EN

BD|SENSORS
pressure measurement

Operating Manual CE

Differential Pressure Transmitter DMD 831

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Table of contents

1. General information

1.1 Information on the operating manual

This operating manual contains important information on proper usage of the device. Read this operating manual carefully before installing and starting up the pressure measuring device.

Adhere to the safety notes and operating instructions which are given in the operating manual. Additionally applicable regulations regarding occupational safety, accident prevention as well as national installation standards and engineering rules must be complied with!

This operating manual is part of the device, must be kept nearest its location, always accessible to all employees.

This operating manual is copyrighted. The contents of this operating manual reflect the version available at the time of printing. It has been issued to our best knowledge. BD SENSORS is not liable for any incorrect statements and their effects.

– Technical modifications reserved –

1.2 Symbols used

⚠ **DANGER!** – dangerous situation, which may result in death or serious injuries

⚠ **WARNING!** – potentially dangerous situation, which may result in death or serious injuries

⚠ **CAUTION!** – potentially dangerous situation, which may result in minor injuries

⚠ **CAUTION!** – potentially dangerous situation, which may result in physical damage

☞ NOTE – tips and information to ensure a failure-free operation

1.3 Target group

⚠ **WARNING!** To avoid operator hazards and damages of the device, the following instructions have to be worked out by qualified technical personnel.

1.4 Limitation of liability

By non-observance of the operating manual, inappropriate use, modification or damage, no liability is assumed and warranty claims will be excluded.

1.5 Intended use

- The differential pressure transmitters DMD 831 are planned for industrial uses. The compact construction form of the differential pressure transmitter permits the easy integration also in arrangements and machines with limited place relations.
- Base elements of the DMD 831 are two piezoresistive stainless steel sensors.
- With on both sides pressure admission, the difference of the pressure will be formed between positive and negative side and will be converted into a proportional electric signal.
- The DMD 831 is used among other things in the machine construction and plant construction for the filter supervision and flow measurement as well as in hydraulic uses.
- As measuring media are acceptable the liquids and the gases, which are suited with the seal material as well as stainless steel 1.4404 and 1.4435.
- It is the operator's responsibility to check and verify the suitability of the device for the intended application. If any doubts remain, please contact our sales department in order to ensure proper usage. BD SENSORS is not liable for any incorrect selections and their effects!
- The technical data listed in the current data sheet are engaging and must be complied with. If the data sheet is not available, please order or download it from our homepage. (http://www.bdsensors.com)

⚠ **WARNING!** – Danger through improper usage!

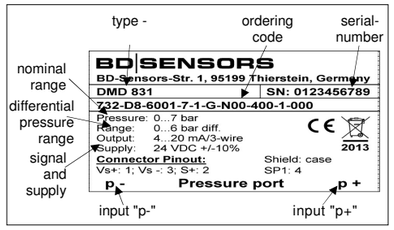
1.6 Package contents

Please verify that all listed parts are undamaged included in the delivery and check for consistency specified in your order:

- Differential Pressure Transmitter DMD 831
- Mounting bracket + 2 screws
- Operating Manual DMD 831

2. Product identification

The device can be identified by its manufacturing label. It provides the most important data. By the ordering code the product can be clearly identified. The programme version of the firmware, (e. g. P07) will appear for about 1 second in the display after starting up the device. Please hold it ready for inquiry calls.



00Fig. 1 manufacturing label

☞ The manufacturing label must not be removed from the device!

3. Mechanical installation

3.1 Mounting and safety instructions

⚠ **WARNING!** Install the device only when currentless!

⚠ **WARNING!** This device may only be installed by qualified technical personnel who has read and understood the operating manual!

☞ Handle this high-sensitive electronic precision measuring device with care, both in packed and unpacked condition!

☞ There are no modifications/changes to be made on the device.

☞ Do not throw the package/device!

☞ Remove packaging only directly before starting up the device to avoid any damage!

☞ Do not use any force when installing the device to prevent damage of the device and the transmitter!

☞ The display and the plastic housing are equipped with rotational limiters. Please do only rotate the display or the housing within the limit.

