# DMK 331

## Industrial Pressure Transmitter

Ceramic Sensor

accuracy according to IEC 60770:
0.5 % FSO

### Nominal pressure

from 0 ... 400 mbar up to 0 ... 600 bar

### Output signals

2-wire: 4 ... 20 mA
3-wire: 0 … 20 mA / 0 … 10 V
others on request

### Special characteristics

- pressure port G 1/2" flush for pasty and polluted media
- pressure port G 1/2" open port PVDF for aggressive media
- oxygen application

### Optional versions

- IS-version
  Ex ia = intrinsically safe for gases and dusts
- SIL 2
  according to IEC 61508 / IEC 61511
- customer specific versions

The industrial pressure transmitter DMK 331 with ceramic sensor has been especially designed for pasty, polluted or aggressive media and for oxygen applications at low pressure range.

As with all industrial pressure transmitters made by BD|SENSORS, you may choose between various electrical and mechanical connections also on DMK 331.

### Preferred areas of use are

- Plant and machine engineering
- Energy industry
- Environmental engineering
  (water - sewage - recycling)
- Medical technology

| **Input pressure range** [1] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal pressure gauge | [bar] | -1…0 | 0.4 | 0.6 | 1 | 1,6 | 2,5 | 4 | 6 | 10 | 16 | 25 | 40 | 60 | 100 | 160 | 250 | 400 | 600 |
| Nominal pressure absolute | [bar] | - | - | 0.6 | 1 | 1,6 | 2,5 | 4 | 6 | 10 | 16 | 25 | 40 | 60 | 100 | 160 | 250 | 400 | 600 |
| Overpressure | [bar] | 4 | 1 | 2 | 2 | 4 | 4 | 10 | 10 | 20 | 40 | 40 | 100 | 100 | 200 | 400 | 400 | 600 | 800 |
| Burst pressure ≥ | [bar] | 7 | 2 | 4 | 4 | 5 | 7,5 | 12 | 18 | 30 | 50 | 75 | 120 | 180 | 300 | 500 | 750 | 1000 | 1100 |
| Vacuum resistance | | $p_N \geq 1$ bar: unlimited vacuum resistance | | | | | | | | | | $p_N < 1$ bar: on request | | | | | | | |
| [1] *PVDF pressure port possible for nominal pressure ranges up to 60 bar* | | | | | | | | | | | | | | | | | | | |

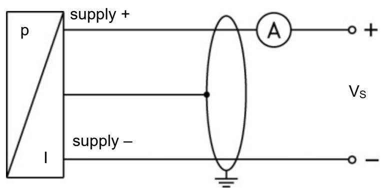
| **Output signal / Supply** | | |
|---|---|---|
| Standard | 2-wire: 4 ... 20 mA / $V_S$ = 8 ... 32 $V_{DC}$ | SIL-version: $V_S$ = 14 ... 28 $V_{DC}$ |
| Option IS-protection | 2-wire: 4 ... 20 mA / $V_S$ = 10 ... 28 $V_{DC}$ | SIL-version: $V_S$ = 14 ... 28 $V_{DC}$ |
| Options 3-wire | 3-wire: 0 ... 20 mA / $V_S$ = 14 ... 30 $V_{DC}$<br>0 ... 10 V / $V_S$ = 14 ... 30 $V_{DC}$ | |
| **Performance** | | |
| Accuracy [2] | ≤ ± 0.5 % FSO | |
| Permissible load | current 2-wire: $R_{max} = [(V_S – V_{S\ min}) / 0.02\ A]\ \Omega$<br>current 3-wire: $R_{max} = 240\ \Omega$<br>voltage 3-wire: $R_{min} = 10\ k\Omega$ | |
| Influence effects | supply: 0.05 % FSO / 10 V<br>load: 0.05 % FSO / kΩ | |
| Long term stability | ≤ ± 0.3 % FSO / year at reference conditions | |
| Response time | 2-wire: ≤ 10 msec<br>3-wire: ≤ 3 msec | |
| [2] *accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)* | | |
| **Thermal effects (offset and span)** | | |
| Thermal error | ≤ ± 0.2 % FSO / 10 K | |
| in compensated range | 0 ... 85 °C | |
| **Permissible temperatures** | | |
| Medium [3] | -40 ... 125 °C | |
| Electronics / environment | -40 ... 85 °C | |
| Storage | -40 ... 100 °C | |
| [3] *for pressure port in PVDF the medium temperature is -30 … 60 °C* | | |
| **Electrical protection** | | |
| Short-circuit protection | permanent | |
| Reverse polarity protection | no damage, but also no function | |
| Electromagnetic compatibility | emission and immunity according to EN 61326 | |
| **Mechanical stability** | | |
| Vibration | 20 g RMS / 10 ... 2000 Hz | according to DIN EN 60068-2-6 |
| Shock | 500 g / 1 msec half sine | according to DIN EN 60068-2-27 |
| **Materials** | | |
| Pressure port | standard: stainless steel 1.4404 (316 L)<br>optional for G1/2" open port (for $p_N \leq 60$ bar): PVDF | <br>others on request |
| Housing | stainless steel 1.4404 (316 L) | |
| Option compact field housing | stainless steel 1.4301 (304); cable gland M12x1.5, brass, nickel plated (clamping range 2 … 8 mm) | |
| Seals | standard: FKM<br>option: EPDM (for $p_N \leq 160$ bar) | <br>others on request |
| Diaphragm | ceramic $Al_2O_3$ 96 % | |
| Media wetted parts | pressure port, seals, diaphragm | |
| **Explosion protection (only for 4 … 20 mA / 2-wire)** | | |
| Approval<br>DX19-DMK 331 | IBExU 10 ATEX 1068 X / IECEx IBE 12.0027X<br>stainless steel pressure port:<br>zone 0: II 1G Ex ia IIC T4 Ga<br>zone 20: II 1D Ex ia IIIC T135 °C Da<br>plastic pressure port:<br>zone 1: II 2G Ex ia IIC T4 Gb<br>zone 21: II 2D Ex ia IIIC T85°C Db | |
| Safety technical maximum values | $U_i = 28\ V_{DC}$, $I_i = 93$ mA, $P_i = 660$ mW, $C_i \approx 0$ nF, $L_i \approx 0$ μH,<br>the supply connections have an inner capacity of max. 27 nF to the housing | |
| Permissible temperatures for environment | in zone 0: -20 ... 60 °C with $p_{atm}$ 0.8 bar up to 1.1 bar<br>in zone 1 or higher: -40/-20 ... 70 °C | |
| Connecting cables<br>(by factory) | cable capacitance: signal line/shield also signal line/signal line: 160 pF/m<br>cable inductance: signal line/shield also signal line/signal line: 1μH/m | |

