

# BDT12 – Diaphragm type pressure gauge 100 & 160mm

## Product description

Badotherm pressure gauge model BDT12 is a diaphragm type pressure gauge and suitable for all gaseous and liquid media, as well as for viscous media and suspended solids. This pressure gauge is typically used for applications in the chemical, petro-chemical, oil & gas, power and utilities, machine building and general process industries. These gauges can be made with threaded connections and flanged connections according ANSI, DIN, and JIS standards.

## Design standard

EN837-3

## Dial sizes, ranges & accuracy

Possibilities in ranges and accuracies are led by the dial size. Accuracy class is based on dry gauges. Liquid filling can affect the accuracy. Compound and vacuum ranges are possible as well based on the standard ranges

Dial size	Ranges	Accuracy
100mm	0...16 mbar to 0...250 mbar (flange Ø 160mm)	1.6%
160mm		
100mm	0...400 mbar to 0...25 bar (flange Ø 110mm)	1.6%
160mm		

## Mounting variation

All BDT12 gauges are bottom connection type A.

- **type A** (13) bottom connection, direct mounting

## Materials of construction

	BDT12
Case	AISI 304
Bezel	AISI 304
Process flange / lower part <sup>1</sup>	AISI 316
Sensing element <sup>1</sup>	AISI 316 (≥ 4 bar Duratherm)
Movement	Stainless steel
Pointer	Aluminium
Dial	Aluminium
Window gasket	NBR
Blow out	
Fill plug	NBR (HNBR for filled gauges)
Flange gasket	FKM
Window	Glass

<sup>1</sup> wetted materials



## Process connection

### Threaded version

Standard thread	optional
G ½ A or ½" NPT	G ½ or ½" NPT-f

Other thread standards such as ISO 7-1 R (BSPT), or DIN 13-1 (M20x1.5) can be selected as well. Due to the weight of the assembly a ¼" thread is not advised.

-> See datasheet "thread information" for specific thread details

### Flanged version

#### ASME 16.5

Size	Rating	Facing	Roughness
1" to 4"	cl. 150 - cl. 300	RF, LMF, FF SMF	Ra 3.2-6.3 µm Ra <3.2 µm

#### EN 1092-1

Size	Rating	Type	Roughness
DN20 to DN100	PN10-40	A, B1, F B2	Ra 3.2-12.5 µm Ra <0.8-3.2 µm

## Pressure limitations

The pressure gauges are built to withstand harsh environments however the EN 837-3 limits the use of a pressure gauge according below table.

Dial size	Steady	Fluctuating	Short time
100mm /160mm	FSV	0.9 x FSV	1.25 x FSV

FSV: full scale value

range	standard	Option 1	Option 2	Type 5
16 mbar	5x FSV	10x FSV	5 bar	-
25 mbar				
40 mbar				
60 mbar				
100 mbar				
160 mbar				
250 mbar	1.25x FSV	5x FSV	10 bar	40 bar
400 mbar				
600 mbar				
1.0 bar				
1.6 bar				
2.5 bar		40 bar		
4.0 bar				
6.0 bar				
10 bar				
16 bar				
25 bar				

## Temperature limitations

The gauges can withstand ambient and process temperature up to a certain limit. The limitations on temperature are:

	Ambient	Medium	Storage
Dry case	-20°C ...+60°C	-20°C...+100°C	-40...+70°C
Filled case	-20°C ...+60°C	-20°C...+90°C	

The variation of indication caused by the effect of temperature shall not exceed:  $\pm 0.8\% / 10K FSV$

## Window

Standard BDT12 gauges have a glass window. Optionally it can be selected with laminated safety glass or plastic

## Pointer

Standard pointer is a slotted black painted aluminum pointer and optionally with a micro adjustable pointer

## Dial facing

The dial plate is made from aluminum and coated with UV resistant white coating. The black dial markings, scale, numbering, and interval is according the EN 837. Options like colored dial, customer logo, or colored segments are possible as well. Scale interval and numbering is following the EN837.

