

**System 6000**  
**Electropneumatic Converters**  
**for DC current signals**  
**I/P Converter Type 6115**



Fig. 1  
Type 6115-11 with direct cable entry

Fig. 2  
Type 6115-15 with junction box in type of protection "flameproof enclosure d"

## 1. Description

### 1.1 Application

These instruments are designed for conversion of a DC current signal in the ranges of 4 to 20 mA or 0 to 20 mA into a pneumatic signal of 0.2 to 1 bar (3 to 15 psi), and can be used as intermediate elements between electric measuring equipment and pneumatic controllers or electric controllers and pneumatic control valves.

### Types of certificates

CSA approval certificate, LR 54227-4, flameproof enclosure, Class I, Groups B, C and D, Class II, Groups E, F and G, Class III Certificate of conformity, PTB No. Ex 86/1078, EEx d II C T6.

Certificate of conformity, PTB No. Ex-90 C.1030, with junction box, EEx d Ull C T6, EEx d e II C T6.

## 1.2 Versions

**Type 6115-11** (Fig. 1) · i/p converter, threaded conductor bushing with a cable of 3 m in length (Fig. 6.1) for direct cable entry according to DIN EN 50 018.

**Type 6115-12** · i/p converter, threaded conductor bushing and tube connection (Fig. 6.2) for indirect cable entry according to DIN EN 50 018.

**Type 6115-13** · i/p converter, threaded conductor bushing and cable grip (Fig. 6.3) for conduit entry according to American standards.

**Type 6115-14** · i/p converter as Type 6115-12, but with junction box (Fig. 6.4) in type of protection "increased safety e".

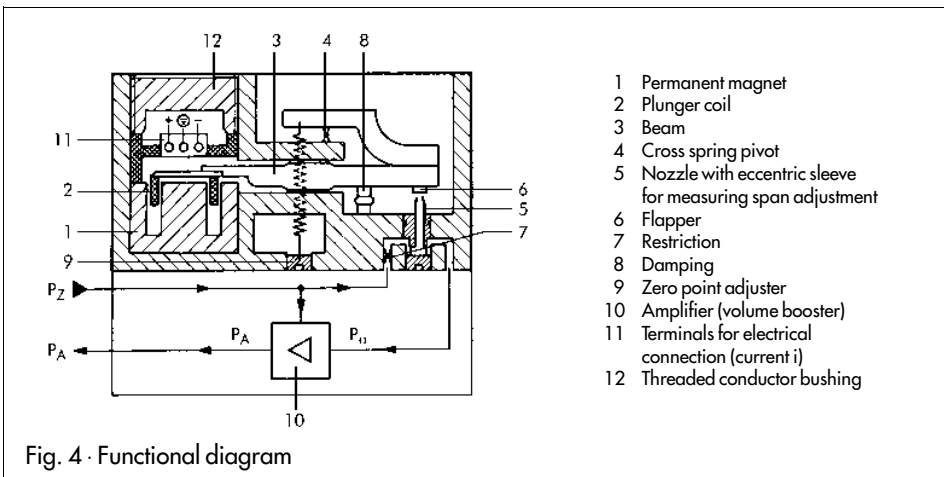
**Type 6115-15** (Fig. 2) · i/p converter as Type 6115-13, but with junction box (Fig. 6.5) in type of protection "flameproof enclosure d".

## 1.3 Principle of operation

The instruments consist of an i/p conversion unit operating according to the force balance principle and a connected amplifier operating as volume booster.

The DC current  $i$ , fed to the instrument via the threaded conductor bushing and the terminals (11), flows through a plunger coil (2) located in the field of a permanent magnet (1). The magnetic force of the plunger coil is proportional to the current  $i$ . This force is balanced at the beam (3) by the dynamic back pressure. The back pressure is generated by the jet stream coming out of the nozzle (5), which is directed onto the flapper (6).

The supply air is applied to the volume booster (10). This air flows through the restriction (7) and the nozzle (5) against the flapper (6). When the input current  $i$  increases, and thus also the magnetic force of the plunger coil, the flapper (6) moves closer to the nozzle (5). Due to this, the dynamic back pressure increases and consequently also the pressure  $p_A$  fed to the booster (10). This pressure increases until a new balance state is obtained, i.e. until  $p_A$  is proportional to the current  $i$ . The connected volume booster (10) amplifies the air output capacity of the i/p conversion unit. Depending on the instrument version used, the unit has an output pressure ( $p_A$ ) of 0.2 to 1.0 bar or 3 to 15 psi.



