>2</sub> O <sub>3</sub> , brass, FKM	1
d / switching contact	standard micro switch + 4 - 20 mA	1
-	dash	-
e / pressure range	0 - 60 bar	030
-	dash	-
g / process connection (wetted)	1/2" BSP male, brass	C
h / electrical connection	2x ISO 4400 4-pin plug	P
i / further options	enclosure equipped with Gore® Protective Vent	KH

**MANOCOMB® Precision Pressure Switch Model 96x96**



**at a glance**

- friction free force balance measuring system
- very high repeatability
- outstanding long-term stability
- pressure ranges from -1... 0 bar to 0 - 400 bar
- comfortable setpoint adjustment with scale
- optionally integrated pressure gauge
- for panel mount

**description**

The MANOCOMB®-96x96 is a precision pressure switch for measuring pressure, differential pressure and/or vacuum of gaseous and liquid, also crystallizing or highly viscous media.

**operating principle**

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.

### switching function

1K	1x SPDT
1KA	1x SPDT, 1x integrated pressure gauge
2K	2x SPDT
2KA	2x SPDT, 1x integrated pressure gauge
2KP	2x SPDT, separate measuring systems
2K2AP	2x SPDT, separate measuring systems with 1x integrated pressure gauge each
1KPDi	1x SPDT, differential pressure
1K2APDi	1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet

### technical data

### standard version

function	mechanical pressure switch; force balance measuring system with bellows sensors
life cycle	at least 10 mio switch cycles
low pressure ranges	0 - 60 mbar to 0 - 600 mbar
normal pressure ranges	0 - 1 bar to 0 - 60 bar
high pressure ranges	0 - 100 bar to 0 - 400 bar
differential pressure	max. ration between static and differential pressure 10:1
vacuum ranges	-1...0 bar to -60...0 mbar
over pressure safety	> 1,5x FS
vacuum safety	-1 bar
material enclosure	sheet steel black, window PMMA
material wetted parts	brass or stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L)
material wetted gaskets	FKM or welded measuring system (only stainless steel version)
permissible media temperature	-20...+80°C (+130°C for stainless steel version)
permissible ambient temperature	-20...+80°C
temperature deviation	approx. 1% per 20°C
switching contact	1 or 2 switching contacts (for details please see electrical data)
adjustment accuracy	≤ 1,0% FS
switching accuracy	please see electrical data
repeatability	≤ 0,5% FS
switching differential (hysteresis)	please see electrical data
process connection	1/4" BSP male (EN837)
electrical connection	terminal blocks
weight	approx. 1,5 kg (depending on switching function and material)
protection	IP20 (optionally IP65 front-facing)

### options & accessories

special scales and units; extended overpressure safety

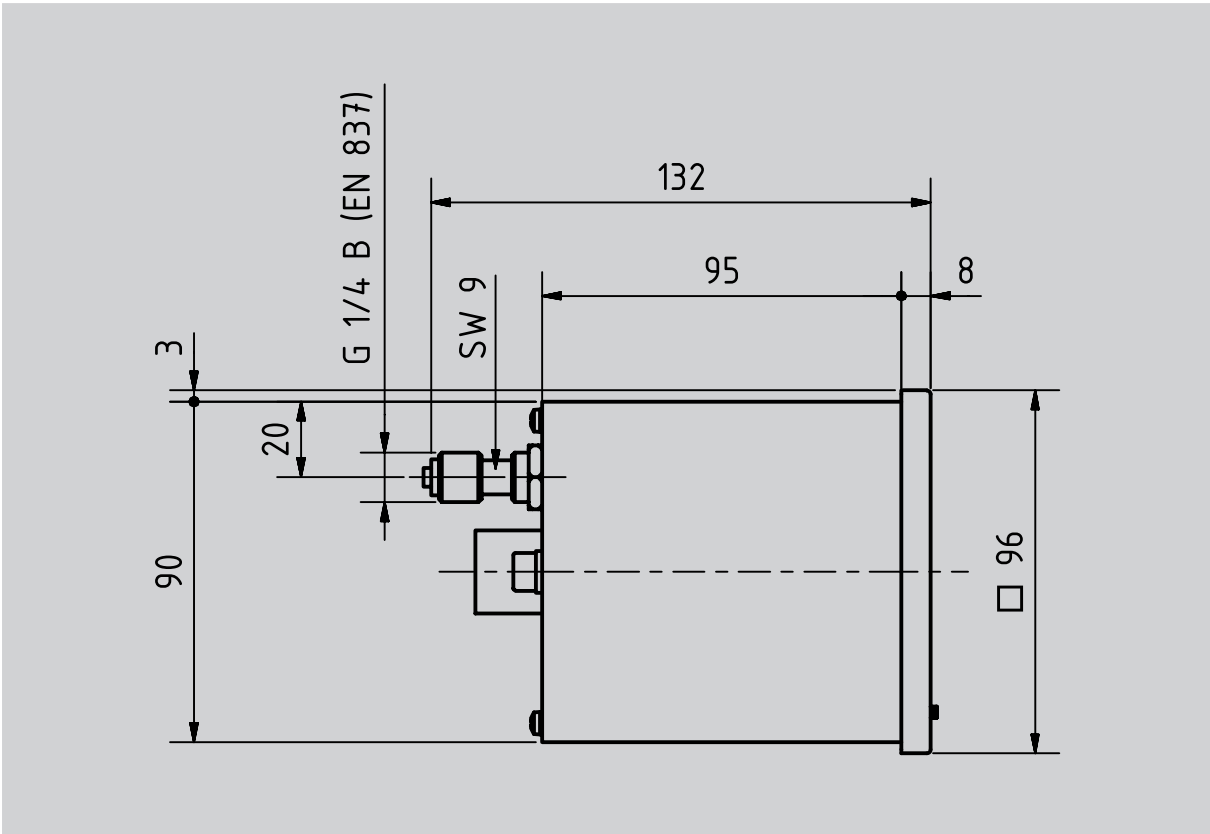
special materials; cleaned for O2 service; nonferrous metal free version

