

## Electropneumatic Converters for direct current signals

### I/P Converter Type 6124

#### Application

Rack-mounting units to convert a direct current signal into a pneumatic signal for measuring and control. Especially suitable as an intermediate element between electrical measuring devices and pneumatic regulators or between electrical control devices and pneumatic control valves.



The input is a load-independent direct current of 4 to 20 mA or 0 to 20 mA, the output is a pneumatic standardized signal of 0.2 to 1.0 bar (3 to 15 psi) with a supply pressure of 1.4 bar (20 psi).

The I/P converters are rack-mounting units in the Europe card C size and have a plug-in width of just 4 HP (20 mm).

#### Special features

- Very compact design allowing a 20 mm wide rack-mounting unit to be equipped with two I/P conversion units.
- Excellent dynamic response (limiting frequency 8 Hz at 0.1 dm<sup>3</sup> and 0.5 Hz at 1.0 dm<sup>3</sup> connected volume), very insensitive to mechanical vibrations, e.g. effects less than 0.5 % for vibrations in all directions up to 300 Hz and 4 g.
- Low input resistance (approx. 200 Ω) and accordingly low internal voltage drop (approx. 4 V with 20 mA).
- Versions with reversed characteristics are available.
- Pneumatic connectors which seal the air connections when the I/P converter is unplugged.

#### Versions for non-hazardous areas

**Type 6124-01** (Fig. 1) · Rack-mounting unit with one I/P conversion unit.

**Type 6124-02** (Fig. 2) · Rack-mounting unit with two I/P conversion units.

**Type 6124-03** · Same as Type 6124-01, but with test sockets for checking the input and output signals at the front panel.

#### Versions for hazardous areas

Input circuit in protection type EEx ia IIC

**Type 6124-21** · Rack-mounting unit with one I/P conversion unit

**Type 6124-22** · Rack-mounting unit with two I/P conversion units

Note: I/P converters for output signals up to 8 bar are available. For details, see Data Sheet T 6116 E.

