DATA SHEET

T 7540 EN

Type 3804-1 Pneumatic Transmitter for Pressure

Application

Transmitter for use in pneumatic control systems with operating pressures from 0 to 20 bar

The pressure transmitters are suitable for liquids, gases and vapors. They measure pressures and convert the measured value into a pneumatic output signal from 0.2 bar to 1.0 bar. The devices are designed according to the modular principle and comprise a transmitter, which operates according to the force-balancing principle, as well as easily replaceable measuring elements.

Special features

- The exchangeable measuring elements (Fig. 3) permit the use of the transmitters for measuring spans from 0.25 to 20 bar.
- All components that come into contact with the process medium are made of stainless steel, even in the standard version.
- Wide permissible ambient temperature range from –35 to +120 °C
- Measuring span adjustable over a spindle within a wide range; max. ratio 1:25
- High overload capability and wide range of application
- Easy-to-replace booster section comprising feedback bellows, nozzle and pneumatic booster
- Can be used in hazardous areas (Zones 1 and 2)
- For pressure measurements of flammable gases and vapors, install a type-approved flame arrester into the measuring line.

Versions

Type 3804-1 standard version (Fig. 1) · Suitable for direct connection of the process medium · Lower range value p_e = 0 bar

Type 3804 DM (with diaphragm seal) · For special process media, see Data Sheet ▶ T 7550

Fig. 1: *Type 3804-1 Pneumatic Transmitter*

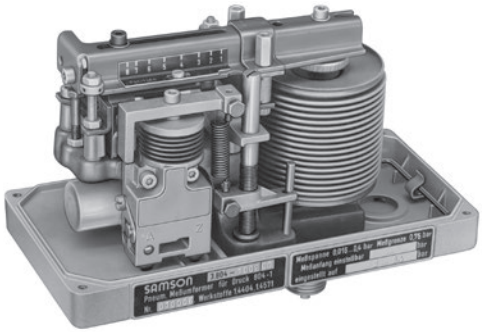

Fig. 2: *Type 3804-1, front view (without housing)*

Pressure measuring element for max. measuring spans of 6 or 20 bar

Fig. 3: *Type 3804-1, pressure measuring elements*

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Principle of operation (see Fig. 4, Fig. 5 and Fig. 6)

The pressure p of the process medium produces a force at the measuring element (10) which is transmitted by the balance beam (9) and the moveable span rider (4) to the compensation beam (7). The system is balanced when the input force and the force resulting from the output air pressure p_A and the surface area of the feedback bellows (2) are in equilibrium.

The supply air is fed to the pneumatic booster (17) and flows through the throttle (1) and the nozzle (15) and hits the flapper plate (14).

When the pressure p of the process medium increases, the balance beam (9) starts to move and the flapper (14) becomes closer to the nozzle (15). This causes the cascade pressure supplied to the booster (17) to increase, causing the output air pressure (p_A) supplied to the feedback bellows (2) to increase as well. This pressure increases until the force created at the feedback bellows (2) balances out the force created at the measuring element (10) and a new equilibrium is reached. When the pressure p inside the pressure measuring element (10) drops, the flapper (14) moves away from the nozzle (15) and both the cascade pressure and the output pressure p_A decrease until the system is balanced again. The pneumatic output signal p_A assumes a value proportional to that of the input pressure.

Due to the relay arrangement of the booster (17), the distance between the flapper (14) and the nozzle (15) in the force-balancing system is extremely small, i.e. practically zero. Therefore, the hysteresis of the pressure measuring element (10), feedback bellows (2), cross spring pivot of the balance beam (9) and compensation beam (7) as well as the springs for zero and lower range value adjustment (8, 18) have almost no influence on the measuring characteristics of the transmitter.

After loosening the locking screw (5), the span rider (4) can be moved by turning the spindle (3) and the transmission ratio between the measuring element (10) and the feedback bellows (2), i.e. the measuring span, can be continuously adjusted. The ratio of the adjustable minimum span to the maximum adjustable span is 1:25 in transmitters with a bellows measuring element.

Zero can be adjusted at the zero screw (8) without removing the cover.

