



Technical Data

Housing designs

Standard housing with right angle plug

material: st. steel mat.-no. 1.4301
 type of protection: IP 65
 silicon cover plate for trimming potentiometers. Right angle plug as per DIN 43650 with cable gland M16x1.5 mm, cable diameter 4...10 mm.
 Inner chamber aeration for measuring ranges ≤ 10 bar.

Field housing, solid design

material: st. steel mat.-no. 1.4301
 types of protection:
 · standard
 IP 65, inner chamber aeration via integrated sintered filter, only for excess pressure measuring ranges ≤ 10 bar, if aeration via cable is impossible.
 Option:
 IP 67, inner chamber aeration via connection cable for excess pressure measuring range ≤ 10 bar.
 Screwable cover ring with O-ring seal for the externally accessible trimming potentiometers.
 Screwable case cap for connection chamber.
 Connection terminals 4 mm².
 Cable gland M16x1.5 for cable diameter 4.5...100 mm, material polyamide.

Process connection

- G 1/2 B, DIN EN 837-1
- G 1/2 A, flush mounted

Measuring system

piezoresistive measuring bridge, protected by integrated stainless-steel diaphragm. Completely welded system

Filling material

silicone-free, synthetic oil

Material

diaphragm: st. steel mat.-no. 1.4404
 socket: st. steel mat.-no. 1.4404

Weights

standard housing: approx. 300 g
 field housing: approx. 750 g

Allowed storage temperature

-25...+80 °C

Operating temperature range

-25...+70 °C

Compensated temperature range

-10...+70 °C

Temperature influence

on zero point: ≤ 0.02 % of meas. span/K
 on meas. span: ≤ 0.02 % of meas. span/K

Auxiliary power supply

standard version:
 · nominal voltage 24 V DC
 · function range
 2-wire circuitry 14...30 V DC
 3-wire circuitry 16...30 V DC
 · max.permiss.operating voltage 30 V DC

Ex design:

- permis. voltage range of 2-wire circuitry 15...30 V DC
- Ex design:
 · permis. voltage range of 3-wire circuitry 16...30 V DC

Standard measuring ranges

see order details

Overload limits UE

for short-time overload.
 See order details

Overload influence

≤ 0.1 % f.s.

Output signal

4...20 mA, 2-wire circuitry, standard.
 Further possibilities see order details

Test output (with field housing only)

non interruptible output current measurement via integrated LOC diode

Current limitation in output signal

max. output current approx. 30 mA

Supply voltage influence

≤ 0.2 % f.s. / 10 V

Features

- Measuring ranges 0...160 mbar up to 0...400 bar rel. 0...0.4 bar up to 0...25 bar abs
- Piezoresistive sensor element
- Measuring system overload protected
- Zero point and measuring span can be adjusted externally by means of a potentiometer
- Internal diaphragm type series CB1(2)02 .
- Flush mounted diaphragm type series CE1(2)02 .
- Wetted parts of stainless steel, completely welded
- Stainless steel housing as standard or field housing
- Type of protection IP 65 or IP 67
- Output signal: 4...20 mA, option: 0...20 mA, 0...10 V DC
- Explosion protection: II 1/2G EEx ia IIC T4/T6 IECEx Ex ia IIC T6...T4

Application

The analog pressure transmitter UNIVERSAL is suited for measuring the relative and absolute pressure of gases, vapors and liquids.

The area of application lies in general process measurement technology. There are two different designs of housings available: standard housing with right angle plug or stainless steel field housing for use in tough environments.

Technical Data (continued)

Linearity error incl. hysteresis
 $\leq 0.3\%$ f.s. (limit point calibration)

Adjustable range
 zero point and measuring span approx.
 $\pm 10\%$

Response time
 ≤ 20 ms

Ex-approval
 TÜV 02 ATEX 1971 X
 II 1/2G EEx ia IIC T4/T5/T6,
 IECEx Ex ia IIC T6...T4

ambient temperatures max.