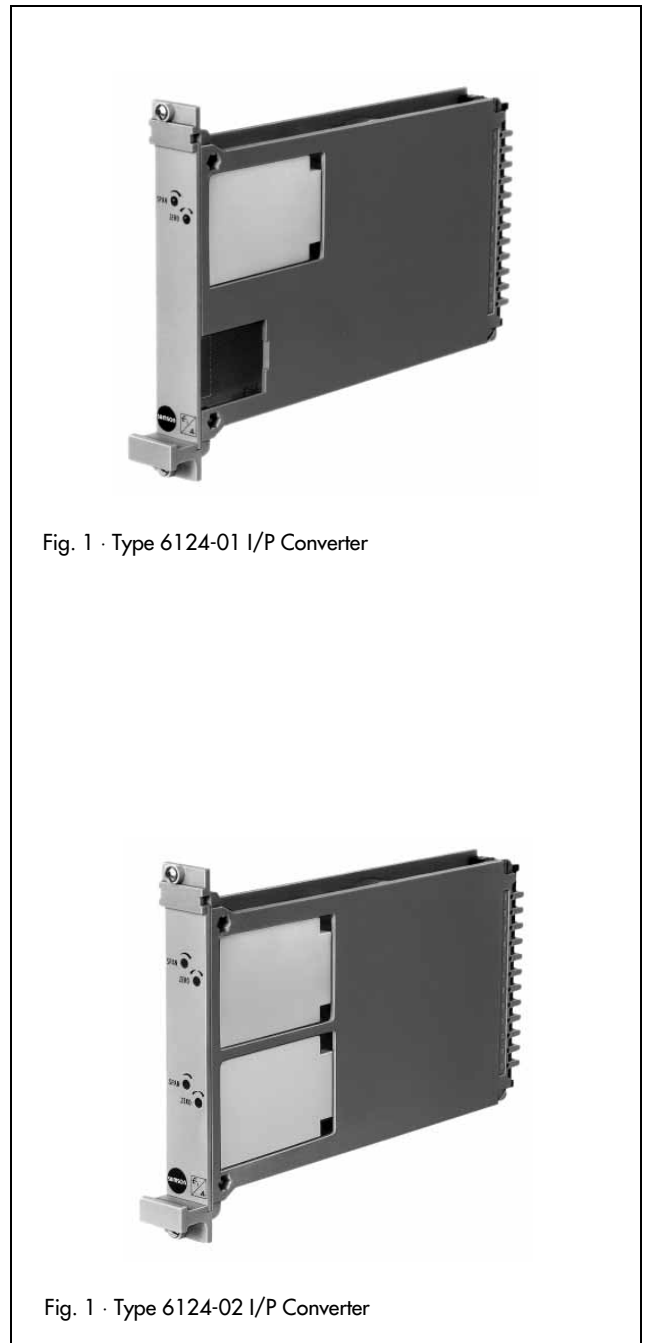


Fig. 1 · Type 6124-01 I/P Converter

Fig. 1 · Type 6124-02 I/P Converter

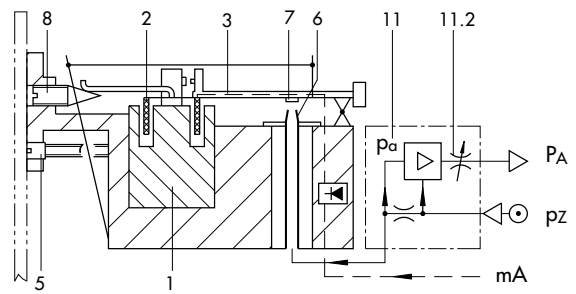
## Principle of operation

Depending on the version, the converters have either one or two I/P conversion units operating according to the principle of force equilibrium.

The direct current  $i$  flows through the coil (2) located in the field of a permanent magnet (1). At the balance beam (3), the force of the coil which is proportional to the current  $i$  is balanced against the force of the dynamic back-pressure. This back-pressure is produced on the flapper (7) by the air jet leaving the nozzle (6).

The supply air ( $p_z$ ) supplies the amplifier (11) and flows through the volume restrictor (11.2) and the nozzle (6) and hits the flapper (7). When the input current  $i$  increases, the force of the coil increases and the flapper (7) moves closer to the nozzle (6). Thus the dynamic back-pressure and consequently the pressure  $p_a$  fed to the amplifier are increased. The pressure  $p_a$  increases until a new balanced state is reached and  $p_a$  is proportional to the current  $i$ . Air delivery of the I/P converter is amplified by the volume amplifier (11). The converter has an output pressure ( $p_A$ ) from 0.2 to 1.0 bar (3 to 15 psi).

The lower range value and the measuring span can be adjusted with the adjusters (5 and 8). The air supply can be adjusted using the volume restrictor (11.2).



- 1 Permanent magnet
- 2 Coil
- 3 Balance beam
- 5 Zero point adjuster
- 6 Nozzle
- 7 Flapper
- 8 Measuring span adjuster
- 11 Volume amplifier
- 11.2 Volume restrictor

Fig. 3 · Functional diagram of the Type 6124 I/P Converter

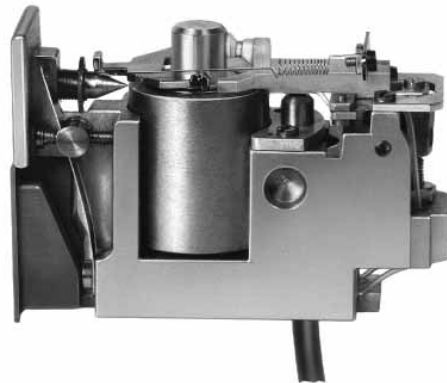


Fig. 4 · I/P conversion unit

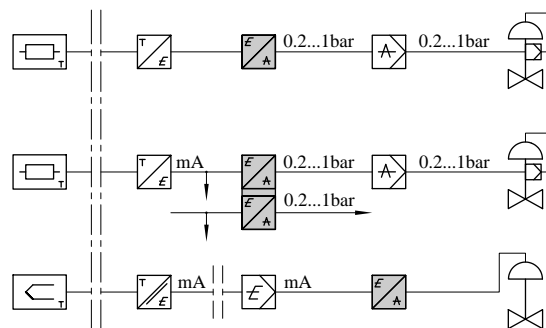


Fig. 5 · Application

## Technical data

Type		6124-01, 6124-02, 6124-03	6124-21, 6124-22
Input		4 to 20 mA or 0 to 20 mA	
Input resistance R <sub>i</sub>	approx.	200 Ω ± 7.5 % at 20 °C	200 Ω ± 7.5 % at 20 °C Effective inductance ≈ 0 mH
Input circuit	Ex	–	Intrinsically safe <sup>1)</sup>
Output		0.2 to 1 bar (max. 0.02 to 1.35 bar) or 3 to 15 psi (0.3 to 18 psi)	
Air supply <sup>2)</sup> adjustable	at Q <sub>max</sub> at Q <sub>min.</sub>	1.3 m <sub>n</sub> <sup>3</sup> /h - min. connected volume: > 0.025 dm <sup>3</sup> 0.5 m <sub>n</sub> <sup>3</sup> /h - min. connected volume: > 0.006 dm <sup>3</sup>	
Supply <sup>3)</sup>		1.4 ± 0.1 bar (20 ± 1.5 psi)	
Power consumption		0.18 m <sub>n</sub> <sup>3</sup> /h	
Characteristic		Output linear to input	
Hysteresis		≤ 0.1 % of upper range value	
Deviation from terminal-based conformity		≤ 0.25 % of upper range value	
Influence in % of upper range value		Supply: 0.1 %/0.1 bar	
		Alternating load, air supply failure, interruption of input current: < 0.1 %	
		Ambient temperature: Lower range value < 0.03 %/°C Measuring span < 0.03 %/°C	
Load characteristic <sup>2)</sup>		± 3 % at air output capacity ± 0.22 m <sub>n</sub> <sup>3</sup> /h, reversing errors not detectable	
Dynamic response			
Connected volume		0.1 dm <sup>3</sup>	1 dm <sup>3</sup>
Limiting frequency		8 Hz	0.55 Hz
Phase shift		-128°	-80°
<b>Environmental conditions, degree of protection, weights</b>			
Permissible ambient temperature		-10 to +60 °C <sup>1)</sup>	
Permissible storage temperature		-10 to +60 °C	
Degree of protection		IP 00	
Weights	approx.	Types 6124-.1 and 6124-03: 0.25 kg Type 6124-.2: 0.35 kg	