Legend for Fig. 4, Fig. 5 and Fig. 6

1 Jet nozzle
2 Feedback bellows
3 Spindle with hexagon socket
4 Span rider
5 Locking screw
6 Scale for preliminary adjustment of the measuring span
7 Compensation beam
8 Zero screw
9 Balance beam
10 Pressure measuring element
11 Base
12 Process fluid connection (input = E)
13 Rail
14 Flapper
15 Outlet nozzle
16 Volume
17 Booster
19 Nuts for adding and removing tension from spring (18)
20 Booster

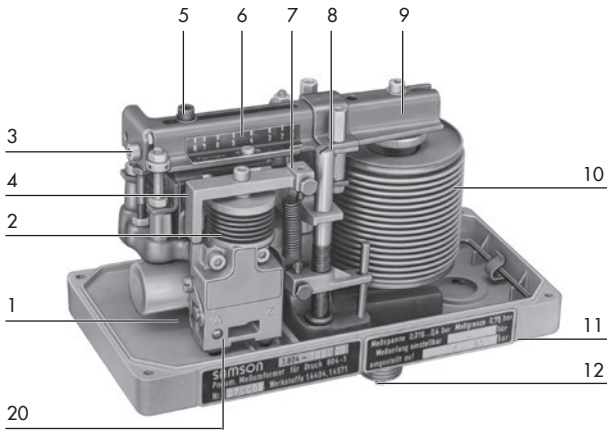

Fig. 4: *Front view (without housing)*

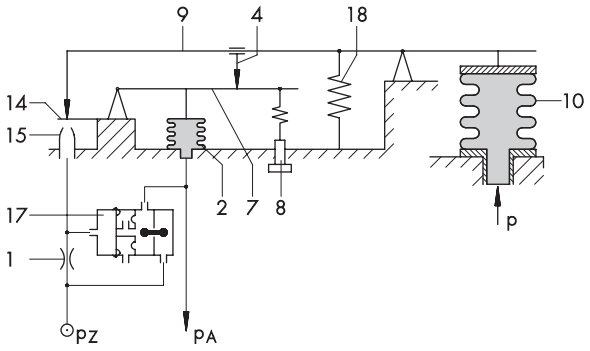

Fig. 5: *Functional diagram*

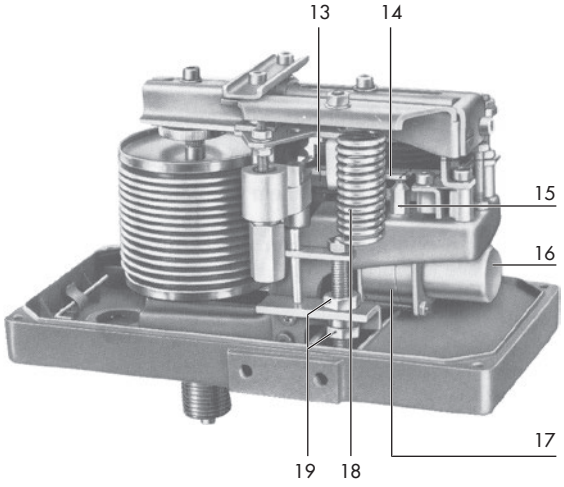

Fig. 6: *Rear view (without housing)*

Table 1: *Technical data · All pressure stated as gauge pressure p_e in bar unless specified otherwise*

Type 3804-1		
Measuring span, continuously adjustable	0.25 to 6 bar	0.8 to 20 bar
Overloading	Ten times the adjusted span, however not exceeding	
	25 bar	50 bar
Ultimate strength up to	60 bar	100 bar
Pressure measuring element	Metal bellows	
Volume of the pressure measuring element	12 cm^3	6.4 cm^3
Supply air	1.4 ±0.1 bar (20 ±1.5 psi) · Air quality according to ISO 8573-1 · Max. particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected	
Output pressure	0.2 to 1 bar (3 to 15 psi possible)	
Permissible ambient temperature	–35 to +120 °C, lower temperatures on request	
Perm. storage temperature	–50 to +120 °C	
Air consumption in steady state	<0.15 m_n^3/h	
Max. air capacity	1 m_n^3/h	
Load characteristic	0.3 m_n^3/h per 3 % output signal change	
Characteristic	Linear	
Deviation from linearity	<0.5 % with terminal-based conformity	
Hysteresis	<0.5 %	
Dead band	<0.05 %	
Temperature influence	<0.03 %/K (at –20 to +120 °C)	
Influence of supply air ±0.1 bar for measuring spans of the positions on the scale (6)	1 to 3: <0.4 %/0.1 bar on pressure change 4 to 8: <0.25 %/0.1 bar on pressure change	
Effect of overload	Overload up to permissible value <1 %	
Degree of protection	IP 54	
Additional effect of temperature on adjustable lower range value up to ten times the adjusted measuring span	<0.05 %/K	