T_a [°C]	T_m [°C]	temperature class
70 °C	55 °C	T6
70 °C	70 °C	T5
70 °C	70 °C	T4

Electrical data
 sum of the maximum values of the
 intrinsically safe circuits:

$$U_i = 30 \text{ V}$$

$$I_i = 100 \text{ mA}$$

$$P_i = 0.7 \text{ W}$$

Signal mode	C_i [nF]	L_i [μ H]
2-wire 4...20 mA	33	20
3-wire 0(2)...10 V	43	30
3-wire 0(4)...20 mA	43	30

Burden

- current output
 2-wire circuitry
 standard version $R_a = \frac{U_b - 14 \text{ V}}{20 \text{ mA}}$ (KOhm)

with explosion protection $R_a = \frac{U_b - 15 \text{ V}}{20 \text{ mA}}$ (KOhm)

- voltage output
 a current of 20 mA can be obtained in the
 case of devices with power output.

Burden influence

for 500 Ohm burden of change: $\leq 0.1\%$ f.s.

EMC-Test

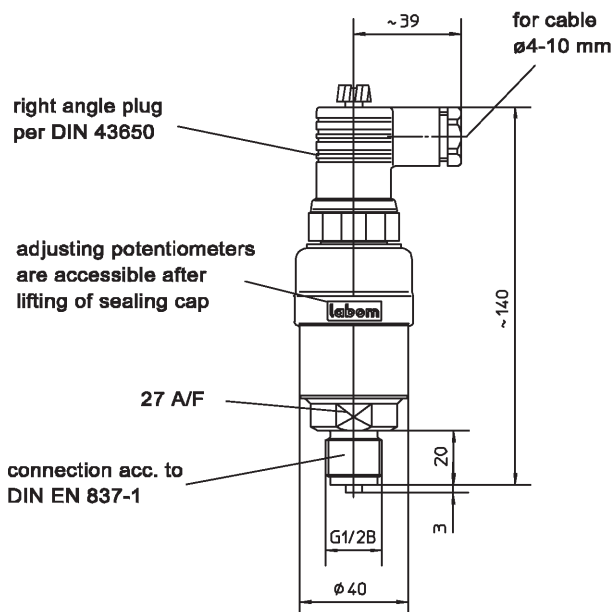
- noise immunity as per EN 50082, section 2, March 95 issue for industry
- emitted interference as per EN 50081, section 1, 1993 issue for residential and industrial areas

Information on other models see order details or upon request.