process connection: all common threads; pipe fittings; flanges

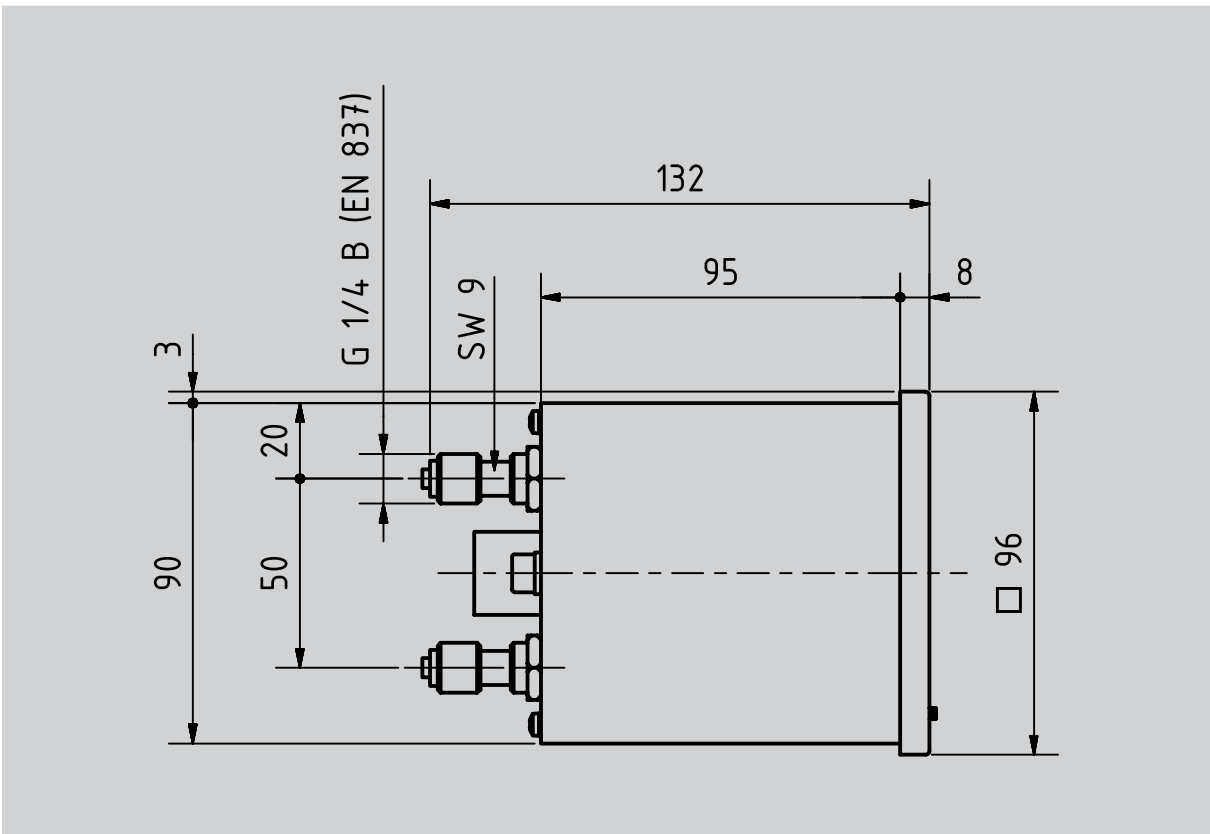
accessories: see catalogue "accessories"

