

Application

Used to convert a direct-current input signal into a pneumatic output signal for measuring and control tasks · Particularly suitable as intermediate element between electric measuring devices and pneumatic controllers or between electric control devices and pneumatic control valves

Ex certified 

These converters are designed for use in all kinds of industrial applications, especially in the field of process engineering.

The converters accept a load-independent 4 to 20 mA or 0 to 20 mA direct current input signal which they convert into a pneumatic output signal.

Wide output pressure ranges can be selected for the Type 6111 i/p Converter by installing various converter modules (see Technical data). The maximum output pressure that can be achieved is 8 bar.

Special features

- Wide selection of measuring ranges
- High output pressures up to 8 bar
- Easy replacement of i/p module
- Zero reset at specific mA value when switch-off electronics are activated
- Operation possible without an upstream pressure regulator
- Version designed as rail-mounting unit with plastic housing or as field unit for offshore applications in a stainless steel enclosure
- Supply air manifold for rail-mounting units available as accessories for 3, 4, 5 and 6 converter units (Fig. 4)

Versions

- Type 6111 as a rail-mounting unit (Fig. 1) · Mounted on a top-hat rail
- Type 6111 as a field unit for offshore applications (Fig. 2) Mounted using a bracket

Special versions (on request)

- 0/2 to 10 V input signal with Type 6151 module
- Electric connection with an angle connector according to DIN EN 175301-803 A
- AS-Interface connection over Type 6150 module
- Initial pressure of 0 bar possible

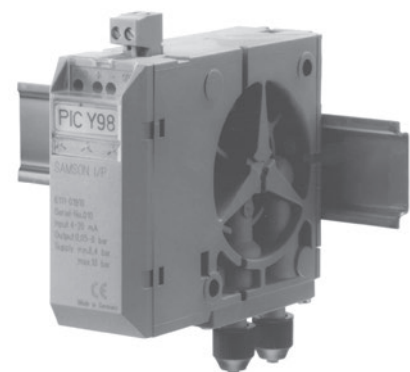


Fig. 1: Type 6111 i/p Converter, rail-mounting unit



Fig. 2: Type 6111, field unit for offshore applications

Principle of operation (Fig. 3)

The electropneumatic converter consists of an i/p converter module, which operates according to the force-balance principle, and a downstream volume booster.

When operated, the supplied direct current (4) flows through the plunger coil (2) located in the field of a permanent magnet (3). At the balance beam (1), the force of the plunger coil, which is in proportion to the current, is balanced against the force of the dynamic backpressure. The backpressure is produced on the flapper plate (6) by the air jet leaving the nozzle (7).

The nozzle is supplied with air from the pneumatic output (36). With an input signal of 0 mA, an output pressure of approximately 50 to 80 mbar is already issued due to the offset spring.

The supply air (9) flows in the lower diaphragm chamber, and a certain amount flows to the output. When the current increases, the flapper moves closer to the nozzle. The force of the resulting backpressure p_K pushes both the diaphragm (5) and sleeve (8) downwards, allowing additional air to enter the chamber. The passing air volume increases until the forces on the diaphragm obtain a state of equilibrium. When the current decreases, this action is reversed. The backpressure created by the nozzle and flapper decreases, and the diaphragm is pressed upwards. In this process, it releases the sleeve, if applicable, and opens the vent (11) until the forces on the diaphragm are balanced again.

Converter modules with an input signal range from 4 to 20 mA have a slide switch which activates the switch-off electronics. The electronics cause the pneumatic output to be vented up to approx. 100 mbar when the input signal falls below ± 4.08 mA tolerance. In this way, the tight shut-off function of a valve can be guaranteed.