3.2 General installation steps

- Carefully remove the pressure measuring device from the package and dispose of the package properly.
- Connect the reference pressures according to the following mounting steps, conformable of your mechanical connections. It is important to note that:
  - the higher pressure must be connected at the input "+"
  - the lower pressure must be connected at the input "-"

3.3 Installation steps according to DIN 3852

☞ DO NOT USE ANY ADDITIONAL SEALING MATERIALS, LIKE YARN, HEMP OR TEFLON TAPE!

- Control both mechanical connections, whether the o-ring properly sits in the groove. (o-rings belong to the scope of supply.)
- Ensure that the sealing surface of the taking part is perfectly smooth and clean. (RZ 3.2)
- Screw the device into the corresponding thread by hand.
- Hold on the DMD 831 with a hand to the key surface SW 27 of the respective mechanical connection and tighten your fittings successively (wrench size of steel: G1/4": approx. 5 Nm; G1/2": approx. 10 Nm).
- The indicated tightening torques must not be exceeded!

3.4 Installation steps according to EN 837

- Use a suitable seal, corresponding to the medium and the pressure input (e. g. a copper gasket).
- Ensure that the sealing surface of the taking part is perfectly smooth and clean. (RZ 6.3)
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for G1/4": approx. 20 Nm; for G1/2": approx. 50 Nm).
- The indicated tightening torques must not be exceeded!

3.5 Installation steps for NPT

- Use a suitable seal (e. g. a PTFE-strip).
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for 1/4" NPT: approx. 30 Nm; for 1/2" NPT: approx. 70 Nm).
- The indicated tightening torques must not be exceeded!

3.6 Mounting with mounting bracket

With the mounting bracket the DMD 831 can be mounted on smooth surfaces / walls.

The mounting bracket is screwed below onto the plastic housing of the DMD 831. Remove the blind caps and use the added screws.

4. Electrical Installation

⚠ **WARNING!** Install the device only when currentless!

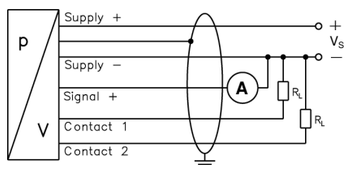
Connect the device accordingly of your electric connection, with the help of the pin configuration table and the wiring diagram, electrically.

☞ At devices with cable gland connection as well as cable tins, must be respected to the fact, that the external diameter of the used wire must lie within the allowed clamp area. Moreover, must be made sure, that this firmly and freely of gap sits in the cable screw connection!

4.1 Pin configuration

electrical connections	M12x1 (5-pin)	cable colours
supply +	1	wh (white)
supply –	3	bn (brown)
3-wire: signal +	2	gn (green)
contact 1	4	gy (gray)
contact 2	5	pk (pink)
shield	pressure port	ye/gn (yellow/ green)

4.2 Wiring diagram



☞ For the electrical connection a shielded and twisted multicore cable is recommended.

5. Initial start-up

At the introduction of your differential pressure transmitter must be paid attention to the fact, that the device will be admissioned in both mechanical connections at the same time with the pressure. At one-side pressure admission, the maximal allowed static pressure (one-side) should be considered (see attached technical data).

⚠ **WARNING!** Before start-up, the user has to check for proper installation and for any visible defects.

⚠ **WARNING!** The device can be started and operated by authorized personnel only, who have read and understood the operating manual!

⚠ **WARNING!** The device has to be used within the technical specifications, only (compare the data in the data sheet)!

6. Operation

6.1 Operating and display elements

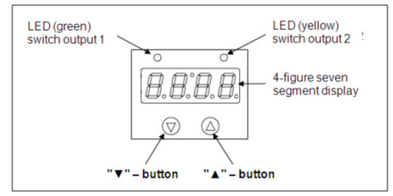


Fig. 3 service foil

The display owns to the displaying of the active switch output for switch output 1 a green LED and for switch output 2 (optional) a yellow LED. If someone of these LED's shines, the respective switch point is reached and the switch output is active.

