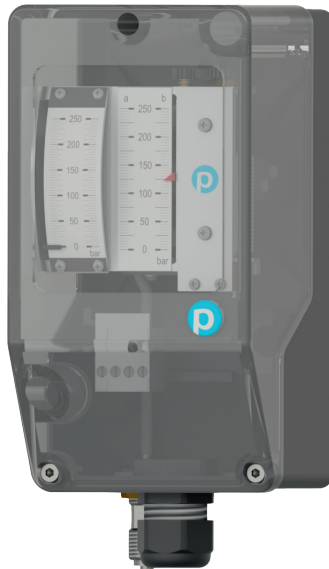


**MANOCOMB® Precision Pressure Switch Model IP65**



**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  
 VdTÜV 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. ratio 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

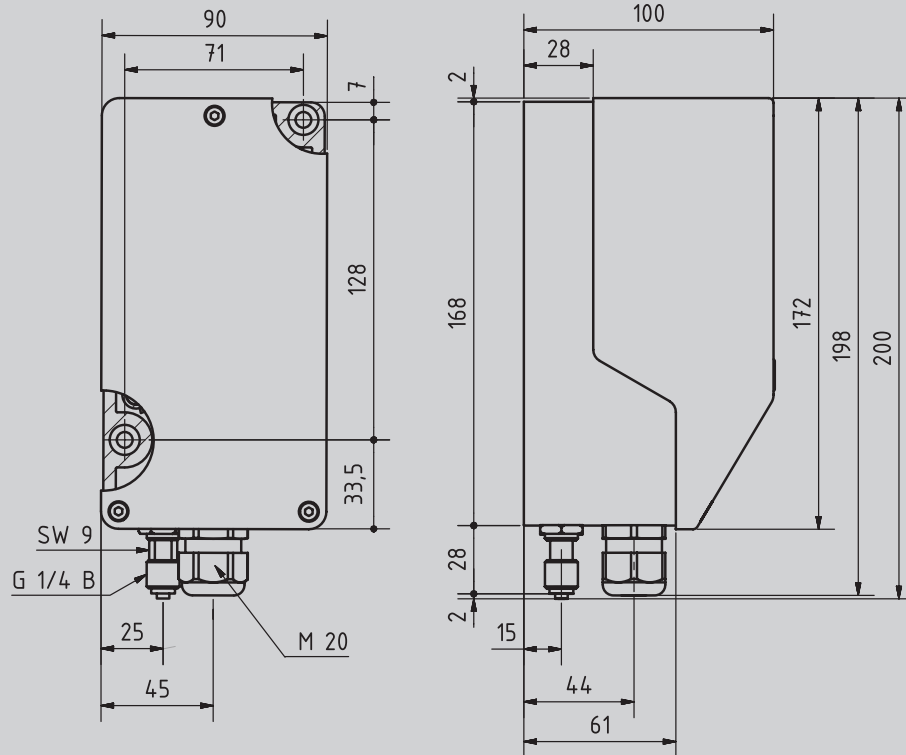
process connection: all common threads; pipe fittings; flanges

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

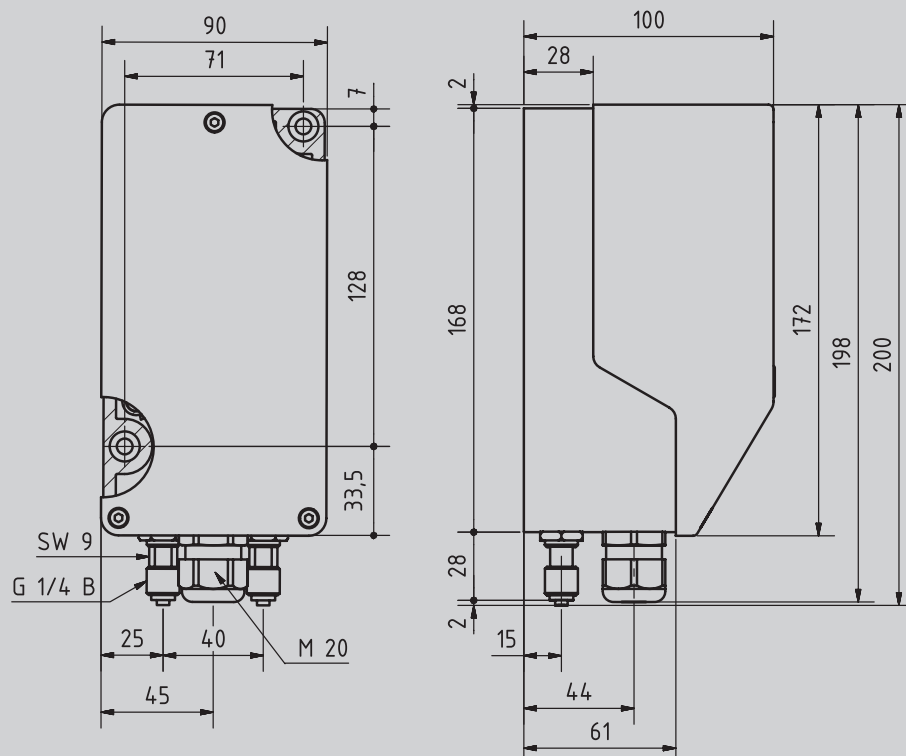
accessories: see catalogue "accessories"

