

de	Betriebsanleitung.....3
en	User Manual.....21



DPT 200, DGP 200, DGP 100



Differenz-Druckmessumformer für die Prozessindustrie

Differential Pressure Transmitter for the Process Industry

ENGLISH

Content

1. General information	27
2. Product identification.....	27
3. Technical data	30
4. Mechanical installation	36
5. HART® communication	38
6. Electrical installation	39
7. Commissioning	40
8. Operation	327
9. Decommissioning.....	45
10. Maintenance	45
11. Servicing / Repair.....	46
12. Disposal	46
13. Warranty Conditions	46
14. Declaration of conformity / CE	46
15. Anlage 1/Attachment 1: EG-Konformitätserklärung/EC Declaration of Conformity	47

1. General information

1.1 Information concerning the user manual

This user manual contains important information regarding the proper handling of the device. You must therefore read this user manual carefully before installation and commissioning.

Follow the safety and handling instructions that are set out in this user manual. Compliance with the applicable accident prevention regulations and safety regulations as well as with national installation standards and recognised codes of practice must also be ensured.


This user manual is part of the device and should be kept accessible to personnel at all times in the immediate vicinity of the installation location of the device.




We reserve the right to make technical changes.

Further information:

- www.bdsensors.de / www.bdsensors.com
- Data sheet: DPT 200, DGP 200, DGP 100

1.2 Warning notices

 Warning term	Nature and source of danger - Measures to prevent danger
--	--

Warning term	Meaning
 DANGER	Immediate danger! - Failure to observe will result in death or serious injury.
 WARNING	Possible danger! - Failure to observe may result in death or serious injury.
 CAUTION	Dangerous situation! - Failure to observe may result in slight or moderate injury.



NOTE – Tips and information for the user in order to ensure trouble-free operation

1.3 Qualification of personnel

Installation, commissioning, operation, maintenance, decommissioning and disposal may be carried out only by appropriately qualified specialist personnel.

Work on electrical components must be performed only by a qualified electrician and in accordance with the applicable regulations and guidelines.

1.4 Limitation of liability

The manufacture shall accept no liability in the event of failure to follow the instructions or comply with technical regulations, improper use of the device or use in a manner other than that intended, or alteration or damage to the device.

1.5 Intended use


The **DPT 200** Differential Pressure Transmitter was designed specifically for the process industry and is used for applications that include level measurement in closed, pressurised tanks and monitoring of pumps and filters.

The pressure transmitter **DGP 200** and **DGP 100** was designed specifically for the demands of the process industry and capture under, over and absolute pressure of gases, steams, liquids up to 400 bar or 600 bar.

The device is equipped as standard with HART® communication and its parameters can be set using a PC, HART® communicator, etc.

Media that can be measured are gases or liquids that are compatible with the materials that contact the medium. These are described in the data sheet. Furthermore, it must be ensured in each individual case that the medium is compatible with the parts they come into contact with it.

The technical data as set out in the current data sheet are authoritative. Should you not have the data sheet, please request it from us or download it from our website. (<http://www.bdsensors.de>)

 WARNING	Danger of death through incorrect use - In order to avoid accidents, use the device only in accordance with its intended use.
---	---

1.7 Package contents

Check that all of the listed parts are included in the delivered package, are undamaged, and have been supplied in accordance with your order:

- Device
- Protective caps
- User manual

2. Product identification

The type plate serves to identify the device. The most important data can be taken from this. The order code is used to uniquely identify your product.

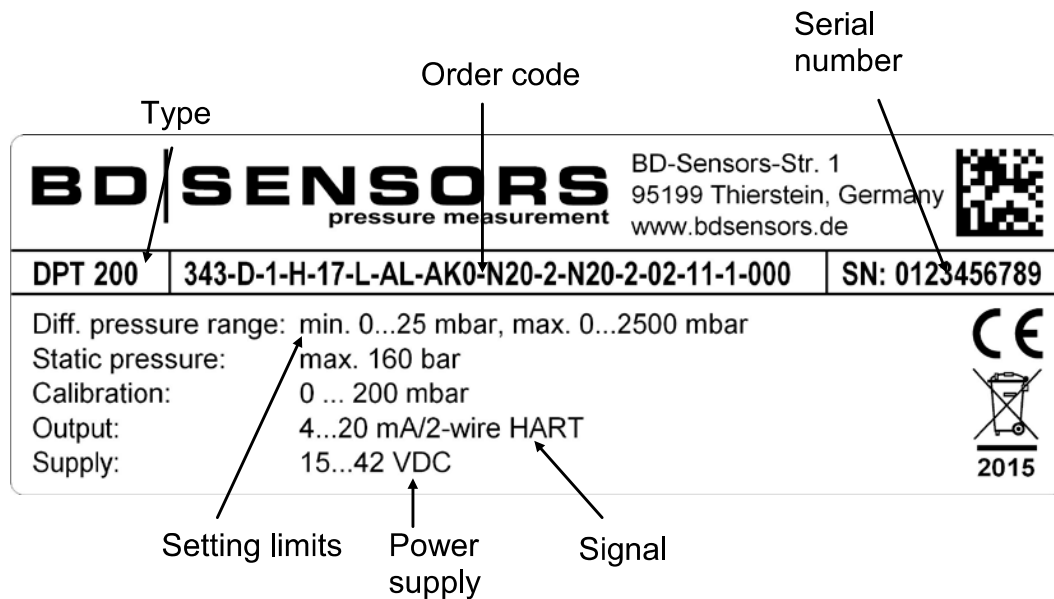


Fig. 2 Type plate



The type plate must not be removed from the device!