| **Miscellaneous** | | |
|---|---|---|
| Option SIL2 version [4] | according to IEC 61508 / IEC 61511 | |
| Option oxygen application | for $p_N \leq 25$ bar: O-ring in FKM Vi 567 (with BAM-approval);<br>permissible maximum values are 25 bar / 150° C | |
| Current consumption | signal output current: max. 25 mA | signal output voltage: max. 7 mA |
| Weight | approx. 140 g | |
| Installation position | any | |
| Operational life | 100 million load cycles | |
| CE-conformity | EMC Directive: 2014/30/EU | Pressure Equipment Directive: 2014/68/EU (module A) [5] |
| ATEX Directive | 2014/34/EU | |

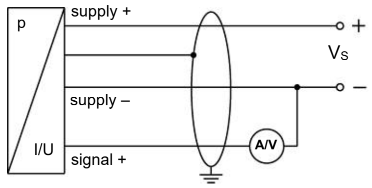
[4] *only for 4 … 20 mA / 2-wire*
[5] *this directive is only valid for devices with maximum permissible overpressure > 200 bar*

## Wiring diagrams

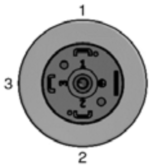
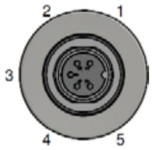
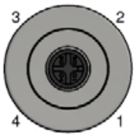
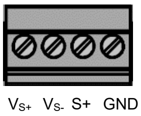
2-wire-system (current)



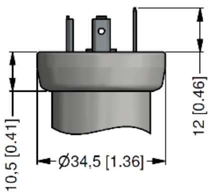
3-wire-system (current / voltage)



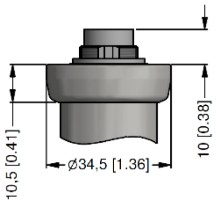
## Pin configuration

| Electrical connection | ISO 4400 | | Binder 723 (5-pin) | M12x1 / metal (4-pin) | compact field housing | cable colour (IEC 60757) |
|---|---|---|---|---|---|---|
| |  | |  |  |  | |
| Supply +<br>Supply –<br>Signal + (only for 3-wire) | 1<br>2<br>3 | | 3<br>4<br>1 | 1<br>2<br>3 | $V_S$+<br>$V_S$-<br>S+ | WH (white)<br>BN (brown)<br>GN (green) |
| Shield | ground pin | ⏚ | 5 | 4 | GND | GNYE (green-yellow) |