## Dimensions

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

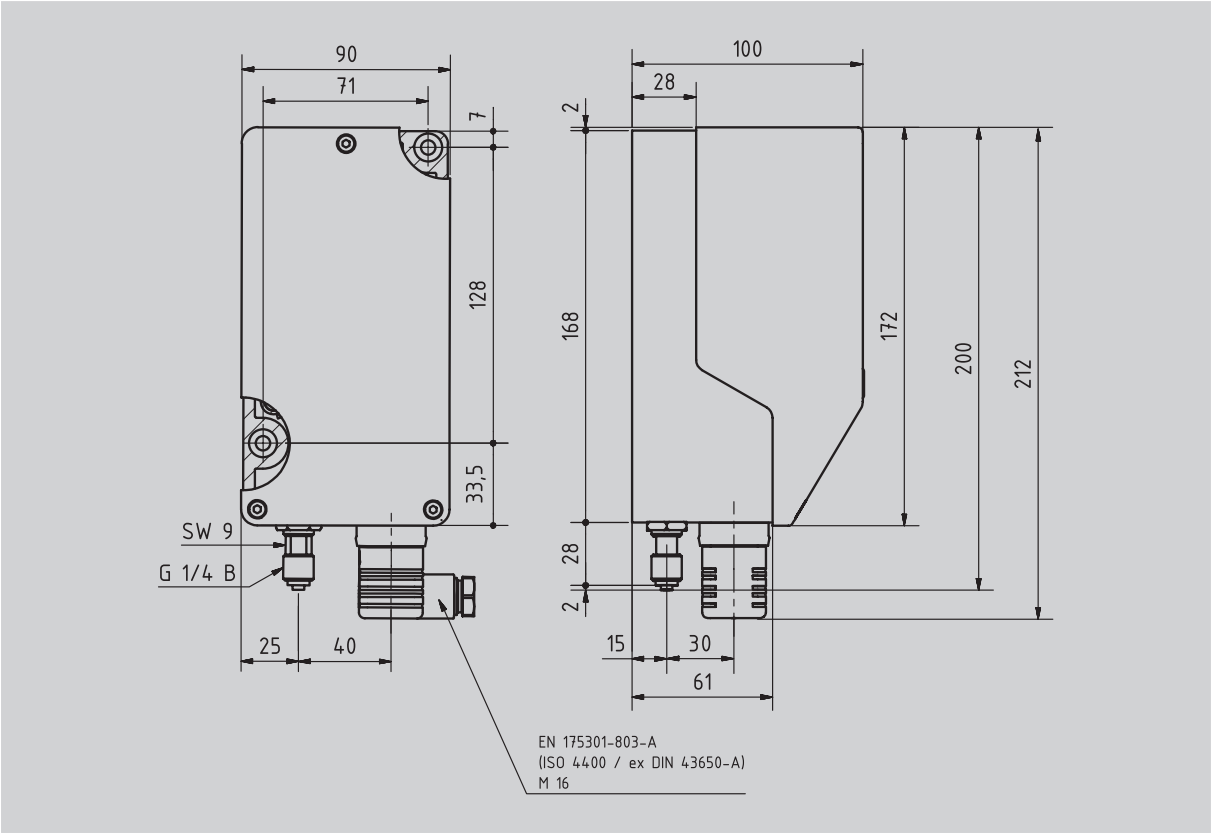


### Standard version (2KP, 2K2AP, 1KPDi, 1K2APDi)



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

|                                                        |                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>description</b>                                     | <p>With limiter functions, it is absolutely necessary to maintain the switch-off state and to lock it.<br/>Only after eliminating the cause that led to the shutdown, the lock may be released and the system again put into operation.</p>                                                                                   |
| <b>Safety Pressure Limiter with external interlock</b> | <p>on safety pressure limiters with external interlock, the switch-off state is realized for example via a next in line control.<br/>For suggestions on implementing an external interlock, please contact our sales team.</p>                                                                                                |
| <b>Safety Pressure Limiter with internal interlock</b> | <p>on safety pressure limiters with internal interlock, the switch-off state is locked within the pressure limiter.<br/>With the manual reset on the device, the locking state is released.<br/>An external lock is not necessary.</p> <p>For pressure limiters with internal interlock, see MANOCOMB-IP65/CV on page 22.</p> |

### 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<br>2nd pressure range for switching functions: 2KP and 2K2AP<br>leave blank for all other switching functions<br>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   |