3. Technical data

DPT 200

Differential pressure ranges						
Measuring cell	Type	A	B	C	D	E
Differential pressure range dp		10 mbar	60 mbar	400 mbar	2.5 bar	20 bar
Setting limits (zero point and span freely configurable within this range)		-10 ... 10 mbar	-60 ... 60 mbar	-400...400 mbar	-2.5 ... 2.5 bar	-20 ... 20 bar
Smallest permitted span		1 mbar	2 mbar	4 mbar	25 mbar	200 mbar
Permitted static pressure		70 bar	160 bar	160 bar	160 bar	160 bar
Optional		-	-	400 bar	400 bar	400 bar
Turn down ratio TD (in relation to the differential pressure range dp)		10:1	30:1	100:1	100:1	100:1
Output signal / auxiliary power						
Standard		2-wire: 4 ... 20 mA / U _B = 12 ... 42 V _{DC} (with LCD display / U _B = 15 ... 42 V _{DC})				
Error signal	Namur NE43	High / low (configurable)				
Signal characteristics						
Accuracy		TD ≤ 10:1: ≤ ± 0.075 % FSO TD >10:1: ≤ ± [0.0075x TD] % FSO where TD = differential pressure range dp / set pressure range (FSO = full scale output)				
Influence of auxiliary power		≤ 0.001 % FSO / 10 V				
Influence of static pressure		Type A: ± [0.015 mbar + 0.1 % of the set pressure range] / 40 bar Type B: ± [0.06 mbar + 0.075% of the set pressure range] / 160 bar Type C: ± [0.2 mbar + 0.05% of the set pressure range] / 160 bar Type D: ± [1.25 mbar + 0.05% of the set pressure range] / 160 bar Type E: ± [10 mbar + 0.05% of the set pressure range] / 160 bar				
Influence of installation position		Max. 400 Pa (can be offset using the zero adjustment)				
Long-term stability		Type A: ≤ ± (0.5 % x differential pressure range dp) / year under reference conditions Type B: ≤ ± (0.2% x differential pressure range dp) / year under reference conditions Type C: ≤ ± (0.1% x differential pressure range dp) / year under reference conditions Type D: ≤ ± (0.1% x differential pressure range dp) / year under reference conditions Type E: ≤ ± (0.1% x differential pressure range dp) / year under reference conditions				
Permitted load		Without LCD display : R _{max} = [(U _B – 12 V) / 0.023 A] Ω With LCD display : R _{max} = [(U _B – 15 V) / 0.023 A] Ω HART® communication: R = 230 Ω ... 600 Ω				
T90 response time T90		Type A: approx. 1.6s Type B: approx. 0.4s Type C: approx. 0.2s Type D: approx. 0.2s Type E: approx. 0.1s				
Damping		Electronic :0 ... 60 s plus T90 response time				
Temperature error (zero point and span)						
Temperature range -20 ... +65°C		Type A: ± [0.45 x TD + 0.25]% of the set pressure range Type B: ± [0.30 x TD + 0.20]% of the set pressure range Type C: ± [0.20 x TD + 0.10]% of the set pressure range Type D: ± [0.20 x TD + 0.10]% of the set pressure range Type E: ± [0.20 x TD + 0.10]% of the set pressure range				
Temperature range -40 ... -20°C or +65 ... +100°C		Type A: ± [0.45 x TD + 0.25]% of the set pressure range Type B: ± [0.30 x TD + 0.20]% of the set pressure range Type C: ± [0.20 x TD + 0.10]% of the set pressure range Type D: ± [0.20 x TD + 0.10]% of the set pressure range Type E: ± [0.20 x TD + 0.10]% of the set pressure range				
Temperature limits						
Environment / storage		Without display : -40 ... 85 °C With display : -20 ... 65 °C (85°C when not in use)				
Media-contacting parts		Silicone oil : -40 ... 100 °C (Info: +125°C for a short time, max. 30 min.) Fluorinated oil : -40 ... 100 °C (Info: +125°C for a short time, max. 30 min.)				

Electrical protective measures	
Short circuit protection	Permanent
Reverse polarity protection	No damage if connections are reversed, but no function either
Mechanical strength	
One-sided overload	Equivalent to the maximum static pressure of the differential pressure measuring cell
Vibration	5 g RMS (25 ... 2000 Hz) in accordance with DIN EN 60068-2-6
Shock	100 g / 1 ms in accordance with DIN EN 60068-2-27
Materials	
Pressure connection / flange Standard Option	Stainless steel 304 / 1.4301 Stainless steel 316 / 1.4401 Others: on request
Separating diaphragm Standard Option	Stainless steel 316L / 1.4404 Hastelloy® C-276 Others: on request
Venting / drain valves Sealing plugs Standard Option	Stainless steel 304 / 1.4301 Stainless steel 316 / 1.4401
Nuts / bolts Standard Option	Stainless steel 304 / 1.4301 Stainless steel 316 / 1.4401 Others: on request
Type plate	Stainless steel 316 / 1.4401
Housing Standard Option	Cast aluminium with epoxy coating (blue) Housing made of stainless steel 304 / 1.4301 Others: on request
Seals (media contacting) Standard Option	FKM (-30...250°C) NBR (-40...125°C), PTFE (-180...250°C) Others: on request
Filling liquid Standard Option	Silicone oil (-40...125°C) Fluorinated oil (-40...125°C) Others: on request
Miscellaneous	
Optional display	Type : LCD Number of lines : 2 Number of digits : 8 Bar graph : 0...100% Rotatable : Yes, in 90° steps and / or by rotating the electronics housing
Configuration	- Zero point / span locally using 2 buttons - Local configuration with optional display - Full configuration via HART®
Optional mounting bracket	Material: C-steel or stainless steel 304 / 1.4401 Weight: 0.45 kg (including nuts and bolts)
Protection class	IP 67
Mounting position	Any
Weight	Differential pressure transmitter: approx. 3 kg (depending on the version used)
Current consumption	Max. 23 mA
CE conformity	EMC directive: 2004/108/EC
Connections	
Electrical connections	- Connector terminals in the terminal compartment (wire cross-sections up to 2.5mm²)
Process connections Standard Option	internal thread 1/4" - 18 NPT / fixing 7/16 UNF internal thread 1/4" - 18 NPT / fixing M10 oval flange 1/2" NPT internal thread adapter M20x1,5 Others: on request