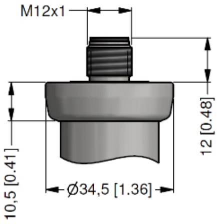
## Electrical connections (dimensions mm / in)



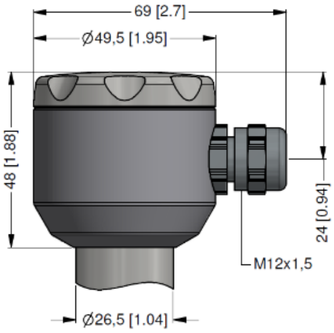
ISO 4400
(IP 65)



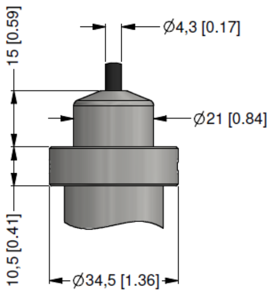
Binder Serie 723, 5-pin
(IP 67)



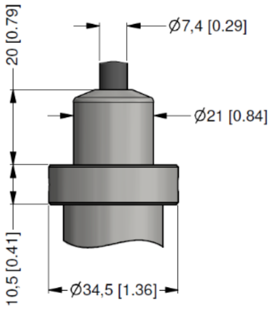
M12x1, 4-pin
(IP 67)



compact field housing
(IP 67)



cable outlet
with PVC-cable (IP 67) [6]



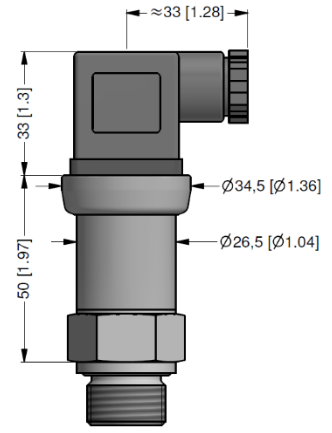
cable outlet, cable with
ventilation tube (IP 68) [7]

⇨ **universal field housing stainless steel 1.4404 (316 L) with cable gland M20x1.5 (ordering code 880) and other versions on request**

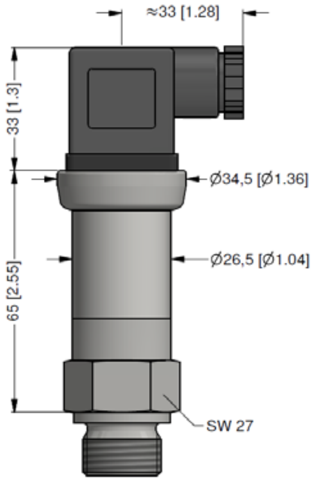
[6] *standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C)*
[7] *different cable types and lengths available, permissible temperature depends on kind of cable*

## Dimensions (mm / in)

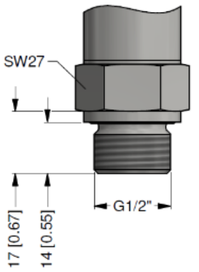
**Standard**



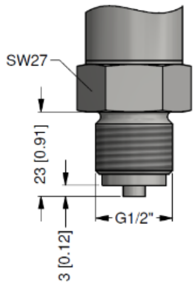
**SIL- and SIL-IS version**



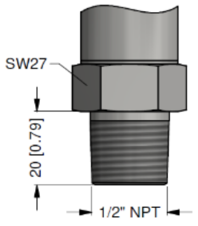
## Mechanical connection (dimensions mm / in)



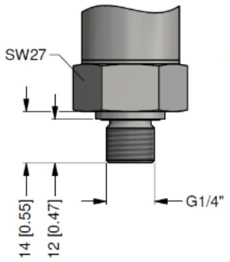
G1/2" DIN 3852



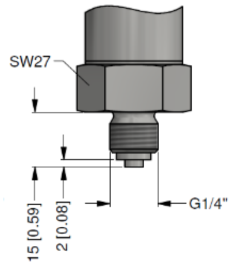
G1/2" EN 837



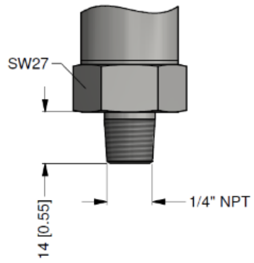
1/2" NPT



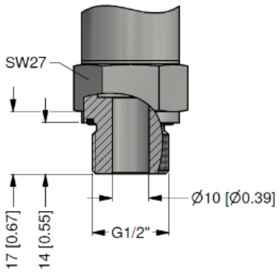
G1/4" DIN 3852



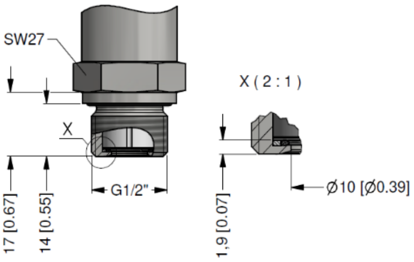
G1/4" EN 837



1/4" NPT



G1/2" open port DIN 3852



G1/2" semi-flush DIN 3852 [8]