The displaying of the measuring value as well as configuring the single parameters occurs menu-driven by a 4-figure seven segment display. The single functions are regulated on the basis of two-front-sided arranged miniature push buttons:

- **"▲"** – button: with this button you move in the menu system forward or you raise the display value
- **"▼"** – button: with this button you move in the menu system backward or you reduce display value.
- both buttons at the same time: if you press both buttons at the same time, you can change between display mode and configuration mode and confirm a menu point or an adjusted value.

☞ With the adjusting of the values you can raise the countable speed, while you low-spiritedly hold the respective button ("▲" or "▼") longer than 5 seconds.

6.2 Configuration

The menu system is closed in itself, so that someone can turn the leaves forward as well as backward by the single setting menus to reach to the desired setting point. All settings are stored permanently in an EEPROM and are available therefore also after separation of the supply again. The menu system and the menu points were formed so simply as possible. In the following every single menu point is described in detail by which an easy and a quick configuration of your device are possible. The construction of the menu systems differs by the fact, that the grey deposited menus are available only with two switch outputs or analog output.

☞ Please keep exactly to the descriptions and note that changes become effective in the adjustable parametres (switch on point, switch off point etc.) only after activity of both buttons and after abandonment of the menu point.

6.3 Password system

The terminal box is provided with an access protection, so that the menu system can be served only by the authorized person.

- If you activate the password, the complete menu system is closed.
- If the access protection is lifted by the password, the complete menu is released.

☞ You can activate the password about menu "PAon" or "PAof" and deactivate.

☞ You can change the password about the special menu 4.

☞ In the case that the password has been lost, the device must be returned to the manufacturer.

6.4 Unit

The unity of the shown measuring value is already fixed at the time of the order by the desired measuring area.

6.5 Configuration example of analogue output (optional)

With the help of the menus ZP and EP the analog output can be configured (if available). In the following, the function of these menus should be made clear at an example:

Accepted someone has a differential pressure transmitter with a nominal pressure range 0... 6 bar, which is connected to P1. The analogous signal amounts to 4 ... 20 mA / 3-wire and were configured in the menu 26 "SiAn" on "P1".

Factory-sided, the following signal behavior is put:

0 bar = 4.00 mA 3 bar = 12.00 mA 6bar= 20 mA

If someone changes the value in the menu ZP from 0 to 1 and the value in the menu EP from 6 to 5, the following signal behavior will appear:

1 bar = 4.00 mA 3 bar = 12.00 mA 5bar= 20 mA

☞ The values of the menus ZP and EP are adjustable up to the relation 1:10 of the nominal pressure range.

6.6 Hysteresis and comparing mode

To invert the respective modes, you have to exchange the values for the switch-on and switch-off points.