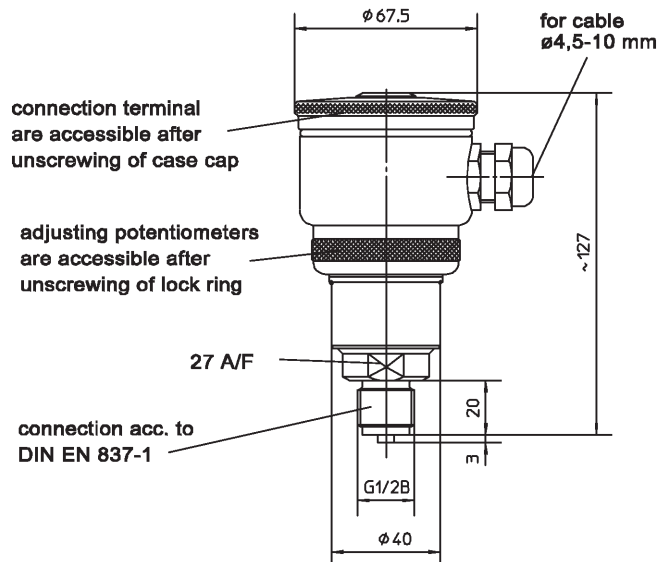
Dimensions

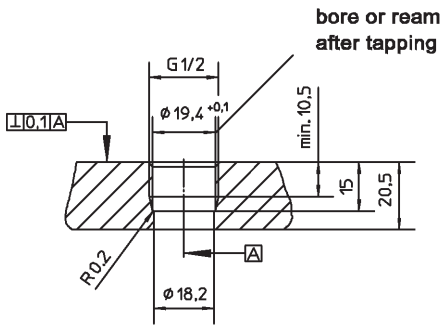
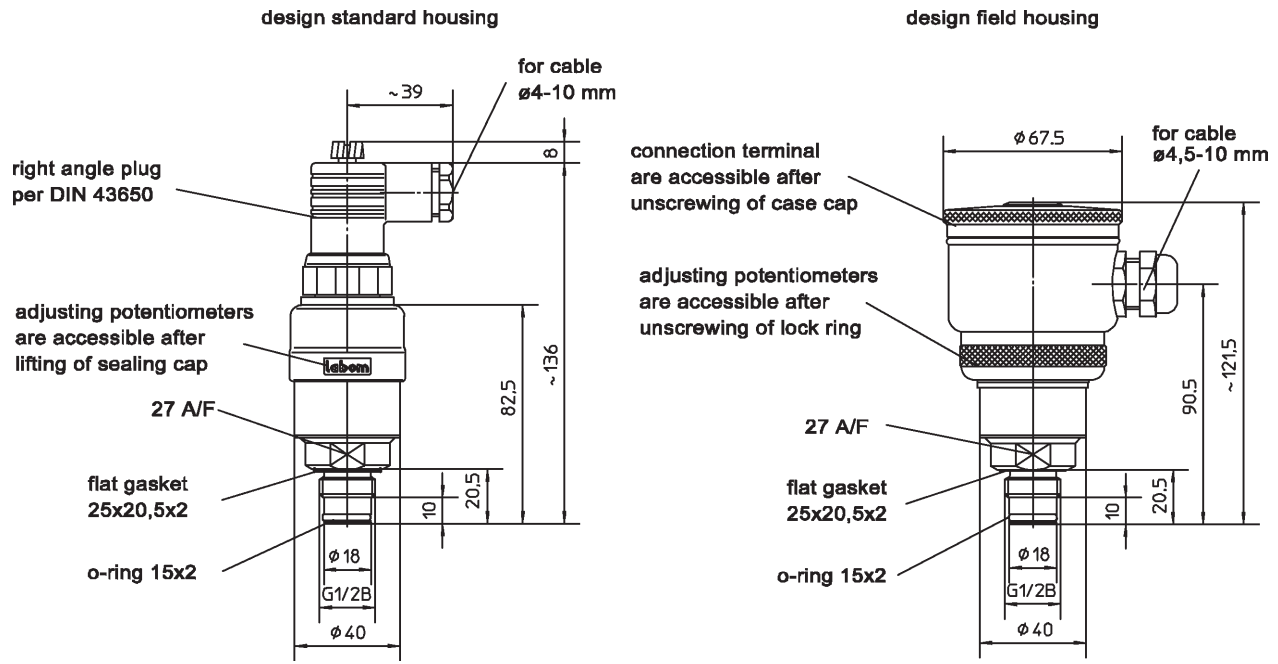
Pressure transmitter UNIVERSAL with internal diaphragm type series CB 1(2)02.

design standard housing

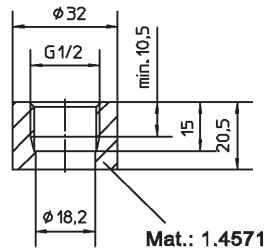


design field housing



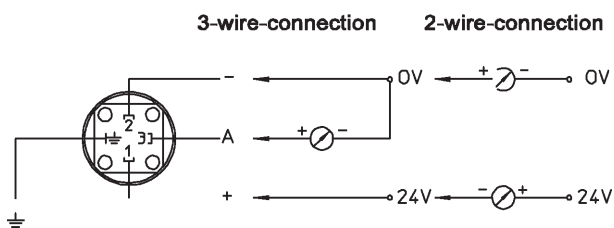


Screw-in hole (example)