## 1.4 Technical data

<b>Input</b>	4...20 mA or 0...20 mA, coil resistance R; at 20 °C		
<b>Output</b>	0.2...1 bar (max. 0.02...1.35 bar) or 3...15 psi (max. 0.3...18 psi)		
	Air delivery	2.0 m <sub>n</sub> <sup>3</sup> /h — min. connected volume: >0.025 dm <sup>3</sup>	
<b>Supply air</b>	1.4 ± 0.1 bar (20 ± 1.5 psi)		
	Power consumption	0.18 m <sub>n</sub> <sup>3</sup> /h	
<b>Characteristic</b>	Output linear to input		
	Hysteresis	<0.15 % of span	
	Terminal based non-conformity	<0.3 % of span	
	Effects in % of span	Supply: 0.2%/0.1 bar, measured at medium output pressure	
		Changing load, failure of supply air, interruption of input current: <0.1 %	
Ambient temperature: Lower range value <0.02 %, measuring span <0.03 %/°C			
Load characteristic	±3 % for air delivery of ±1.0 m <sub>n</sub> <sup>3</sup> /h Reversing errors not detectable		
<b>Dynamic response</b>	For a connected volume of 0.1 dm <sup>3</sup>	For a connected volume of 1 dm <sup>3</sup>	
	Limiting frequency	3 Hz	0.4 Hz
	Phase displacement	-105°	-40°
<b>Environmental conditions, protection type, weights</b>			
Admissible ambient temperature	-20 to +70 °C		
Degree of protection	IP 54		
Weight	approx.	1.6 kg	

<sup>1)</sup> Instrument in degree of protection "flameproof enclosure d". For details (also electrical data and notes on installation), see PTB certificate.



### WARNING

Assembly, commissioning and operation of this device may only be performed by experienced personnel. Proper shipping and appropriate storage are assumed.

## 2. Installation

### 2.1 Mounting

The i/p converter can be mounted directly on either a wall or a control valve. Tube mounting is possible by means of the corresponding mounting parts. For this purpose, see dimensional drawings in section 5.

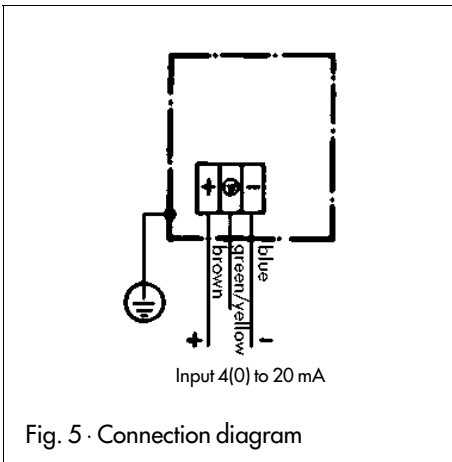
### 2.2 Electrical connection

All electrical wiring must be done in accordance with the respective relevant national regulations. The input signal wires are connected to the terminals + and - in the enclosure as shown in the connection diagrams 5 and 6.

### 2.3 Air connections

The air connections for supply air (Supply 8) and output air (Output 36) are designed as NPT 1/4" tapped holes. The customary screw glands for metal pipes or plastic hoses can be used.

The air supplied to the instrument has to be dry and free of oil and dust. The air pressure has to be set to  $1.4 \pm 0.1$  bar. The maintenance instructions for connected pressure reducing stations must be strictly observed. Thoroughly blow through hoses before connecting them.



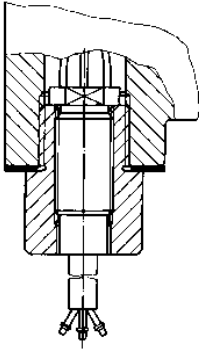


Fig. 6.1  
For direct cable entry

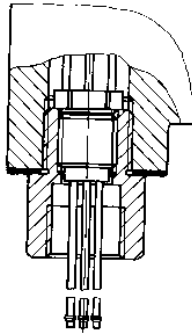


Fig. 6.2  
For indirect cable entry

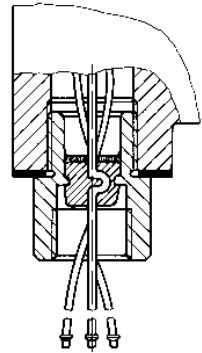


Fig. 6.3  
For conduit entry according to American standards

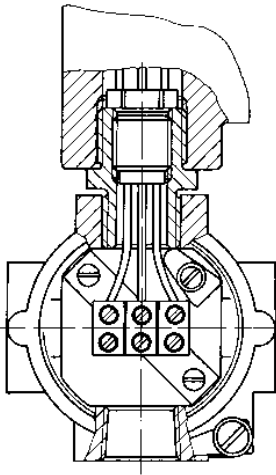


Fig. 6.4 · For indirect cable entry with junction box Ex e

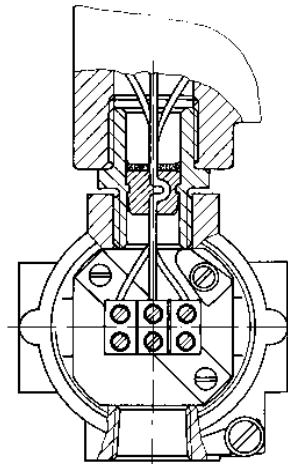


Fig. 6.5 · For conduit entry with junction box Ex d

Fig. 6 · Threaded conductor bushings

### 3. Operation

#### 3.1 Checking zero point and span

The range of the instrument was adjusted by the manufacturer as specified on the name plate. The instrument comes ready for operation. This specified range cannot be changed.