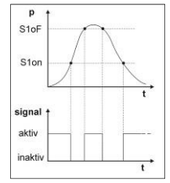


Fig. 4 compare mode inverted

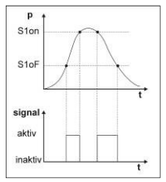


Fig. 5 compare mode

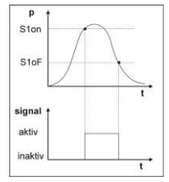


Fig. 6 hysteresis mode

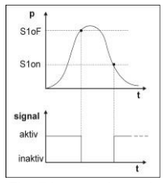
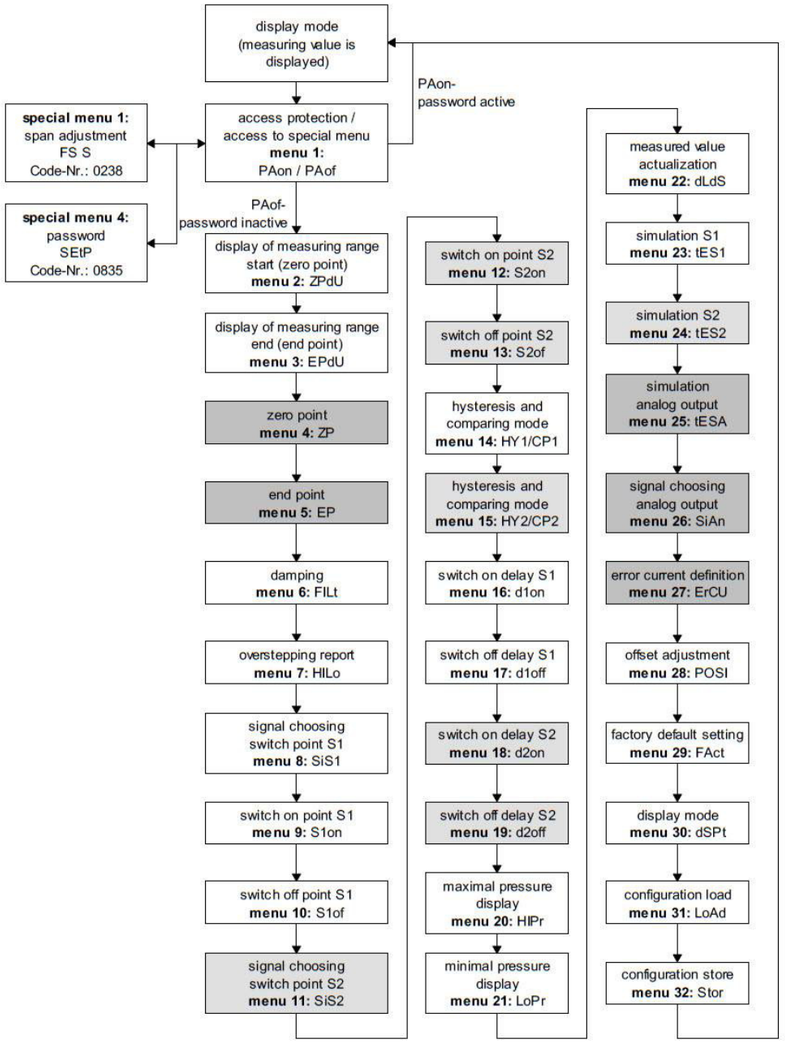