## Degree of protection

The BDT12 has a standard degree of protection of IP65. The values are determined according the IEC/EN 60529.

## Add-on contacts

The BDT12 can be equipped with an add-on contact mounted in a Makrolon hood. For low pressures <100 mbar inductive contacts are advised.

## Case filling

The gauges can be filled with different kind of fill fluids. The fill fluids available are:

- BPF01 - Glycerine 86%
- BPF02 - Silicon
- BPF03 - Silicon for contacts
- BPF04 - Mineral oil (Foaming service)
- BPF05 - Halocarbon (inert fluid for oxygen service)

## Special service

The gauges can be supplied cleaned for oxygen use. This means the gauge is assembled and tested in a special area free of oil. The gauges are individually packed in a plastic bag with marking. The symbol used is:



## Certification & Declaration

### Calibration

Gauges are full range calibrated as a factory standard. Optionally you can select a 5 points calibration certificate

[ATEX 114 - 2014/68/EU](#)

ATEX restrictions are explained in the IOM and in the ATEX background datasheet.

[EN 10204 material certificate](#)

A material 3.1 certificate on the wetted parts can be supplied.

## Retaining bolts & nuts

The retaining bolts between upper and lower part are made of A4-70 (AISI316) material.

Size	Grade bolt	Grade nut	Material
M6 (≤250 mbar)	ISO 3506-1 A4-70	ISO 3506-2 A4	AISI 316

## Torque

The closing between upper part and lower part is done with retaining bolts. The torque of the bolts is 10 Nm (7.3 ft-lb).

## Gaskets

For the BDT12 a gasket is supplied for the closing between the upper and the lower part. The standard flange gasket is FKM (Viton) material. Depending on the chemical compatibility the option of NBR or EPDM

Material	Operating temperature
FKM ◀	-40 / +108°C
NBR	-25 / +204°C
EPDM	-55 / + 150°C

◀: Standard gasket

## Wetted part and diaphragm combinations

The BDT12 can be selected with process flanges in exotic materials or coatings. The diaphragm can be executed with a exotic material protection sheet as well. Applying protection sheets will have consequences for the accuracy of the gauge.

Flange + connection	Diaphragm material		
	General name	UNS	Wst.
AISI 316(L)	AISI 316L	S31603	1.4404
	Alloy C276	N27600	2.4810
	PTFE Sheet	-	-
Alloy 400	Alloy 400	N04400	2.4360
Alloy C-276	Alloy C-276	N10276	2.4810
PTFE lining	Tantalum	R05200	

## Polymer solutions

Polymer solutions come in several executions and forms. The technical data on thickness and temperature limitation can be found in datasheet "polymer solutions". The diaphragm of the BDT12 can be treated with the below coatings or sheet. Sheets cannot be used with application with vacuum pressures.

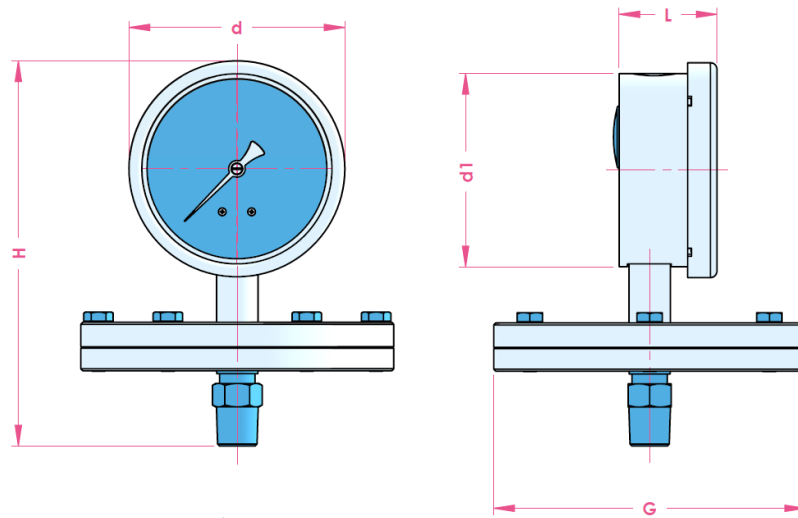
- PTFE coating
- ECTFE (Halar®) coating
- PFA coating
- FEP coating
- PTFE sheet