DGP 200

Pressure range gauge								
Sensor	Type	1B	1C	1D	1E	1G	1H	1I
Pressure range dp	[bar]	0.06	0.4	2.5	20	100	210	400
Setting limits (offset and span in this range freely adjustable)		-0.06 ... 0.06	-0.4 ... 0.4	-1 ... 2.5	-1 ... 20	-1 ... 100	-1 ... 210	-1 ... 400
Lowest permissible span		0...6 mbar	0...20 mbar	0...25 mbar	0...200 mbar	0...1 bar	0...2.1 bar	0...4 bar
Overcharge	[bar]	400	400	400	400	200	500	500
Burst pressure ≥	[bar]	-	-	-	-	210	710	710
rangeability TD (with respect to the differential pressure range dp)		10:1	20:1	100:1	100:1	100:1	100:1	100:1
Pressure range abs.								
Sensor	Type	1L		1M		1O		
Pressure range P _N	[bar]	0.4		2.5		30 bar		
Setting limits (offset and span in this range freely adjustable)		0 ... 4		0 ... 2,5		0...30		
Lowest permissible span		0...20 mbar		0...25 mbar		0...300 mbar		
Overcharge	[bar]	10		40		150		
Burst pressure	[bar]	11		41		160		
rangeability TD (with respect to the differential pressure range dp)		20:1		100:1		100:1		
Output signal / Supply								
Standard	2-wires: 4 ... 20 mA / U _B = 12 ... 42 V _{DC} (with LCD-Display / U _B = 15 ... 42 V _{DC})							
Signal range	3.9 ... 20.5 mA							
Error signal	Low: 3.7 mA / High: 21 mA (standard)							
Performance								
Accuracy	TD ≤ 10:1: ≤ ± 0.075 % FSO TD >10:1: ≤ ± [0.0075x TD] % FSO (TD = pressure range P _N / adjusted range) (FSO = Full Scale Output)							
Influence supply	≤ 0.001 % FSO / 10 V							
Influence installation position	max. 400 Pa (can be compensated about zero-point correction)							
Long term stability	Type 1B/1L: ≤ ± (0.2% x pressure range P _N) / year andere: ≤ ± (0.1% x pressure range P _N) / year							
Permissible load	without LCD-display: R _{max} = [(U _B - 12 V) / 0.023 A] Ω with LCD-display : R _{max} = [(U _B - 15 V) / 0.023 A] Ω HART®-communication: R = 230 Ω ... 600 Ω							
Response time T90 (t.b.d.)	Typee 1B: ca. 0.4s Typee 1E – 1O: ca. 0.1s Type 1C: ca. 0.2s Type 1D: ca. 0.2s							
damping	electronic : 0 ... 60 s plus response time T90							
Thermal effects (Offset and Span)								
Temperature range -40 ... 100°C	Type 1B/1L: ± [0.30 x TD + 0.20]% of the adjusted range other: ± [0.20 x TD + 0.10]% of the adjusted range							
Permissible temperatures								
Environment / storage	without display : -40 ... 85 °C with display : -20 ... 65 °C (85°C without function)							
Media wetted parts	Silicon oil : -40 ... 100 °C (Info: +125°C short time, max. 30 min.)							

Electrical protection		
Short-circuit protection		permanent
Reverse polarity protection		no damage, but also no function
Mechanical stability		
One-sided overload		According to the maximum static pressure of differential pressure sensor
Vibration		5 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock		100 g / 1 ms according to DIN EN 60068-2-27
Materials		
Pressure port / flange	standard	stainless steel 316 / 1.4401 others: on request
Diaphragm	standard	stainless steel 316L / 1.4404 others: on request
	option	Hastelloy® C-276
Manufacturing label		stainless steel 316 / 1.4401
Housing	standard option	aluminum die cast with epoxy painting (blue) stainless steel 304 / 1.4301 others: on request
Filling fluids	standard	Silicon oil (-40...125°C) others: on request
Miscellaneous		
Display (optionally)		Type : LCD Lines : 2 Digits : 8 Bargraph : 0...100% Rotatability : yes, 90°-steps and / or by turn of the electronic case
configuration		- offset / span local via 2 buttons - local configuration with an optional display - complete configuration via HART®
Mounting bracket (optionally)		material CF8M or stainless steel 304 / 1.4401
Ingress protection		IP 67
Installation position		any
Weight		ca. 3,3 kg
Current consumption		approx. 23 mA
CE-conformity		EMV Directive: 2004/108/EC
Connections		
Electrical connection		- terminal clamps in clamping chamber (for cable-Ø max.2.5 mm²)
Process connections	Standard option	internal thread 1/4" - 18 NPT oval flange 1/2" NPT internal thread adapter M20x1,5 others: on request