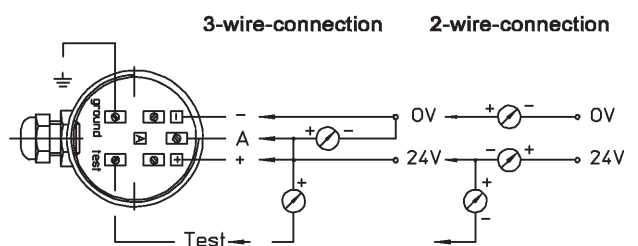


Welding nipple (option)

Connection diagram



design standard housing



design field housing

Order Details - please give additional specifications for models not listed -

Pressure transmitter UNIVERSAL with internal diaphragm		
design	· standard housing	CB102 .
	· field housing	CB202 .
version	· standard	0
	· explosion protection, type of ex-protection s. below	1
measuring range	· per table
output signal	· 4...20 mA, 2-wire	H1
	· 0...20 mA, 3-wire	H2
	· 0...10 V, 3-wire	H4
	· 0...5 V, 3-wire	H6
additional features (to be indicated in case of need, only)		
type of protection ³	· IP 65 (standard)	T2
	· IP 67 ²	T1
type of ex-protection (for ex-protection only)	· II 2G EEx ia IIC T4	S69
	· II 2G EEx ia IIC T5/T6, standard	S68
	· II 1/2G EEx ia IIC T4	S62
	· II 1/2G EEx ia IIC T5/T6	S66
	· IECEx Ex ia IIC T6...T4	S76
Order code (example):		
		CB1021 A1010 H4

standard measuring ranges and overload protection UE		
meas. range	UE bar ¹	order code
-160...0 mbar	2	A1119
-250...0 mbar	2	A1120
-400...0 mbar	6	A1121
-600...0 mbar ⁴	6	A1123
-1...0 bar ⁴	10	A1086
-1...0.6 bar ⁴	10	A1087
-1...1.5 bar ⁴	16	A1088
-1...3 bar ⁴	16	A1089
-1...5 bar ⁴	30	A1090
-1...9 bar ⁴	30	A1091
-1...15 bar ⁴	50	A1092
0...160 mbar	2	A1009
0...250 mbar	2	A1010
0...0.4 bar	6	A1051
0...0.6 bar	6	A1052
0...1 bar	10	A1053
0.2...1 bar	10	A1080
0...1.6 bar	10	A1054
0...2.5 bar	16	A1055
0...4 bar	16	A1056
0...6 bar	30	A1057
0...10 bar	30	A1058
0...16 bar	50	A1059
0...25 bar	50	A1060
0...40 bar	70	A1061
0...60 bar	70	A1062
0...100 bar	200	A1063
0...160 bar	200	A1064
0...250 bar	500	A1065
0...400 bar	500	A1066
0...0.4 bar abs	6	B1051
0...0.6 bar abs	6	B1052
0...1 bar abs	10	B1053
0...1.6 bar abs	10	B1054
0...2.5 bar abs	16	B1055
0...4 bar abs	16	B1056
0...6 bar abs	30	B1057
0...10 bar abs	30	B1058
0...16 bar abs	50	B1059
0...25 bar abs	50	B1060