⇨ **metric threads and other versions on request**

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[8] *possible for nominal pressure ranges $p_N \leq 60$ bar; absolute pressure ranges on request*

# Ordering code DMK 331

| DMK 331 | ☐☐☐-☐☐☐☐-☐-☐-☐☐☐-☐☐☐-☐-☐-☐-☐☐☐ | |
|---|---|---|
| **Pressure** | | |
| gauge | 2 5 0 | |
| absolute | 2 5 1 | |
| **Input** [bar] | | |
| 0.4 | 4 0 0 0 | |
| 0.6 | 6 0 0 0 | |
| 1.0 | 1 0 0 1 | |
| 1.6 | 1 6 0 1 | |
| 2.5 | 2 5 0 1 | |
| 4.0 | 4 0 0 1 | |
| 6.0 | 6 0 0 1 | |
| 10 | 1 0 0 2 | |
| 16 | 1 6 0 2 | |
| 25 | 2 5 0 2 | |
| 40 | 4 0 0 2 | |
| 60 | 6 0 0 2 | |
| 100 | 1 0 0 3 | |
| 160 | 1 6 0 3 | |
| 250 | 2 5 0 3 | |
| 400 | 4 0 0 3 | |
| 600 | 6 0 0 3 | |
| -1 … 0 | X 1 0 2 | |
| customer | 9 9 9 9 | consult |
| **Output** | | |
| 4 … 20 mA / 2-wire | 1 | |
| 0 … 20 mA / 3-wire | 2 | |
| 0 … 10 V / 3-wire | 3 | |
| intrinsic safety 4 … 20 mA / 2-wire | E | |
| SIL2 4 … 20 mA / 2-wire | 1S | |
| SIL2 with intrinsic safety 4 … 20 mA / 2-wire | ES | |
| customer | 9 | consult |
| **Accuracy** | | |
| 0.5 % FSO | 5 | |
| customer | 9 | consult |
| **Electrical connection** | | |
| male and female plug ISO 4400 | 1 0 0 | |
| male plug Binder series 723 (5-pin) | 2 0 0 | |
| cable outlet with PVC cable (IP67) [1] | T A 0 | |
| cable outlet, cable with ventilation tube (IP68) [2] | T R 0 | |
| male plug M12x1 (4-pin) / metal | M 1 0 | |
| compact field housing stainless steel 1.4301 (304) | 8 5 0 | |
| customer | 9 9 9 | consult |
| **Mechanical connection** [3] | | |
| G1/2" DIN 3852 | 1 0 0 | |
| G1/2" EN 837 | 2 0 0 | |
| G1/4" DIN 3852 | 3 0 0 | |
| G1/4" EN 837 | 4 0 0 | |
| G1/2" DIN 3852 with semi-flush sensor [4] | F 0 0 | |
| G1/2" DIN 3852 open pressure port | H 0 0 | |
| 1/2" NPT | N 0 0 | |
| 1/4" NPT | N 4 0 | |
| customer | 9 9 9 | consult |
| **Seal** | | |
| FKM | 1 | |
| EPDM [5] | 3 | |
| customer | 9 | consult |
| **Pressure port** | | |
| stainless steel 1.4404 (316L) | 1 | |
| PVDF [6] | B | |
| customer | 9 | consult |
| **Diaphragm** | | |
| ceramics $Al_2O_3$ 96 % | 2 | |
| customer | 9 | consult |
| **Special version** | | |
| standard | 0 0 0 | |
| oxygen application [7] | 0 0 7 | |
| customer | 9 9 9 | consult |

[1] standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C); others on request

[2] code TR0 = PVC cable, cable with ventilation tube available in different types and lengths

[3] metric threads and others on request

[4] possible for nominal pressure ranges $p_N \le 60$ bar; absolute pressure ranges on request

[5] possible for nominal pressure ranges $p_N \le 160$ bar

[6] PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar); permissible medium temperature: -30 … 60 °C

[7] oxygen application with FKM-seal up to 25 bar possible

02.02.2023