DGP 100

Pressure range gauge									
Sensor	Type	B	C	D	F	G	H	I	J
Pressure range dp	[bar]	0.06	0.4	2.5	30	100	210	400	600
Setting limits (offset and span in this range freely adjustable)		-0.06 ... 0.06	-0.4 ... 0.4	-1 ... 2.5	-1 ... 30	-1 ... 100	-1 ... 210	-1 ... 400	-1 ... 600
Lowest permissible span		6 mbar	20 mbar	25 mbar	300 mbar	1 bar	2.1 bar	4 bar	0...6 bar
Overcharge	[bar]	2	10	40	150	200	500	500	700
Burst pressure	[bar]	3	11	41	160	210	710	710	710
rangeability TD (with respect to the differen- tial pressure range dp)		10:1	20:1	100:1	100:1	100:1	100:1	100:1	100:1
Pressure range abs.									
Sensor	Type	L			M		O		
Pressure range P _N	[bar]	0.4			2.5		30 bar		
Setting limits (offset and span in this range freely adjustable)		0 ... 4			0 ... 2,5		0...30		
Lowest permissible span		20 mbar			25 mbar		300 mbar		
Overcharge	[bar]	10			40		150		
Burst pressure ≥	[bar]	11			41		160		
Rangeability TD (with respect to the differential pressure range dp)		20:1			100:1		100:1		
Output signal / Supply									
Standard		2-wires: 4 ... 20 mA / U _B = 12 ... 42 V _{DC} (with LCD-Display / U _B = 15 ... 42 V _{DC})							
Signal range		3.9 ... 20.5 mA							
Error signal		Low: 3.7 mA / High 21 mA (standard)							
Performance									
Accuracy		TD ≤ 10:1: ≤ ± 0.075 % FSO TD >10:1: ≤ ± [0.0075x TD] % FSO (TD = pressure range P _N / adjusted range) (FSO = Full Scale Output)							
Influence supply		≤ 0,001 % FSO / 10 V							
Influence installation position		max. 250 Pa (can be compensated about zero-point correction)							
Long term stability		Type B/L: ≤ ± (0.2% x pressure range P _N) / year other: ≤ ± (0.1% x pressure range P _N) / year							
Permissible load		without LCD-display: R _{max} = [(U _B – 12 V) / 0.023 A] Ω with LCD-display : R _{max} = [(U _B – 15 V) / 0.023 A] Ω HART®-communication: R = 230 Ω ... 600 Ω							
Response time T90		Type B: ca. 0.35s Type D - O: ca. 0.15s Type C: ca. 0.25s							
damping		electronic : 0 ... 60 s plus response time T90							
Thermal effects (Offset and Span)									
Temperature range -40 ... 100 °C	Type B/L: other:	± [0.30 x TD + 0.20]% of the adjusted range ± [0.20 x TD + 0.10]% of the adjusted range							
Permissible temperatures									
Environment / storage		without display : -40 ... 85 °C with display : -20 ... 65 °C (85 °C without function)							
Media wetted parts		Silicon oil : -40 ... 100 °C (Info: +125 °C short time, max. 30 min.)							
Electrical protection									
Short-circuit protection		permanent							


Reverse polarity protection	no damage, but also no function		
Mechanical stability			
Vibration	5 g RMS (25 ... 2000 Hz)		according to DIN EN 60068-2-6
Shock	100 g / 1 ms		according to DIN EN 60068-2-27
Materials			
Pressure port / flange	standard	stainless steel 316 / 1.4401	others: on request
Diaphragm	standard	stainless steel 316L / 1.4404 Hastelloy® C-276	others: on request
option			
Manufacturing label		stainless steel 316 / 1.4401	
Housing	standard option	aluminum die cast with epoxy painting (blue) stainless steel 304 / 1.4301 others: on request	
Filling fluids	standard	Silicon oil (-40...125°C)	others: on request
Miscellaneous			
Display (optionally)	Type : LCD Lines : 2 Digits : 8 Bargraph : 0...100% rotatability : yes, 90°-steps and / or by turn of the electronic case		
configuration	- offset / span local via 2 buttons - local configuration with an optional display - complete configuration via HART®		
Mounting bracket (optionally)	material CF8M or stainless steel 304 / 1.4401		
Ingress protection	IP 67		
Installation position	any		
Weight	ca. 1.6 kg		
Current consumption	approx. 23 mA		
CE-conformity	EMV Directive: 2004/108/EC		
Connections			
Electrical connection	- terminal clamps in clamping chamber (for cable-Ø max.2.5 mm²)		
Process connections	standard option	½ " NPT IG ½ " NPT AG; ¼" NPT AG; M20x1,5 IG; G ½" IG; vacuum connection DIN 28403KF16/ISO 2861 ¹	others: on request

¹ only for $P_N \leq 2.5$ bar




¹ only for $P_N \leq 2,5 \text{ bar}$

4. Mechanical installation

4.1 Installation and safety instructions

 WARNING	Danger of injury from media escaping under pressure <ul style="list-style-type: none"> - Install in an unpressurised state. - Depressurise the system.
---	--


- In case of increased danger of lightning strike or damage by overvoltage, a stronger lightning protection should be planned.
- Do not install the device in a pneumatic delivery stream!
- Excessive dust accumulations (over 5 mm) or complete coverage with dust must be prevented!
- A minimum of protection class IP 20 must be ensured for the electrical installation.
- ☞ Please treat this highly sensitive electronic measuring instrument carefully, both when packed and when unpacked!
- ☞ No modifications or alterations may be made to the device.
- ☞ The device must not be thrown!
- ☞ Only remove the packaging and, if applicable, the protective cap from the device shortly before its installation, so as to avoid damaging the diaphragm. Be sure to retain any protective cap supplied!
- ☞ Fit the protective cap back over the diaphragm immediately after dismantling the device.
- ☞ Treat the unprotected diaphragm with extreme care; it can be damaged very easily.
- ☞ Do not apply any force to install the device so as to avoid damaging the device and the system!
- ☞ When installing outdoors or in humid environments, the following points should be noted:
 - The device should be electrically connected immediately after installation to ensure that no moisture is able to penetrate into the plug connector. If this is not possible, the ingress of moisture must be prevented by using a suitable protective cap. (The protection class specified in the data sheet applies to the connected device.)
 - Select an installation position that allows splashed water and condensation to drain away. Ensure that sealing surfaces are not exposed to standing liquid!
 - When using devices with a cable outlet, the outgoing cable should be routed downwards. If the line must be routed upwards, this is to be achieved by bending it through a downward-pointing arc.
 - Install the device such that it is protected from direct sunlight. Direct exposure to sunlight may, in the worst case, cause the maximum permissible operating temperature to be exceeded.
- ☞ When the device is connected to the pressure chamber, the user must ensure proper sealing.
- ☞ Check that the envisaged or, if applicable, supplied seals are compatible with the medium used. If it is not possible to guarantee compatibility, other suitable seals must be employed.