The lower part of the BDT12 flanged can be executed with:

- PTFE coating
- PFA coating
- PTFE lining

Lining on threaded versions is not advised. G ½" A is possible in combination with a rotating process nut to prevent damage to the lining

## Dimensions table threaded



*BDT12 – 25...400 mbar*

Dial size	d	d1	L	H	G	SW	weight
100	110.0	100.0	50.0	200.0	160.0	22	1.8 kg
160	160.0	149.0	52.0	250.0			2.1 kg

*BDT12 – 0.6...25 bar*

Dial size	d	d1	L	H	G	SW	weight
100	110.0	100.0	50.0	200.0	108.0	22	1.6 kg
160	160.0	149.0	52.0	250.0			1.9 kg

## Product code 100, 160mm

Code	
Example code:	<b>BDT12 160 A G12M S303 S304 FP S304 A 0 G P48 16</b>
<b>TYPE</b>	
100 mm ◀	100
160 mm ◀	160
<b>MOUNTING</b>	
Bottom connection - direct mounting (13) ◀	A
<b>CONNECTION</b>	
G1/2 ◀	G12M
1/2" NPT	N12M
R 1/2	R12M
M20 x 1.5	M20M
Flanged (see table 4)	–
<b>SENSING ELEMENT</b>	
AISI 316L (>4 bar Duratherm) ◀	S363
Alloy 400 *1	A400
Alloy C276*1	A276
Tantalum *1	TA52
PTFE sheet*1	
<b>PROCESS FLANGE (LOWER PART)</b>	
AISI 316(L) ◀	S316
Alloy 400	A400
Alloy C276	A276
AISI316(L) PTFE lined*2	LPTF
<b>GASKET MATERIAL</b>	
FKM ◀	FP
NBR	NB
EPDM	EP
<b>CASE/BEZEL MATERIAL</b>	
AISI 304 ◀	S304
AISI 316	S300
<b>POINTER</b>	
Adjustable slotted pointer ◀	A
Micro adjustable pointer	M
Add-on contact device (see table 4)	A__
<b>LIQUID FILLING</b>	
Dry ◀	0
BPF 01 - Glycerine filled 1,23 (86%)	1
BPF 02 - Silicone filled	2
BPF 03 – Silicone Contact use	3
BPF 04 – Mineral oil (Foaming service)	4
BPF 05 – Halocarbon (Oxygen service)	5
<b>WINDOW</b>	
Glass ◀	G
Laminated safety glass	L
Acrylic (SAN)	A
<b>RANGE</b>	
See page table 1 and table 2	....
<b>ACCURACY</b>	
1,6 ◀	16

◀: is the sign for the standard pressure gauge.

1: Based on protection sheet. Use of protection sheet leads to a lower accuracy class up to class 2.5. Sheet is not possible for application with vacuum.

2: Not possible for NPT thread, G thread only in combination with rotating nut as process connector