**Dimensions**

**Standard version (1K, 1KA, 2K, 2KA)**



**Standard version (2KP, 2K2AP, 1KPDi, 1K2APDi)**



### Electrical data<sup>1</sup>

max. permissible steady current I max [A] - ohmic load

reference switch cycle: 30/min; reference temperature: +30°C

micro switch	U [V]	24 V	48 V	60 V	110 V	240 V	SD [%] <sup>2</sup>
Standard	I [A] AC	5	5	5	5	5	1
Standard	I [A] DC	5	2	1	0,4	0,2	1
MG <sup>3</sup>	I [A] AC	1	1	1	1	—	1,5
MG <sup>3</sup>	I [A] DC	1	0,5	0,35	0,2	—	1,5
MH	I [A] AC	5	5	5	5	5	1,5
MH	I [A] DC	2	1	0,8	0,8	0,4	1,5
CS	I [A] AC	5	5	5	5	5	2
CS	I [A] DC	5	2	1	0,4	0,2	2
CH	I [A] AC	12	12	10	10	10	2
CH	I [A] DC	10	2	1	0,4	0,2	2

### Electrical connection

micro switch	assignment for all switching functions			additional assignment for 2K-versions			GND
	+Ub	NC	NO	+Ub	NC	NO	
terminal blocks <sup>4</sup>	3	1	2	6	4	5	GND

### Remarks

1 deviant with plug M12: 24 VDC/4A - 24 VAC/3A - 1A with micro switch MG

2 typical switching differential (hysteresis) in % of full scale

3 micro switch with gold-plated contacts

4 assignment NC & NO vice-versa for vacuum ranges

**part number codes**

**codes for most common options**

<b>part number structure</b>	<b>M 0 5 b c d - e (f) - g h i</b>	
b / switching function	1K (1x SPDT)	0
b / switching function	1KA (1x SPDT, 1x integrated pressure gauge)	1
b / switching function	2K (2x SPDT)	2
b / switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
b / switching function	2KP (2x SPDT; seperate measuring systems)	4
b / switching function	2K2AP (2x SPDT; seperate measuring systems with 1x integrated pressure gauge each)	5
b / switching function	1KPDi (1x SPDT, differential pressure)	7
b / switching function	1K2APDi (1x SPDT, differential pressure, 1x integrated pressure gauge for each + & - pressure inlet)	8
c / material wetted parts	brass, FKM	1
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), FKM	2
c / material wetted parts	stainless steel 1.4571 (AISI 316Ti) / 1.4404 (AISI 316L), welded/no gasket	G
d / switching contact	Standard micro switch	A
d / switching contact	MG (micro switch with gold-plated contacts)	B
d / switching contact	MH (for higher switch load at DC)	C
d / switching contact	CS (multi purpose micro switch)	H
d / switching contact	CH (for high switch load)	G
e / pressure range	-1...0 bar	006
e / pressure range	-600...0 mbar	105
e / pressure range	-400...0 mbar	004
e / pressure range	-250...0 mbar	003
e / pressure range	-160...0 mbar	002
e / pressure range	-100...0 mbar	001
e / pressure range	-60...0 mbar	000
e / pressure range	0 - 60 mbar	010
e / pressure range	0 - 100 mbar	011
e / pressure range	0 - 160 mbar	012
e / pressure range	0 - 250 mbar	013
e / pressure range	0 - 400 mbar	014
e / pressure range	0 - 600 mbar	015
e / pressure range	0 - 1 bar	020
e / pressure range	0 - 1,6 bar	022
e / pressure range	0 - 2,5 bar	023
e / pressure range	0 - 4 bar	024
e / pressure range	0 - 6 bar	025
e / pressure range	0 - 10 bar	026
e / pressure range	0 - 16 bar	027
e / pressure range	0 - 25 bar	028
e / pressure range	0 - 40 bar	029
e / pressure range	0 - 60 bar	030
e / pressure range	0 - 100 bar	031
e / pressure range	0 - 160 bar	032
e / pressure range	0 - 250 bar	033
e / pressure range	0 - 400 bar	035

f / pressure range 2  
 differential pressure for switching functions: 1KPDi and 1K2APDi  
 2nd pressure range for switching functions: 2KP and 2K2AP  
 leave blank for all other switching functions  
 codes see „e / pressure range“



## part number codes (continued)

## codes for most common options

part number structure	M 0 5 b c d - e (f) - g h i	
g / process connection (wetted)	1/4" BSP male, brass	A
g / process connection (wetted)	1/4" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	B
g / process connection (wetted)	1/2" BSP male, brass	C
g / process connection (wetted)	1/2" BSP male, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	D
g / process connection (wetted)	compression fitting for pipe Ø6mm, steel	H
g / process connection (wetted)	compression fitting for pipe Ø6mm, stainless steel 1.4571 (316Ti) / 1.4404 (316L)	I
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), brass	T
g / process connection (wetted)	1/4" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	7
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), brass	Z
g / process connection (wetted)	1/2" -18 NPT male (ANSI B1.20.1), stainless steel 1.4571 (316Ti) / 1.4404 (316L)	V
g / process connection (wetted)	fitting for plastic tube Ø6mm	G
h / electrical connection	terminal blocks	I
i / further options	no further options	O
i / further options	cleaned for O2 service	A
i / further options	front-facing door with lock	G