-  Take care that the pressure connector is not subjected to any mechanical stresses higher than those permitted during installation, since this could cause the characteristic to shift or result in damage. This applies particularly to very small pressure ranges.
-  In the case of hydraulic systems, orient the device such that the pressure connector faces upwards (for venting).
-  Provide a cooling section when using the device in steam lines.

4.2 General installation instructions

- Carefully remove the device from its packaging and dispose of the packaging properly.
- Then proceed as described in the following installation instructions.
It should be noted here that (DPT 200):
 - The higher pressure must be connected to the “+” input.
 - The lower pressure must be connected to the “-” input.

4.3 Installation steps for DIN 3852

-  **DO NOT USE ANY ADDITIONAL SEALING MATERIALS, LIKE YARN, HEMP OR TEFLON TAPE!**
- Check to ensure the proper groove fitting of the o-ring and additionally to ensure no damage to the o-ring.
- 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.
- Devices with a spanner flat have to be tightened with an open-end wrench (wrench size of steel: G1/2": approx. 10 Nm).
- **The indicated tightening torques must not be exceeded!**

4.4 for NPT connectors

- Additional seal materials, e.g. PTFE tape, may be used to provide sealing.
- Screw the device into the mounting thread by hand.
- Then tighten it with the open-end wrench (for 1/4" NPT: approx. 30 Nm; for 1/2" NPT: approx. 70 Nm).
- **The specified tightening torques must not be exceeded!**

4.5 Orientation of the display module

The display can be rotated in 90-degree steps, thus guaranteeing easy readability even in unusual installation locations. In order to change its position, proceed as follows:

- Unscrew the housing cover by hand.
- Completely unscrew the two cross-head screws on the front side of the display module. Pull the display module forwards and off, rotate it through 90°, 180° or 270°, and carefully plug it back on again. Reattach the display module with the two screws.
- Before screwing the cover back on, be sure to check the O-rings and sealing surfaces on the housing for damage and replace them if necessary!
- Then screw the cover on by hand, and make certain that the housing is tightly sealed again.



Make sure that no moisture can penetrate into the device! The seals and sealing surfaces must not get dirty; this is because any contamination may, depending on the particular application or location, lead to a reduction in the level of protection and hence to failure of the device or irreparable damage to the device!

5. HART® communication

An additional signal complying with the HART® specification is superposed on the analogue output signal. Configuration of the device can be carried out with the aid of a HART® communication device. We would recommend our CIS 150 programming kit (available as an accessory) for this purpose.

In order to ensure trouble-free operation, the following specifications should be taken into account:

Maximum length of cable between measuring instrument and supply unit:

$$L_{\max} = \frac{65 \cdot 10^6}{R_V \cdot C_V} - \frac{40 \cdot 10^3}{C_V}$$

where L_{\max} : maximum length of the cable in [m]
 R_V : resistance of the cable together with
the load resistance in [Ω]
 C_V : capacitance of the cable in [pF/m]


Resistance R:


$$R = \frac{U - 12}{0,024} \Omega$$

where U: supply in [V_{DC}]

The resistance must be at least 250 Ω .


6. Electrical installation

 WARNING	Danger of death from electric shock - Switch off the power supply before installing the device!
---	---

-  When using devices with connector terminals, implement connections such that the separation distances are in compliance with standards and connecting lines cannot become disconnected.

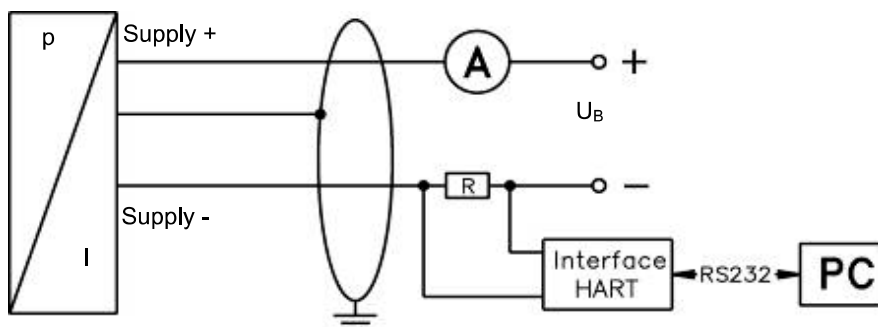
Electrically connect the device in accordance with the specifications given on the type plate, the following connection table and the connection diagram:




Connection assignment table:

Electrical connections	Connection terminals
Supply + (Ub+)	+
Supply / test – (Ub-)	-
Test +	TEST+
Earth	




Connection diagrams:

2-wire (current) HART[®] system



-  Where the cabling is laid in a fixed position, a minimum bend radius of 10 times the diameter must be observed; for flexible use, the limit is 20 times the diameter.
-  In order to electrically connect the device with connector terminals, the cover must be unscrewed. If the device has a display and control unit, this unit must be carefully pulled out. Place it next to the housing during installation such that there is no strain on any connections. Afterwards, carefully plug it back in and make sure that the connecting wires are not twisted or pinched. Before screwing the cover back on, be sure to check the O-rings and sealing surfaces on the housing for damage and replace them if necessary! Then screw the cover on by hand, and make certain that the field housing is tightly sealed again.
-  Use a shielded and twisted multicore cable for the electrical connection.