In the case of any discrepancies at the converter, we recommend to check the converter as follows:

##### **Zero**

The zero point adjuster (9), marked with **Zero**, is located on the front panel of the instrument.

Connect a pressure gauge (at least quality class 1) to the output of the instrument.

Set supply air pressure to  $1.4 \pm 0.1$  bar. Then, apply air to the instrument.

Set input signal to the lower value of the input span using a suitable current source (for, e.g. a range of 4 to 20 mA  $\pm 0.2$  to 1 bar to 4 mA).

The pressure gauge must now show an output of exactly 0.2 bar.

If another value is indicated, readjust zero point adjuster (Zero) correspondingly.

##### **Span**

The span adjuster (5) is not marked. It is located under the plastic plug on the front panel - remove plug and insert screwdriver in the hole.

Set input signal to 20 mA (upper range value) using a suitable current source. The pressure gauge must now show an output of exactly 1.0 bar.

If another value is indicated, readjust span adjuster (5) only a little. Then, abruptly change input signal from 20 to 0 mA (or gently tap the instrument), and check whether the output signal will subsequently assume the upper range value of 1.0 bar.

Since the adjustments of zero point and span depend upon one another, check again both values and correct them, if necessary.

Close hole in the enclosure using the plastics plug.

## 4. Maintenance

### 4.1 Supply air

Proper functioning of the i/p converter is only then ensured when the supply air is well cleaned before being applied to the unit. Air filter and separator of the pressure reducing station must be checked at regular intervals.

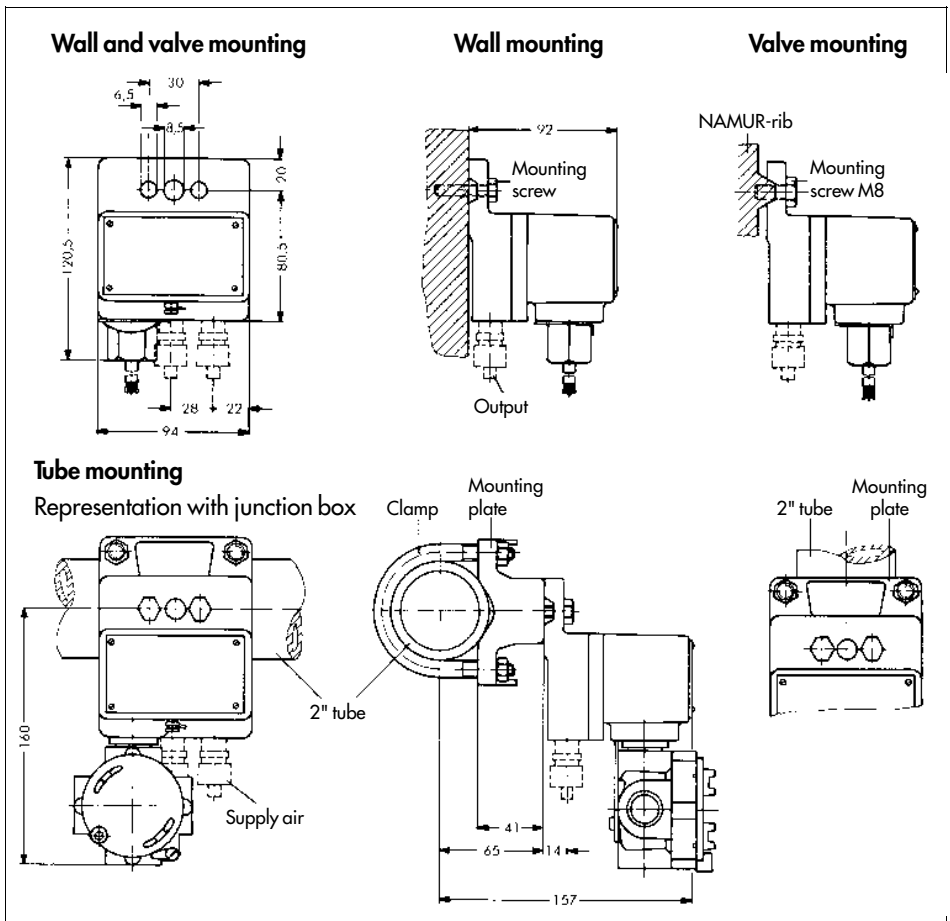
### 4.2 Cleaning of the restriction

The restriction is located in a hole on the side of the enclosure where the electrical connections are made. It is covered by means of a screwed cover.

If the output signal is too small or there is no output at all, the restriction (7) might be clogged. In this case, remove the sieve from the restriction and clean it or respectively replace it by a new one (order no. for sieve: 0550-0193).

Furthermore, the air connections at the bottom of the enclosure are provided with sieves with a plastic rim (order no. 0550-0189). These sieves can be removed for cleaning.

## 5. Dimensions in mm





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