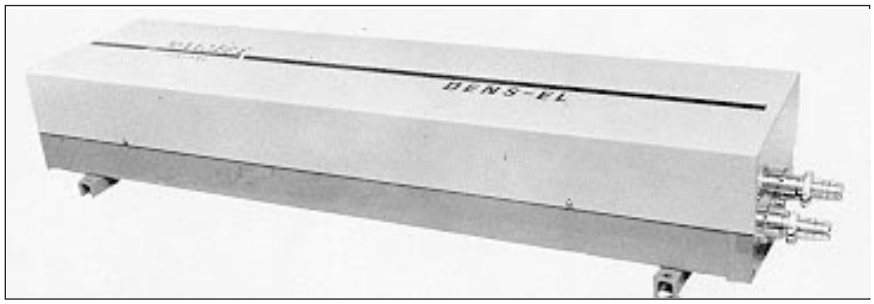
DENS-EL electronic density transmitter

BD220
March 15, 1989

The DENS-EL is an electronic density transmitter that operates on the force balance principle. Due to the small measurement lag it is highly applicable as a measurement transmitter in automatic density control.
When equipped with hygienic bellows, the transmitter meets also the requirements set by food industry for washability.



Technical specification

Span
- acid-resistant bellows: 0.025 to 0.5 kg/dm³
- normal PTFE bellows: 0.025 to 0.5 kg/dm³
- shallow-fold hygienic PTFE bellows: 0.1 to 0.5 kg/dm³
- silicone-lined bellows: 0.025 to 0.5 kg/dm³.

Lower range value: 0.5 to 2.5 kg/dm³.

Output signal
- 2-wire system and (Ex)i: 4 to 20 mA
- 3-wire system: 0 to 20 mA.

Supply voltage: 24 to 50 V DC.

Type Ex intrinsically safe (VDE 0171) (Ex) is G5 PTB Nr. 111 B/E-29 847 B output 4 to 20 mA. Valid only by the transmitters of metal tube type.

Permissible load
- 2-wire system
  - 24 V supply: 370 Ω
  - 48 V supply: 1400 Ω
- 3-wire system
  - 24 V supply: 500 Ω
  - 48 V supply: 1500 Ω

Application ranges
- density: 0.5 to 3.0 kg/dm³
- max. flow
  - AISI 316 tube, ∅32: approx. 120 l/min
  - glass tube, ∅25: approx. 80 l/min
  - HASTELLOY C tube, ∅25: approx. 80 l/min

For higher flows the transmitter is located in a by-pass line or a reflux branch.
- working pressure
  - acid-resistant bellows: 10 bar, Upon request 20 bar (static press. calib.)
  - silicone-lined bellows: 10 bar, Upon request 20 bar (static press. calib.)
  - The max. press. of hoses must be checked.
  - PTFE bellows: see curve
  - DENS-EL Ex i version: 7 bar
- resistance to pressure shocks
  - acid resistant bellows 25 bar
  - rubber lined bellows 25 bar
- max. temperature: 110°C
- max. viscosity: 10 Pa x s

Temperature compensation
Compensation may be adjusted for either linear or curved characteristic.
- max. width of compensation range (depending on the characteristics of the process fluid):Δt = 40 to 80°C
- max. permissible density change for 1 K temperature change in process fluid
  - with normal counterweight: 0.0011 kg/dm³
  - with double compensation weight: 0.0022 kg/dm³.

Max. ambient temperature: 60°C

Error, percent of span 1)	Min. span: 0.025 kg/dm³	Medium span: 0.250 kg/dm³	Max. span: 0.500 kg/dm³
- Non-linearity:	± 0.25 %	± 0.05 %	± 0.05 %
- Hysteresis:	0.20 %	0.05 %	0.05 %
- Sensitivity:	< 0.10%	< 0.10%	< 0.10%
- Repeatability:	0.15 %	0.04 %	0.04 %
- Effect of a 1 bar process pressure change on range zero between 0 and 10 bar	± 0.20 %	± 0.02 %	± 0.01 %
- Effect of supply voltage change: 0.05 %/10 V			

1) This does not apply to DENS-EL transmitters with shallow-fold PTFE bellows.

Mounting
In horizontal position on a firm, vibration-free base.

Process connections
In metal tube type (AISI 316), a 1 1/2" fitting for tubing, or a quick-disconnect fitting corresponding to 3-A standard or flange coupling DN32 PN40.
In glass tube and HASTELLOY C type, a DN25 PN40 flange connection.
DENS-EL Ex i version, DN32 PN40 flange connection.

Electrical connections
To terminal strip in junction box as shown in wiring diagram. Inlet through Pg 13.5 gland.

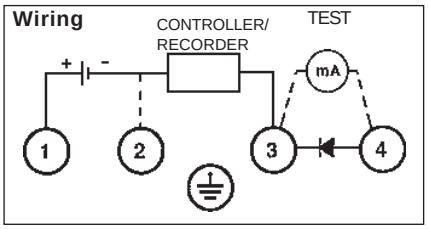
Materials
- measurement tube of acid-resistant steel, Pyrex glass, or HASTELLOY C
- bellows of acid-resistant steel, NBR-lined acid-resistant steel, or PTFE
- fittings of acid-resistant steel AISI 316
- body and case of steel with epoxy powder paint to prevent corrosion.

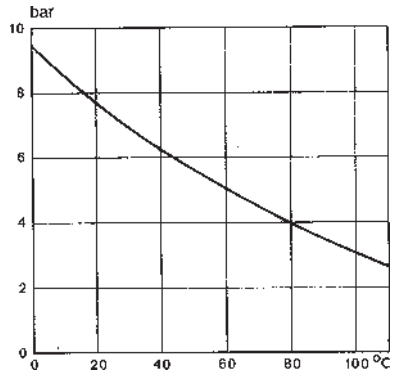
Calibration
The transmitter is factory-calibrated. The customer should supply the necessary data for calibration by filling in a questionnaire which is returned to the manufacturer as an appendix to the order.

Protection degree: IP 54

Weight: approx. 105 kg.

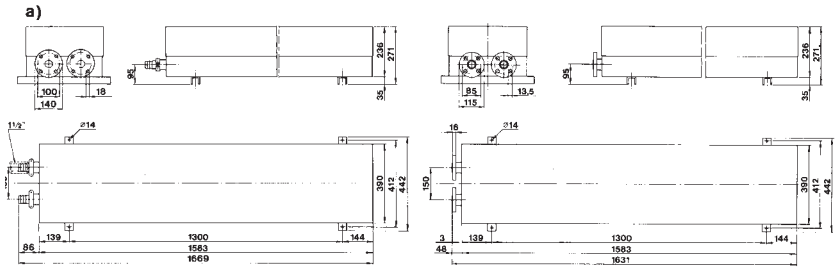
Wiring





The pressure rating of the PTFE bellows of the glass tube type transmitter, as a function of temperature.

We reserve the right to make technical changes without prior notice. Performance is indicated in accordance with IEC546 and IEC770 recommendations.



AISI 316 measurement tube ∅ 32
a) (Ex)i process connection

Glass and HASTELLOY C measurement tube ∅ 25

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