Fig. 7 hysteresis mode inverted

6.6. Structure of the menu system



6.7 Menu list

PAon PAoF	**menu 1 – access protection** PAon ➔ password **active** ➔ to deactivate: set password PAof ➔ password **inactive** ➔ to activate: set password ☞default setting for the password is „**0005**"; modification of the password is described in special menu 4
ZPdU	**menu 2 – displaying of measuring range start** defined by order; no input option
EPdU	**menu 3 – displaying of measuring range end** defined by order; no input option
ZP EP	**menu 4 and 5 – set zero point / end point** The configuration of the zero point causes a changing of the analogue output, whereas the display value remains unchanged. (zero and end point can be configured within the limits of the nominal pressure range, according to the manufacturing label)
FILt	**menu 6 – setting of damping (filter)** this function allows getting a constant display value although the measuring values may vary considerably; the time constant for a simulated low-pass filter can be set (0.3 up to 30 sec permissible)
HILo	**menu 7 – activation of overstepping report** set "on" or "off"
SiS1	**menu 8 – signal choosing of switch output 1** P1", "P2" (the switch point reacts to the static pressure at the suitable input) or "DIFF" (difference pressure between P1 and P2)
S1on	**menu 9 – setting of switch-on point (switch output 1)** set value for activation of contact 1 (S1on)
S1oF	**menu 10 – setting of switch-off point (switch output 1)** set value for deactivation of contact 1 (S1oF)
SiS2	**menu 11 – signal choosing of switch output 2** P1", "P2" or "DIFF"
S2on	**menu 12 – setting of switch-on point (switch output 2)** set value for activation of contact 2 (S2on)
S2oF	**menu 13 – setting of switch-off point (switch output 2)** set value for deactivation of contact 2 (S2oF)
HY 1 CP 1	**menu 14 – selecting hysteresis or comparing mode (switch output 1)** for switch output set 1 hysteresis mode (HY 1) or comparing mode (CP 1) ☞ compare "6.6 hysteresis and comparing mode"
HY 2 CP 2	**menu 15 – selecting hysteresis or comparing mode (switch output 2)** for switch output set 2 hysteresis mode (HY 2) or comparing mode (CP 2) ☞ compare "6.6 hysteresis and comparing mode"
d1on	**menu 16 – setting of switch on delay (switch point 1)** set the value of switch on delay after reaching contact 1 (d1on); (0 up to 100 sec permissible)
d1oF	**menu 17 – setting of switch off delay (switch point 1)** set the value of switch off delay after reaching contact 1 (d1oF); (0 up to 100 sec permissible)
d2on	**menu 18 – setting of switch on delay (switch point 2)** set the value of switch on delay after reaching contact 2 (d2on); (0 up to 100 sec permissible)
d2oF	**menu 19 – setting of switch off delay (switch point 2)** set the value of switch off delay after reaching contact 2 (d2on); (0 up to 100 sec permissible)
HiPr LoPr	**menu 20 and 21 – maximum / minimum value display** view high pressure (HiPr) or low pressure (LoPr) during the measurement process (the value will not remain stored if the power supply is interrupted) ☞to erase: push both buttons again within one second
dLdS	**menu 22 – measured value actualization (display)** set the lenght of the update cycles for the display (0.0 up to 10sec permissible)
tES1	**menu 23 – simulation switch output 1** state of the switch point 1 can be simulated; with the buttons "▲" and "▼", the switch output 1 can be activated or be deactivated
tES2	**menu 24 – simulation switch output 2** state of the switch point 2 can be simulated; with the buttons "▲" and "▼", the switch output 2 can be activated or be deactivated
tESA	**menu 25 – simulation analog output** signal value of the analog output can be simulated; choice between "oi 4" (4 mA or 2 V), "oi12" (12 mA or 6 V) and "oi20" (20 mA or 10 V)
SiAn	**menu 26 – signal choosing analog output** assignment to the analog output the desired input signal; if "P1" or "P2" is put, the analog output follows the static pressure at the suitable input. With the setting "DIFA", "DIFB" and "DIFC" the analog output follows the calculated difference pressure from P1 and P2. With "DIFB" a movement of the analogous signal occurs, in addition, about 50% FSO upwards, with "DIFC" a differential signal with square-root extraction occurs
Si	**menu 27 – error signal definition** fixing the mistake signal, which is given with a device defect; choice between "0FF" (no mistake signal call sign), "C 0" (0 mA or 0 V), "C L0" (3.5 mA or 1.75 V) and "C HI" (23 mA or 11.5 V) ☞ an issue of the mistake signal only occurs if the menu 6 "HILo" on "on" was put
POSI	**menu 28 – position correction / offset adjustement** A position correction or an offset's comparison can be carried out only with availability of suitable reference source, in so far as the measuring value deviation lies within certain borders; confirm the menu point "P0SI" by pressing both buttons. If the offset deviates from the environment pressure, it is necessary to connect the pressure reference, which corresponds to the measuring start value in P1. P2 must stay open! If you press afterwards again both buttons, the signal topically spent by the differential pressure transmitter, will be stored as an offset. Now in the display appears the adjusted measuring start value (Zero Point), although the sensor signal is shifted in the offset. ☞ Note that with available analog output, this remains untouched of the carried out change. Furthermore a movement of the span value (Full Scale) is also carried out at the same time, with the movement of the offset.
FAct	**menu 29 – load of factory default setting** With this menu carried out changes can be cancelled before. Please note that also the password will be put back.
dSPt	**menu 30 – display mode** assigning to the display value the desired input signal (P1", "P2" or "DIFF")
LoAd	**menu 31 – configuration load** loading of stored device configurations (choice between number 1 to 5)
Stor	**menu 32 – configuration store** storing of device configurations (number 1 to 5 is available)
Special menus (special menu 2 and 3 without function) (to access a special menu, select the menu item „PAof" with the ▲- or ▼-button an confirm it; "1" appears in display)	
FS S	**special menu 1 – span adjustement (0238)** The menu serves for the correction of the display with divergent span. Necessarily, this comparison becomes, if the displayed measuring value differs from the enclosed pressure value. A span comparison can be carried out only with availability of suitable reference sources, provided that the measuring value divergence lies within certain borders. To the display correction with divergent span, you should put with the button "▲" or "▼" the number "**0238**". To confirm the setting, press both buttons at the same time. "FS S" appears in the display. Now it is necessary to connect the pressure reference, which corresponds to the measuring range end value, to P1. P2 must stay open! If you press afterwards again both buttons, the signal topically spent by the differential pressure transmitter will be stored as a span signal. In the display the adjusted measuring range end value (End Point) appears from this time, although the sensor signal is shifted in the span signal. ☞Please note that the analogous output signal (with available analog output) remains untouched from this change.
SEtP	**special menu 4 – password setting (0835)** set "**0835**"; confirm by pressing both buttons, "SEtP" appears in display; put now with "▲" or "▼" - button your password. You can choose this freely (0... 9999; excluded are the code numbers 0238, 0247, 0729 and 0835). At last you sould confirm your password by concurrent pressure of both buttons.