<sup>1)</sup> Versions with input circuits in type of protection "intrinsically safe EEx ia IIC": for details (including permissible temperatures, capacitance and inductance) see PTB Certificate of Conformity

<sup>2)</sup> Measured with a tube 4 x 1 and 2 m long

<sup>3)</sup> Measured at average output pressure

<sup>4)</sup> With reversed characteristic ≤ 1% of upper range value

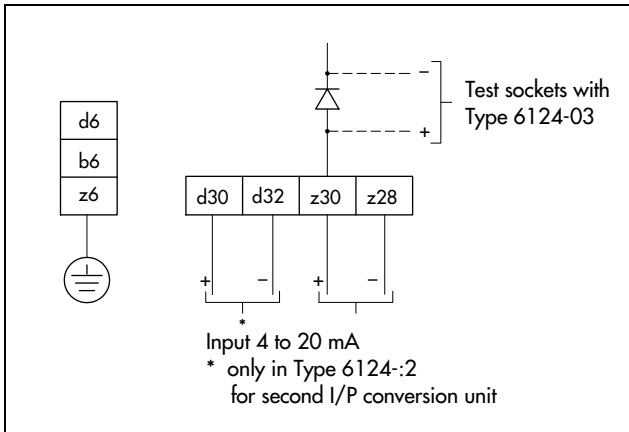
<sup>5)</sup> Coil material Cu, T<sub>K</sub> = 4 %/ 10 K

## Summary of the approved explosion protection certification

Type of certificate	Certificate number	Date	Comments
Certificate of Conformity	PTB No. Ex-87.B.2129 X	28.10.1987	EEx ia II C T6
SEV Approval	93.100906.01	03.09.1993	EEx ia II C T4 to T6

The test certificates listed above are contained in the mounting and operating instructions and are also available on request.

## Electrical connection



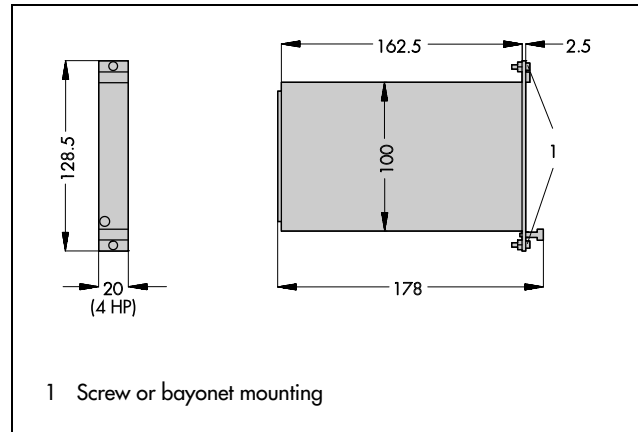
## Connection

The rack-mounting units are primarily available as pre-wired 19" racks designed according to DIN 41 494, Parts 1 and 5. They are components of a complete pre-assembled automation unit. Each rack can accommodate up to 21 rack-mounting units, i.e. up to 42 conversion units. The electric connectors comply with DIN 41 612 (Type F). The integrated pneumatic connectors seal the air connections when the converter is unplugged.

For versions equipped with test sockets (6124-03), an interlock diode is connected for checking the input signal. This allows a mA-meter with an internal resistance of  $R_i \leq 10 \Omega$  to be connected for checking purposes.

The pneumatic output signal is taken from a self-sealing test socket. All checks can be carried out during operation.

## Dimensions in mm



## Ordering text

I/P Converter Type 6124-..

Input ... mA

Output ... bar/psi

Operating direction increasing-increasing/decreasing-increasing

Screw or bayonet mounting

Specifications subject to change without notice.



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