7. Commissioning

-  Before commissioning the device, check that it has been properly installed, and make sure that it does not show any visible defects.
-  The device may be commissioned only by appropriately qualified and trained personnel who have read and understood the user manual.
-  The device may only be operated within its specifications! (Compare the technical data in the data sheet)

The instantaneously present output signal can be checked without breaking the current loop by using a mA ammeter. This is done by connecting a mA ammeter to the “TEST” and “-” electrical connector terminals and measuring the output signal present.

8. Operation

8.1 Display and control unit

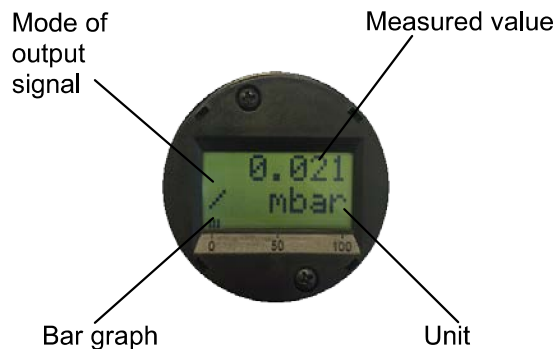


Fig. 4 Display

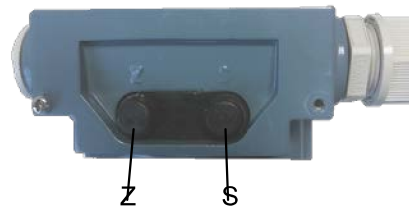



Fig. 5 Push buttons

- / symbol
This symbol on the display indicates that the output signal has a linear characteristic.
- $\sqrt{\quad}$ symbol
This symbol on the display indicates that the output signal has a square root characteristic.
-  symbol
This symbol shows when the signal has transgressed its upper or lower limits.

A bar graph is included on the display; this shows the acting pressure as a percentage of the measuring range. The display indicates the measured value as well as allowing configuration of the individual parameters using menus. The individual functions can be set using two push buttons (accessible from the top). The device can be configured in situ without opening the display and control module. In order to do so, the metal plate (on top of the device) must be rotated to the rear after undoing the left screw. From left to right, the two buttons are assigned to: **Z**, **S**.

Devices with and without a display are operated in different ways.

Devices without a display:

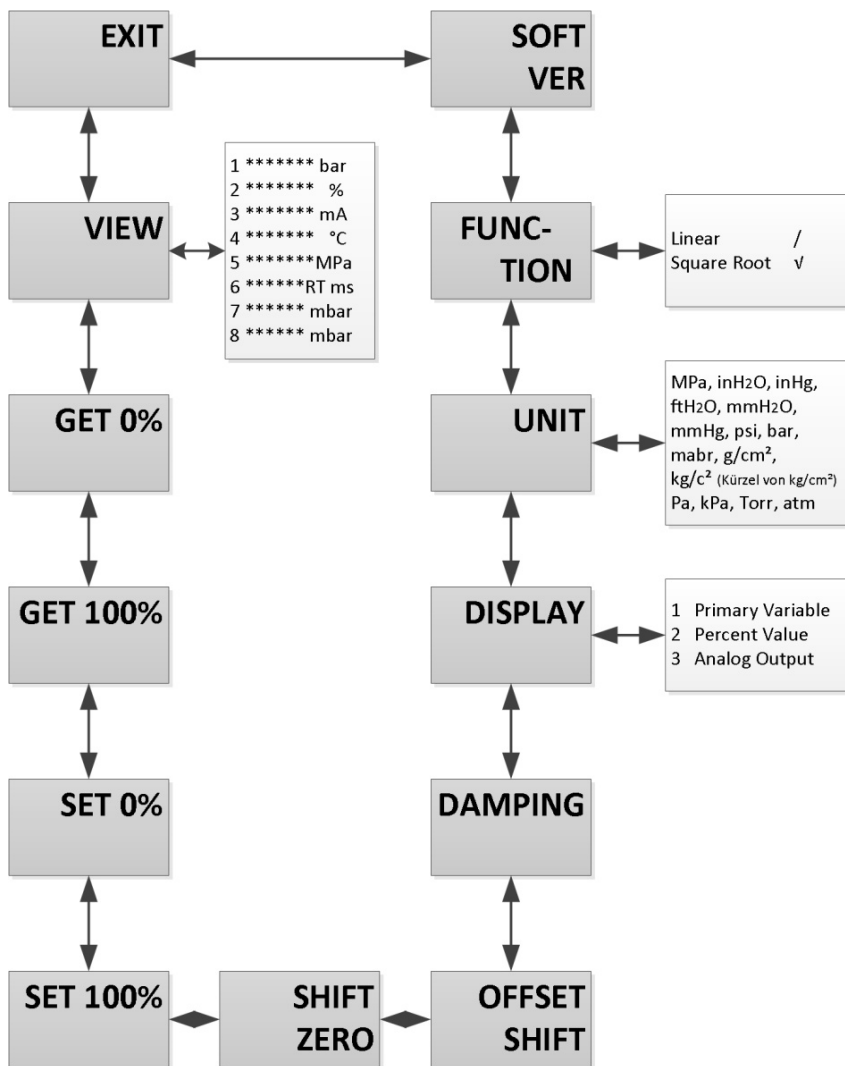
These are operated as follows:

Press both buttons for about 2 to 5 sec, briefly release them, and then press Z(ero) or S(pan) for a further 5 – 10 sec. Press to perform the desired operation. Z then sets the 4 mA value to the acting pressure; S sets the 20 mA value to the acting pressure. It must be ensured that the acting pressure is stable while performing either of these operations.

Devices with a display:

The menu system is self-contained. It allows you to "browse" both forwards and backwards through the individual settings menus in order to reach the desired setting item. All settings are permanently saved in a flash EPROM and are therefore retained even after the supply voltage has been disconnected.