**Tabel 1: Pressure Range code**

bar		mbar		psi		kPa		kgf/cm2	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
C36	-1...0,6	C20B	-10...15	C37	30Hg/15psi	D36	-100...60	E36	-1...0,6
C38	-1...1,5	C21A	-10...30	C39	30Hg/30psi	D38	-100...150	E38	-1...1,5
C40	-1...3	C22A	-10...50	C41	30Hg/60psi	D40	-100...300	E40	-1...3
C42	-1...5	C21C	-20...20	C44	30Hg/100psi	D42	-100...500	E42	-1...5
C45	-1...9	C22B	-20...40	C46	30Hg/150psi	D45	-100...900	E45	-1...9
C50	-1...15	C22C	-30...30	C50	30Hg/220psi	D50	-100...1500	E50	-1...15
C54	-1...24	C24C	-40...60	C53	30Hg/300psi	D54	-100...2400	E54	-1...24
B01	-1...0	C24D	-50...50	P32	0...15	L01	-100...0	K01	-1...0
B04	-0,6...0	C27B	-100...150	P35	0...25	L04	-60...0	K04	-0,6...0
B31	0...0,6	M19	0...16	P37	0...35	L31	0...60	K31	0...0,6
B35	0...1	M20	0...25	P40	0...60	L35	0...100	K35	0...1
B36	0...1,6	M21	0...40	P43	0...100	L36	0...160	K36	0...1,6
B38	0...2,5	M22	0...60	P46	0...150	L38	0...250	K38	0...2,5
B40	0...4	M24	0...100	P48	0...250	L40	0...400	K40	0...4
B42	0...6	M25	0...160	P51	0...350	L42	0...600	K42	0...6
B45	0...10	M27	0...250	P55		L45	0...1000	K45	0...10
B50	0...16	M29	0...400	P56				K50	0...16
B54	0...25	M31	0...600	P57				K54	0...25

**Table 2: Secondary scale**

Dual scale option	code
PSI red	#PR
PSI black	#PB
PSI blue	#PBL
bar red	#BR
bar black	#BB
bar blue	#BBL

Add the code behind the pressure code (eg B45#PR for 0...10 bar//psi with red scale)

**Table 3: General option code**

Option (start options with X_)	code
IP 65 class	_IP65
IP 67 Class	_IP67
Cleaned for Oxygen use	_CFO
NACE ISO 15156 (MR 01 75) (alloy 400)	_N75
ATEX II 2G Ex h IIC	_ATEX
3.1 material certificate	_IC31
Calibration certificate 5 points	_CC5
5x over pressure safe	_05X
10x over pressure safe	_10X
5 bar over pressure safe	_05B
10 bar over pressure safe	_10B
40 bar over pressure safe	_40B

**Table 4: Flange size**

ASME B16.5

Flange size	code
0,5"	01
0,75"	1A
1"	02
1,25"	03
1.5"	04
2"	05

Flange Class	code
cl. 150	A1
cl. 300	A2

EN 1092-1

Flange size	code
DN10	21
DN15	22
DN20	23
DN25	24
DN32	25
DN40	26
DN50	27

Flange size	code
PN 10-40	D4

When configuring a flange combine the first two digits and the last two digits.EG: 2" 150# ASME connection is 05A1

**Table 5: Contact option code**

Option (start options with X_)	code	
Snap-action magnetic contact*	M1 (make contact)	_AM1
	M2 (break contact)	_AM2
	M11 (make - make contact)	_AM11
	M12 (make - break contact)	_AM12
	M21 (break - make contact)	_AM21
	M22 (break - break contact)	_AM22
Inductive contact	I1 (make contact)	_AI1
	I2 (break contact)	_AI2
	I11 (make - make contact)	_AI11
	I12 (make - break contact)	_AI12
	I21 (break - make contact)	_AI21
	I22 (break - break contact)	_AI22

<100 mbar only Inductive contact possible. Accuracy BDT12 is excluding contact Contacts are without cable and adjusting key.

**Table 6: Coating**

Option	code
PTFE Coating on Process connection	CPTF
PFA Coating on Process connection	CPFA

Holland – Romania – India – Thailand – Dubai – USA

To our knowledge, the information contained herein is accurate as of the date of this document. However neither Badotherm, nor its affiliates makes any warranty, express or limited, or accepts any liability in connection with this information or its use. This information is for technical skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other product. The user alone finally determines suitability of any information or material in contemplated use, the manner of use and whether any patents are infringed. This information gives typical properties only. Badotherm reserves the right to make changes to the specifications any materials without prior notice. The latest version of the datasheet can be found on [www.badotherm.com](http://www.badotherm.com).

© 2015 Badotherm, all rights reserved. Trademarks and/or other products referenced herein are either trademarks or registered trademarks of Badotherm.

PG 7007

06 February 2020

Page 7 of 7