Table 2: *Materials · Material numbers according to DIN EN*

Type 3804-1	
Metal bellows	1.4404
Connection nipple	1.4571
Spring brackets	1.4310
Span rider and rail	1.4034 hardened
Balance beam	Chromated steel
Booster and volume chamber	Chromated aluminum
Booster gasket	Silicone rubber
O-rings	FPM (fluorocarbon rubber)
Base and cover	Die-cast aluminum, plastic-coated
Weight, approx.	2.7 kg

Installation

The usual mounting position, i.e. with the base in horizontal position and process fluid connection pointing downwards, is shown in Fig. 7.

A different mounting position, i.e. with the base in vertical position and process fluid connection in horizontal position, is possible. In this case, the air connections must be located above the process fluid connection. Zero must be corrected if this mounting position is used.

The supplied mounting parts allow the following types of mounting (see Fig. 7):

- **Pipe mounting** with clamp to horizontal or vertical 2" pipe.
- **Wall mounting** with mounting plate attached to the wall.

Dimensions in mm

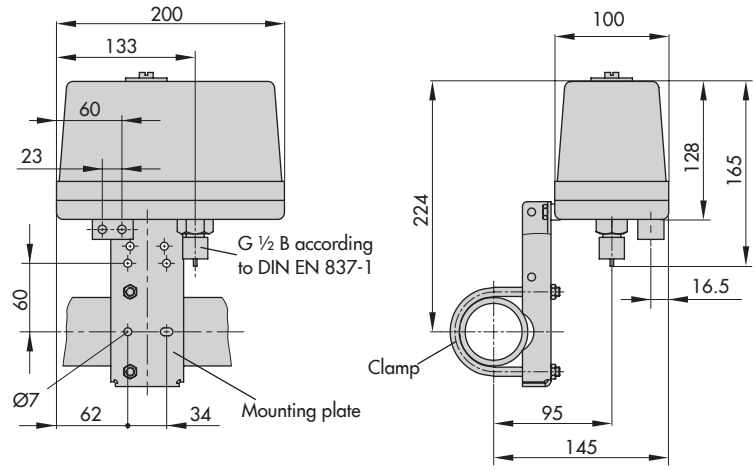

Fig. 7: *Dimensions and mounting positions*

Article code

Pneumatic transmitter for pressure	**Type 3804-**	**1**	**0**	**0**	**x**	**x**	**0**	**1**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pneumatic transmitter for pressure, process fluid connection G ½, for gasket DIN 16288 Form B, pneumatic connections ⅛–27 NPT, at the side																	
Measuring span																	
0.8 to 20 bar					1	0											
0.25 to 6 bar					2	0											

Air connections: Two tapped holes ⅛ NPT

Process fluid connection

Metal bellows measuring element: connection nipple with G ½ B cylindrical pipe thread according to DIN EN ISO 228-1

Pressure Equipment Directive

Classification according to PED 2014/68/EU: the devices are classified in Article 4.3 (sound engineering practice)

Accessories

Screw joints, shut-off valves, supply air reducing stations etc.

Gasket G ½

- Copper
- Centellen® WS 3820

Flame arrester (details ▶ AB 10)

Ordering text

Type 3804-1 Transmitter

Span ... bar

Output 0.2 to 1 bar/3 to 15 psi

Optionally, special version ...

Optionally, accessories ...

Measuring range adjusted to: 0 to ... bar