8.2 Structure of the menu system



8.3 Menu list

- **Z button:** Use this button to move forwards through the menu system or to change the displayed value.
- **S button:** Use this button to move backwards through the menu system or to set the cursor to a different position.
- **Z+S buttons:** Press both buttons simultaneously to invoke the menu, to select a menu item, and to confirm the set value and exit the menu item.

Configuration process:

- Start by pressing the **Z+S buttons** simultaneously for about 2 to 5 s.
- Select the desired menu item using the **Z** and **S** buttons.
- Invoke the selected menu item by pressing the **Z+S buttons** simultaneously for about 2 to 5 s.
- Set the desired value or select a default value using the **Z** and **S** buttons.
- Save/confirm the set value or default value, and exit the menu item by pressing the **Z+S buttons** simultaneously.





If a parameter can be configured by changing its numerical value, each digit is individually editable. So after invoking a menu item of this kind (e.g. "DAMPING"), pressing the **S** button makes the first digit of the currently set value begin to flash. You can now use the **Z** button to adjust the desired digit. Now press the **S** button, and the following digit begins to flash and can be adjusted as described. After you confirm the set value by pressing the **Z+S** buttons simultaneously, the whole value is saved and the display shows "OK" if the value is permitted (the menu returns to the normal operating display after 60 s, or you can exit the menu by selecting Exit). Otherwise an error message (e.g. ERROR VALUE) appears on the display and the value is **not** saved. (Press the Z+S buttons simultaneously to return to the menu.)

If it is necessary to set a negative value, you must switch the sign using the **Z** button.

DISPLAY	Display
VIEW	Displays the various current values <div> <div>1 Acting pressure [unit]</div> <div>2 Acting pressure in %</div> <div>3 Analogue signal mA</div> <div>4 Current medium temperature °C</div> </div> (5 - 8 for internal manufacturer evaluations, not relevant for the user)
GET 0%	Adjusts the zero point for the output signal After setting and applying the reference pressure (e.g. 0 bar), press the Z and S buttons simultaneously for at least 2 – 5 seconds in order to specify that the acting pressure is to serve as the start value for the output signal (4 mA); the display then indicates "OK". This means that the specified span is shifted without any interaction; the digitally displayed value corresponds to 0% output signal for the acting pressure. If the digitally displayed physical pressure is also to be corrected to zero, this must be done using the SHIFT ZERO menu item. The displayed value remains unchanged.
GET 100%	Adjusts the end value for the output signal After setting and applying the reference pressure (e.g. 20 bar), press the Z and S buttons simultaneously for at least 2 – 5 seconds in order to specify that the acting pressure is to serve as the end value for the output signal (20 mA); the display then indicates "OK". The set span is changed. The zero point remains as previously set; for the 20 mA point, the acting pressure is adopted as 20 mA or 100% of the output span. The displayed value remains unchanged.
SET 0%	Sets the start value (as a numerical value in physical units) Use the Z and S buttons to set the start value for the measuring range, and then confirm the value by pressing the Z and S buttons simultaneously for at least 2 – 5 seconds. The display shows "OK".
SET 100%	Sets the end value (as a numerical value in physical units) Use the Z and S buttons to set the end value for the measuring range, and then confirm the value by pressing the Z and S buttons simultaneously for at least 2 – 5 seconds. The display shows "OK".

SHIFT ZERO	Zeros the display (in physical units (Zero point trim)) After setting and applying the reference pressure, press the Z and S buttons simultaneously for at least 2 – 5 seconds in order to set zero the display and set output signal 4 mA; the display then indicates “OK”.
OFFSET SHIFT	Shifts the set span (only for DPT 200) This function can be used to shift the configured span to suit the application. This is done by assigning a specified percentage value of the span to the acting pressure. The size of the set span is not changed in the process. After invoking this function, the display shows the acting value as a percentage of the span, and this can be reconfigured accordingly. Example: You require the range -10 ... 10 bar; your device has a differential pressure range (dp) of 0 ... 20 bar: After applying 0 bar, use the Z and S buttons to set +50%, and then confirm the value by pressing the Z and S buttons simultaneously for at least 2 – 5 seconds. You can now check the result under “VIEW”: 6. Apply 0 bar; acting pressure = 0 bar; analogue signal: 12 mA 7. Apply 10 bar; acting pressure = 10 bar; analogue signal: 20 mA 8. Apply -10 bar; acting pressure = -10 bar; analogue signal: 4 mA 9. Select SET 0%; start value = -10 bar 10. Select SET 100%; end value = 10 bar
DAMPING	Sets the damping Settable range: from 0.1 to 60 s
DISPLAY	Selects the displayed variable 1 Measured pressure (unit) 2 Measured value in percent 3 Analogue signal display
UNIT	Sets the pressure unit Settable units: MPa, inH ₂ O, inHg, ftH ₂ O, mmH ₂ O, mmHg, psi, bar, mbar, g/cm ² , kg/c ² (abbreviation of kg/cm ²), Pa, kPa, Torr, atm Conversion of all pressure-related parameters is performed automatically.
FUNCTION	Selects the function Linear / Square root √
SOFT VER	Displays the program version (RSR101 R10)
EXIT	Exits the menu Press the Z+S buttons simultaneously to exit from the menu. If no buttons are pressed for 60 seconds, the device returns to its normal operating state.


9. Decommissioning

 WARNING	Danger of injury from media escaping under pressure. <ul style="list-style-type: none"> - Disassemble in an unpressurised state. - Depressurise the system.
 ATTENTION	Danger of injury from aggressive media. <ul style="list-style-type: none"> - Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing, e.g. gloves, goggles.

10. Maintenance

The device is, in principle, maintenance free. If necessary, the housing of the device may be cleaned with a damp cloth and a non-aggressive cleaning solution while it is switched off.