7. Placing out of service

⚠ **WARNING!** When dismantling the device, it must always be done in the depressurized and current-less condition! Check also if the medium has to be drained off before dismantling!

⚠ **WARNING!** Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

8. Correction of defects

failure	possible cause	error detection / redress
no source signal	- wrong connected - wire break - defective measuring instrument (signal input)	- check the connections - check all wire connections which are necessary to the supplying of the device (including the plugs) - check the ammeter (fine protection) or the analogous entrance of your signal processing unity
analog output signal too small	- load resister too high - the supply too low - defective energy supply	- check the value of load resister - check the exit tension of power supply - check the power supply unit and the supply tension on input
movement of the output signal	- the membrane of the measuring cell has got dirty or damaged	- the device should be sent for repair to BD SENSORS
wrong or no output signal	- damaged electric connection - wrong polarity of the enclosed pressures	- check the connection - check whether the higher pressure is connected in "+"

If you ascertain a mistake, you should try to repair this with the help of the above table, or send in the device to the repair to our service address.

☞ **Repair in the device may be carried out only by the manufacturer!**

9. Recalibration

During the life span of the device it can seem that the offset moves. This can lead to the fact that a divergent signal value covered to the opposed measuring area beginning is given.
It is also possible that the span value (Full-Scale) moves. This would lead to the fact that one signal value divergent from the opposed measuring area end is given.
Should one of these both phenomena appear, after longer use, a recalibration is recommended to be able to guarantee and furthermore high exactness.
For the recalibration, please send your device to BD SENSORS.

10. Maintenance

In principle, this device is maintenance-free. If desired, the housing of the device can be cleaned when switched of using a damp cloth and non-aggressive cleaning solutions.

11. Return

Before every return of your device, whether for recalibration, decalcification, modifications or repair, it has to be cleaned carefully and packed shatter-proofed. You have to enclose a notice of return with detailed defect description when sending the device. If your device came in contact with harmful substances, a declaration of decontamination is additionally required. Appropriate forms can be downloaded from our homepage **www.bdsensors.com**. Should you dispatch a device without a declaration of decontamination and if there are any doubts in our service department regarding the used medium, repair will not be started until an acceptable declaration is sent.

⚠ **WARNING**! If the device came in contact with hazardous substances, certain precautions have to be complied with for purification!

12. Disposal

The device must be disposed according to the European Directives 2002/96/EG and 2003/108/EG (on waste electrical and electronic equipment). Waste of electrical and electronic equipment may not be disposed by domestic refuse!

⚠ **WARNING!** Depending on the measuring medium, deposit on the device may cause danger for the user and the environment. Comply with adequate precautions for purification and dispose of it properly.

13. Warranty conditions

The warranty conditions are subject to the legal warranty period of 24 months from the date of delivery. In case of improper use, modifications of or damages to the device, we do not accept warranty claims. Damaged diaphragms will also not be accepted. Furthermore, defects due to normal wear are not subject to warranty services.

14. Declaration of conformity / CE

The delivered device fulfils all legal requirements. The applied directives, harmonised standards and documents are listed in the EC declaration of conformity, which is available online at http://www.bdsensors.com. Additionally, the operational safety is confirmed by the CE sign on the manufacturing label.