Pressure transmitter UNIVERSAL with flush mounted diaphragm			
design	· standard housing	CE101 .	
	· field housing	CE201 .	
version	· standard	0	
	· explosion protection, type of ex-protection s. below	1	
measuring range	UE bar ¹		
	-1...1.5 bar ⁴	16	A1088
	-1...3 bar ⁴	16	A1089
	-1...5 bar ⁴	30	A1090
	-1...9 bar ⁴	30	A1091
	-1...15 bar ⁴	50	A1092
	0...2.5 bar	16	A1055
	0...4 bar	16	A1056
	0...6 bar	30	A1057
	0...10 bar	30	A1058
	0...16 bar	50	A1059
	0...25 bar	50	A1060
	0...2.5 bar abs	16	B1055
	0...4 bar abs	16	B1056
	0...6 bar abs	30	B1057
	0...10 bar abs	30	B1058
	0...16 bar abs	50	B1059
0...25 bar abs	50	B1060	
output signal	· 4...20 mA, 2-wire	H1	
	· 0...20 mA, 3-wire	H2	
	· 0...10 V, 3-wire	H4	
	· 0...5 V, 3-wire	H6	
additional features (to be indicated in case of need, only)			
type of ex-protection (for ex-protection only)	· II 2G EEx ia IIC T4	S69	
	· II 2G EEx ia IIC T5/T6, standard	S68	
	· II 1/2G EEx ia IIC T4	S62	
	· II 1/2G EEx ia IIC T5/T6	S66	
	· IECEx Ex ia IIC T6...T4	S76	
type of protection ³ (field housing)	· IP 65 (Standard)	T2	
	· IP 67 ²	T1	
with welding nipple to process connection			
Order code (example):			
		CE1010 A1057 H2	

¹ special overload protection (UE) upon request
² aerated cable with < 10 bar is required
³ design field housing only
⁴ negative relative pressure ranges (e.g. -1...+1 bar) are adjusted at works to 0...100%, e.g. 4...20mA.
 Temporary operation up to -1 bar at room temperature and continuous operation up to -500 mbar at max. 50°C is admissible.
 Long-term vacuum measurements at temperatures above +50°C may cause changes in the properties of the measurement device.
 Vacuum-proof designs are available upon request

Introduction

These operating instructions refer to installation, commissioning, servicing and adjustment. Statutory regulations, valid standards, additional technical details in the relevant data sheet, details of the type plate and any additional certificates are to be observed along with these operating instructions.



Safety instructions

- Installation, operation and maintenance of the instrument may be executed by authorized personnel, only, using suitable equipment.
- Warning: If the instrument is used incorrectly it is possible that serious injuries or damage can occur!
- Prior to the disassembly of the pressure transmitter the impulse ducts between the measuring transmitter and the process have to be locked and relieved from pressure.
- The standard nominal pressure rating and the permissible operating temperature of the gasket should be observed for all process connections. Operation outside the allowed nominal pressure rating, especially with clamp connections, is only possible with suitable clamps. In this case, note DIN 32676 for stipulations on heat resistance.
- Pressure transmitters that are mechanically defective can cause injuries or give rise to process faults. Suitable precautions should be taken to avoid this.

Transportation and storage

Store and transport pressure transmitters under dry, clean condition and, where possible, in their original packaging.
Permissible storage temperature: $-40^{\circ}\text{C} \dots +90^{\circ}\text{C}$ (with liquid filling VE-water: $0^{\circ}\text{C} \dots +90^{\circ}\text{C}$). Avoid shock and vibrations.