## ordering example

part number structure	M 0 5 b c d - e (f) - g h i	
<b>example part number</b>	<b>M0531A-020-AIO</b>	
ID for MANOCOMB-96x96		M05
b / switching function	2KA (2x SPDT, 1x integrated pressure gauge)	3
c / material wetted parts	brass, FKM	I
d / switching contact	Standard micro switch	A
-	dash	-
e / pressure range	0 - 1 bar	020
-	dash	-
g / process connection (wetted)	1/4" BSP male, brass	A
h / electrical connection	terminal blocks	I
i / further options	no further options	O

**Conversion table for pressure units**

	Standard International Units						Technical Units					
	mbar	bar	Pa	kPa	MPa		mm WC	m WC	kp/cm <sup>2</sup>	atm	Torr	psi
Standard International Units	mbar	•	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>
	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
	Pa	0,01	•	•	0,0001		0,10197	0,10197 x 10 <sup>-3</sup>	0,10197 x 10 <sup>-6</sup>	9,8692 x 10 <sup>-6</sup>	7,5006 x 10 <sup>-3</sup>	0,14504 x 10 <sup>-3</sup>
	kPa	10	1.000	•	•		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
	MPa	10.000	1.000.000	1.000	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>
Technical Units	mm WS	98,067 x 10 <sup>-3</sup>	98,067	9,8067	9,8067 x 10 <sup>-3</sup>	9,8067 x 10 <sup>-6</sup>	•	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	9,8067 x 10 <sup>3</sup>	9,8067	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/cm <sup>2</sup>	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>	10 <sup>-1</sup>	10	•	0,96784	735,56	14,223
	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
	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>
	psi	68,948	68,948 x 10 <sup>3</sup>	6,8948 x 10 <sup>7</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	•

### Inquiry checklist

#### your data

Last Name, First Name	Telephone	Fax	E-Mail
Company Name	Street	Post Code	City
Inquiry-No.	Project-No.	special instructions	

#### general design

Application	medium to be measured	medium temperature (Tmin / Tmax)	ambient temperature (Tmin / Tmax)
wetted parts material	material enclosure	Pressure range (Pmin / Pmax)	vacuum? <input type="checkbox"/> yes <input type="checkbox"/> no
special instructions / requirements			

#### pressure switch design

Model	Variant <input type="checkbox"/> mechanical / electrical <input type="checkbox"/> electronic <input type="checkbox"/> mechanical / pneumatic	ATEX-version <input type="checkbox"/> no <input type="checkbox"/> Zone 1/21 <input type="checkbox"/> Zone 2/22	ATEX-ignition protection <input type="checkbox"/> no <input type="checkbox"/> Ex i (intrinsically safe) <input type="checkbox"/> Ex d (flame-proof)
Quantity of switching contacts <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> _____	Type of switching contacts <input type="checkbox"/> micro switch <input type="checkbox"/> inductive contact <input type="checkbox"/> pneumatic	switch load	additional functions <input type="checkbox"/> actual value indicator <input type="checkbox"/> switch-off interlock <input type="checkbox"/> analogue output
Pressure range	Differential pressure <input type="checkbox"/> no <input type="checkbox"/> _____	overpressure safety <input type="checkbox"/> 1,5x FS <input type="checkbox"/> _____	factory (pre-)adjusted set point(s)
process connection <input type="checkbox"/> BSP-thread (EN 837) <input type="checkbox"/> thread (ASME B1.20) <input type="checkbox"/> thread (DIN 3852) <input type="checkbox"/> _____	<input type="checkbox"/> male <input type="checkbox"/> female <input type="checkbox"/> 1/4" <input type="checkbox"/> 1/2" <input type="checkbox"/> _____	electrical connection <input type="checkbox"/> terminal blocks <input type="checkbox"/> plug ISO 4400 <input type="checkbox"/> plug HARTING H7 <input type="checkbox"/> plug HARTING H8	<input type="checkbox"/> plug M12 <input type="checkbox"/> cable _____ Meter <input type="checkbox"/> _____
approvals / certificate			
other / further information / requirements			

#### Request for quotation

required pieces	demand for <input type="checkbox"/> annual <input type="checkbox"/> frequent project based <input type="checkbox"/> one-time <input type="checkbox"/> spare part	quotation required until	please call me for / to <input type="checkbox"/> technical support <input type="checkbox"/> make an appointment
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