With certain media may, however, deposits or contamination may accumulate on the diaphragm. The specification of appropriate maintenance intervals for inspection is recommended in this case. Once the device has been properly decommissioned, the diaphragm can normally be cleaned with a non-aggressive cleaning solution and a soft brush or sponge. Care should be taken while doing so. If the diaphragm is covered in limescale, decalcification by BD SENSORS is recommended. See the Servicing / Repair section with regard to this.

 Incorrect cleaning can result in irreparable damage to the measuring cell. For this reason, you should never use sharp objects or compressed air to clean the diaphragm.


11. Servicing / Repair

11.1 Recalibration

It is possible that the offset value or the scaling value may shift during the lifetime of the device. This is indicated by a deviation in the output signal value with reference to the set measurement range start or end values respectively. If either of these two phenomena should occur after a prolonged period of use, recalibration is recommended in order to ensure a continued high level of accuracy.

11.2 Return


Whenever the device is returned, no matter whether for recalibration, decalcification, modification or repair, it must be carefully cleaned and packed such that there is no risk of breakage. The device must be accompanied by a notice of return giving a detailed description of the fault. If your device has come into contact with pollutants, then a notice of decontamination will also be needed. You can find the relevant templates on our website at **www.bdsensors.de**. Should you send in your device without a notice of decontamination and doubts with regard to the medium used should arise in our service department, repair work will commence only once an appropriate notice has been received.

 CAUTION	Danger of injury from pollutants - If the device has come into contact with pollutants, wear suitable protective clothing, e.g. gloves, goggles, when cleaning it.
---	--

12. Disposal

The device must be disposed of in accordance with European Directives 2002/96/EC and 2003/108/EC (Waste Electrical and Electronic Equipment). Waste electrical products may not be disposed of with household waste!



 Depending on the medium used, residues on the device may constitute a hazard to the operator and the environment. You must therefore take appropriate precautions if necessary and dispose of the device properly.

13. Warranty Conditions

The warranty conditions are subject to the statutory warranty period of 24 months, starting from the date of dispatch. No warranty claims will be accepted if the device has been used improperly, modified or damaged. The warranty does not cover damaged diaphragms. Warranty cover also excludes any claims for defects that have arisen as a result of normal wear.

14. Declaration of conformity / CE

The supplied device fulfils the statutory requirements. The relevant directives, harmonized standards and documents are listed in the EU Declaration of Conformity applicable to the product. This can be found at <http://www.bdsensors.de>. In addition, the operational safety of the device is confirmed by the CE mark on the type plate. See attachment 1.

15. Anlage 1/Attachment 1: EG-Konformitätserklärung/EC Declaration of Conformity



EG-Konformitätserklärung *EC Declaration of Conformity*

BD Sensors GmbH erklärt hiermit in alleiniger Verantwortung, dass die Produkte
BD Sensors GmbH declares on its own responsibility that the products

DPT 200, DGP 100, DGP 200, DAP 200, DLP 200, DRP 200

mit den aufgeführten Richtlinien und Normen übereinstimmen.
fulfil the below mentioned requirements and standards.

2004/108/EG (EMC) **EN 61326 (1997); EN 61326/A1 (1998)**
 EN 61326/A2 (2001); EN 61326/A3 (2003)

Für Geräte mit Ex-Zulassung:

94/9/EG (ATEX) **AX18-DPT200; AX18-DGP200; AX18-DAP200; AX18-DLP200; AX18-DRP200**

IBExU14ATEX1273 X **EN 60079-0:2012, EN 60079-11:2012, EN 60079-26:2007**

Benannte Stelle / Kennnummer
Notified Body / identification number: **IBExU Institut für Sicherheit GmbH / 0637**

Für Geräte mit maximal zulässigem Überdruck > 200 bar:
for devices with maximum permissible overpressure > 200 bar:

Bewertungsverfahren **Modul A**
*assessment procedure **Module A***

Thierstein, 2015-04-29

D. Sanvenero

Leiter Konstruktion/
Mechanical Design Manager

W. Leupold

Leiter Elektronikentwicklung/
Electronics Design Manager



BD SENSORS GmbH
BD-Sensors-Straße 1
D - 95199 Thierstein

Tel. +49 (0) 92 35 / 98 11- 0
Fax +49 (0) 92 35 / 98 11- 11

www.bdsensors.com
info@bdsensors.de

Headquarters

BD SENSORS GmbH
BD-Sensors-Str. 1
D - 95199 Thierstein
Germany
Tel.: +49 (0) 9235-9811-0
Fax: +49 (0) 9235-9811-11

Russia

BD SENSORS RUS
39a, Varshavskoe shosse
RU - Moscow 117105

Russia

Tel.: +7 (0) 95-380 1683
Fax: +7 (0) 95-380 1681

Eastern Europe

BD SENSORS s.r.o.
Hradištská 817
CZ - 687 08 Buchlovice
Czech Republic
Tel.: +42 (0) 572-4110 11
Fax: +42 (0) 572-4114 97

China

BD SENSORS China Co, Ltd.
Room B, 2nd Floor, Building 10,
No. 1188 Lianhang Rd.
201112 Shanghai,
China
Tel.: +86 (0) 21-51600 190
Fax: +86 (0) 21-33600 613

You can find our offices in

EUROPE

- Belgium
- Denmark
- England
- Finland
- France
- Greece
- Italy
- Lithuania
- Luxembourg
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Sweden
- Switzerland
- Slovakia
- Spain
- Turkey
- Ukraine

AFRICA

- Egypt
- South Africa

ASIA

- India
- Iran
- Israel
- Japan
- Kazakhstan
- Korea
- Malaysia
- Singapore
- Taiwan
- Thailand
- Vietnam

AUSTRALIA

The addresses of our overseas offices can be found at **www.bdsensors.de**. Data sheets, user manuals, ordering codes and certificates are also available for you to download from our website.