Mounting and operating

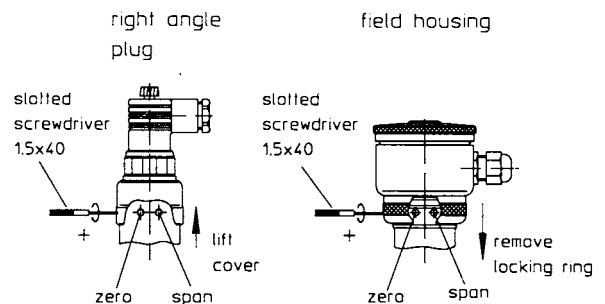
- Before mounting the instrument ensure that pressure range, overpressure resistance, media compatibility, thermostability and pressure port are suitable for the process at hand.
- Conduct process installation before electrical installation.
- Measuring instruments that should not have any oil or grease residues in the pressure port are marked „Free of oil and grease“.
- Gaskets must be chosen that are suited to the process connection and resistant to the measured medium.
- Check for pressure tightness when commissioning the transmitter.
- Do not insulate the temperature decoupler, as this would reduce the decoupling effect. Follow DIN 32676.
- Wire up the instrument with power switched off.
- Instruments with case protection IP67 and pressure ranges to 16 bar/ 250 psi are aerated through the connection cable. Place an aeratable cable in an aeratable connection chamber during mounting. This will compensate for atmospheric variations.
- The instrument can only be protected against electromagnetic interference (EMC) when the conditions for screening, earthing, wiring and potential isolation are met during installation.
- The mounting position should be taken into consideration when checking the zero output. Standard transmitters are adjusted at the factory for vertical mounting. Changes to the mounting position can cause zero shifts at pressure ranges ≤ 2 bar. These drifts can be corrected by adjustment on site (see zero point correction).
- When the instrument is opened any contact with the electrical connections can affect the signals. This situation can be avoided by switching off the supply voltage or by disconnecting the signal circuit.
- The types of protection IP65/IP67 are only achieved, when threaded rings, caps, plugs or fixing screws have been screwed tight after electrical connection/parameterization.
- The instrument requires no maintenance.

Instructions for the operation with diaphragm seal

- To avoid soiling and damage remove protective cap or wrapping in front of the separating diaphragm before mounting.
- Do not touch the flush mounted separating diaphragm, as there is a danger of deformation at measuring ranges to 10 bar / 150 psi. Instrument zero point and measuring characteristics could also be affected.
- Measuring instrument and diaphragm seal are a closed system and should not be separated.
- Avoid overtightening the process screw joints as this can result in zero displacements at the pressure transmitter (fixing error).
- When using systems with capillary for vacuum measurements always mount the pressure transmitter underneath the diaphragm seal. The instruments are set at the factory with pressure transmitter and diaphragm seal at the same height. Correct any differences in height between diaphragm seal and pressure transmitter arising from conditions on site on the pressure transmitter when placing the instrument into operation (see zero-point correction). When correcting for elevation be aware of the adjustment limits.
- Be sure to install and securely fasten the capillary to avoid vibrations. Roll up overlengths with a minimum radius of 20-25 cm. Shock and changes in temperature can impact on measurements.
- Process and ambient temperatures can cause zero displacements at the pressure transmitter with some system designs. We can supply you with an error analysis.

Zero-point correction

Should the devices require re-adjustment you may access the internal potentiometers for zero point and span underneath the cover in standard housings, and by removing the knurled locking ring in field housings. Trim the zero and span potentiometers using a screwdriver (1.5 x 40) (10 turns = $\pm 10\%$ of measuring range). To set the measuring span, you should apply an accurate reference pressure.



The CE marking on the instruments certifies compliance with valid EU directives for bringing products to market within the European Union. The following directives are met: EMC 98/13/EG, PED 97/23/EC. PED: Pressure transmitters are pressure accessories in line with the Pressure Equipment Directive. The CE marking is granted after classification in the relevant categories. Unmarked instruments satisfy the Pressure Equipment Directive and are manufactured in accordance with "sound engineering practice".



Technical Data

Case design

stainless steel
design:
st. steel case with right angle plug
st. steel field housing

Temperature ranges

ambient temperature: -10°C...+70 °C
storage temperature: see page 1
process temperature: depending on type
(measuring range, design and system filling)

Measuring accuracy

linearity error incl. hysteresis $\leq +0.2\%$ f.s.
($\leq +0.3\%$ f.s. for measuring range $\geq 0...60$ bar), fixed-point adjustment
accuracy of adjustment: $\leq \pm 0.2\%$ f.s.
temperature effect see data sheet

Auxiliary energy supply

· nominal voltage 24 V DC
· function range 14...30 V DC
· max. allowable operat. voltage 30 V DC

Signal output

4...20 mA, 2-wire circuitry
0...20 mA/0...10 V/4...20 mA, 3-wire circuitry

Current limitation in output signal

max. output current approx. at 30 mA

Adjusting range

approx. $\pm 10\%$ f.s.
zero point and measuring span separately adjustable

Burden

$$R_a = \frac{U_B - 14 \text{ V}}{23 \text{ mA}}$$

U_B = operating voltage

R_a = max. permissible burden resistance (incl. lead)

Burden influence

for 500 Ohm burden change: $\leq 0.1\%$ f.s.

System filling

standard: silicon oil
foodstuff oil FD1/FD2 (USDAH1 per FDA)
vegetable oil FP
medical white oil FW (USDA-H1 per FDA)

Installation position

any, standard: adjusted at factory for vertical mounting

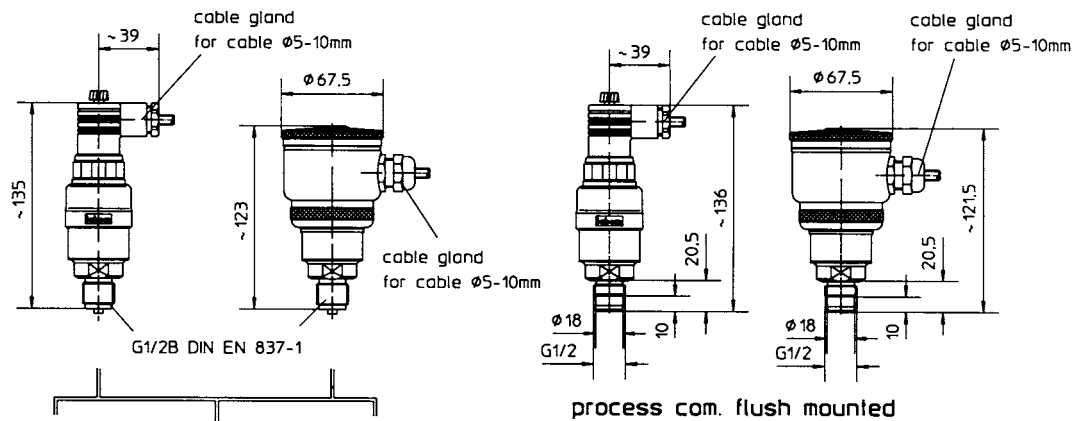
EMC-test

· noise immunity according to EN 50082 section 2, version march 1995 (issue for industry)
· emitted interference according to EN 50081 section 1, version 1993 (issue for residential and industrial areas)
Device emits no radiation on its own

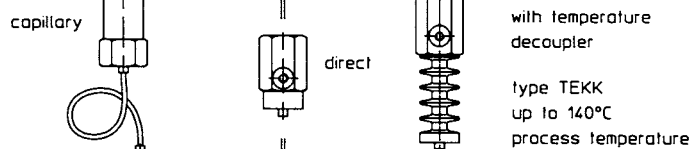
Further details see data sheet

Dimensions/case/process connection

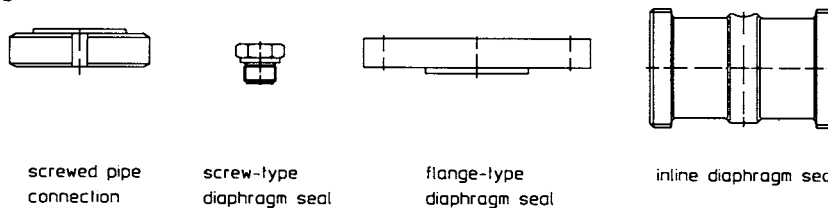
diagram:
versions in
common use



coupler element



diaphragm seal
connectors



Connection diagram