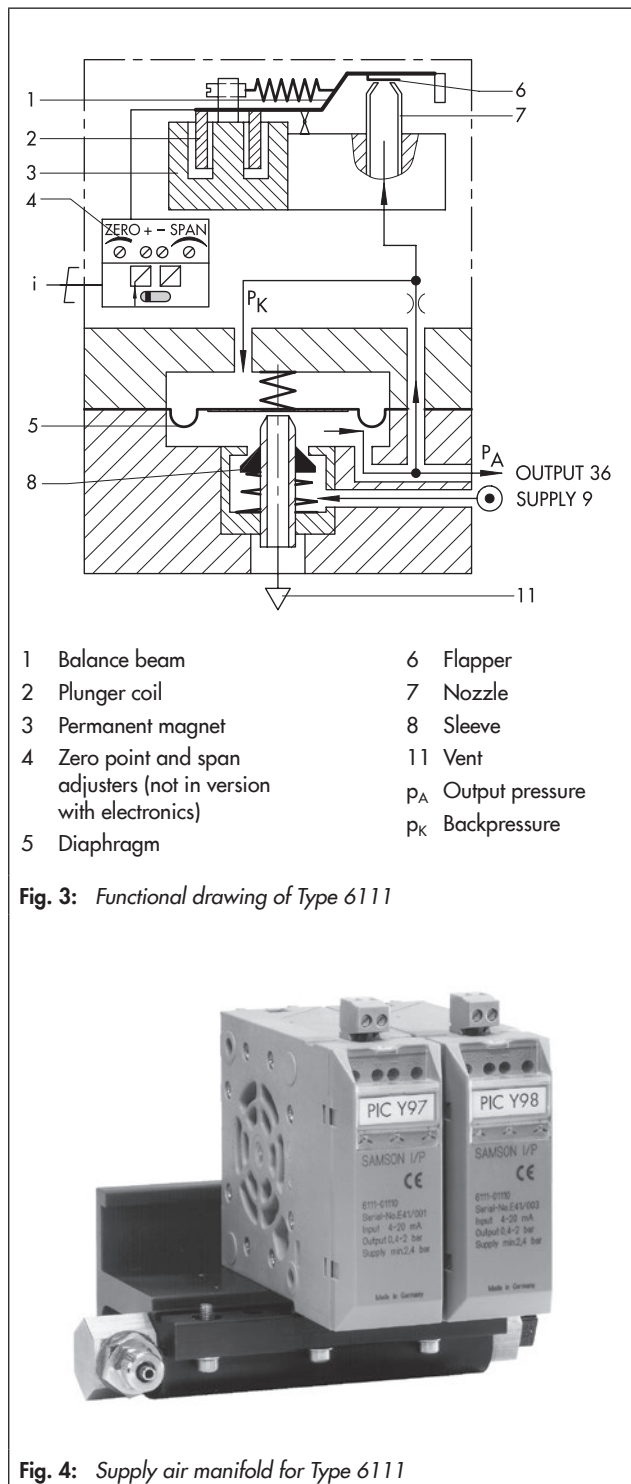


Table 1: Technical data

Type	Type 6111	Rail-mounting unit	Field unit
Explosion protection		⊕ II 2 G Ex ia IIC T6	⊕ II 3 G Ex nA IIC T6
Input		4 to 20 mA (0 to 20 mA on request), for split-range: 4 to 12 mA or 12 to 20 mA, other signals on request	
Load	Standard Explosion-protected version Version without switch-off electronics:	≤ 6 V (corresponding to 300 Ω at 20 mA) 7 V (corresponding to 350 Ω at 20 mA) ≤ 4 V (corresponding to 200 Ω at 20 mA)	
Output	with Type 6112 i/p Module	0.2 to 1 bar (3 to 15 psi) (standard range) 0.4 to 2 bar (6 to 30 psi) (standard range) Special ranges adjustable at the factory to meet customer specifications	
	Module A	Initial value ²⁾ 0.1 to 0.4 bar	Span Δp 0.75 to 1.0 bar
	Module B	0.1 to 0.4 bar	1.0 to 1.35 bar
	Module C	0.1 to 0.4 bar	1.35 to 1.81 bar
	Module D	0.1 to 0.8 bar	1.81 to 2.44 bar
	Module E	0.1 to 0.8 bar	2.44 to 3.28 bar
	Module F	0.1 to 0.8 bar	3.28 to 4.42 bar
	Module G	0.1 to 1.2 bar	4.42 to 5.94 bar
	Module H	0.1 to 1.2 bar	5.94 to 8.0 bar ¹⁾
	Max. air output capacity ³⁾	2.0 m ³ /h at an output of 0.6 bar (0.2 to 1.0 bar) 2.5 m ³ /h at an output of 1.2 bar (0.4 to 2.0 bar) 8.5 m ³ /h at an output of 5.0 bar (0.1 to 8.0 bar)	
Supply air		At least 0.4 bar above the upper signal pressure range value, max. 10 bar without supply pressure regulator	
	Air quality acc. to ISO 8573-1: 2001	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	
	Power consumption	0.08 m ³ /h at 1.4 bar · 0.1 m ³ /h at 2.4 bar · Max. 0.26 m ³ /h at 10 bar	
Characteristic		Characteristic: Output linear to input	
	Hysteresis	≤ 0.3 % of final value	
	Deviation from terminal-based conformity	≤ 1 % of upper range value (for upper range values up to 5 bar); more exact values on request · ≤ 1.5 % of upper range value (for upper range values above 5 bar)	
	Effect in % of the upper range value	Supply air: < 0.1 %/0.1 bar	
		Alternating load, supply air failure, interruption of the input current: < 0.3 % Ambient temperature: lower range value < 0.03 %/K, span < 0.03 %/K	
Dynamic response		At an output of 0.2 to 1 bar	
	Limiting frequency	5.3 Hz	
	Phase shift	-130°	
Variable position		Max. 3.5 % depending on mounting position: e.g. ± 1 % when mounted horizontally	
Ambient conditions, degree of protection, weight			
	Storage temperature	-40 to 70 °C	
	Ambient temperature	-20 to 70 °C	
	Degree of protection	IP 20	IP 65
	Compliance	CE . EAC	
	Weight	Approx. 0.35 kg	1.9 kg
Materials			
	Housing	Glass-fiber-reinforced polyamide	Stainless steel 1.4581 Bracket 1.4301

¹⁾ Max. possible output pressure 8 bar

²⁾ Initial value raised up to 3.0 bar (special version)

³⁾ Measured with 2 m hose with 4 mm inside diameter

Summary of explosion protection approvals

Version	Type of approval	Certificate number	Date	Type of protection	Comments
6111-1	EC Type Examination Certificate	PTB 01 ATEX 2174	2001-11-26	⊕ II 2 G Ex ia IIC T6	-
6111-8	Statement of Conformity	PTB 02 ATEX 2013 X	2001-11-26	⊕ II 3 G Ex nA II T6	-

The test certificates are included in the mounting and operating instructions or are available on request.

Electrical connection

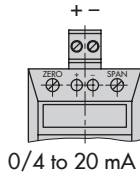


Fig. 5: Terminal assignment · Input signal

Installation

- **Rail-mounting unit** for mounting on a top hat rail according to DIN EN 60715, 35 mm wide
 - Wall mounting possible, using holes with \varnothing 5.5 mm
 - Air connections (supply air and output): hose connection suitable for hose (4 mm inside diameter and 6 mm outside diameter) as standard; also available as ports with $\frac{1}{8}$ NPT, G $\frac{1}{8}$ or M5 female thread
 - Mounting on supply air manifold possible
 - Electrical connection: plug-in two-pole terminals for 0.5 to 2.5 mm² wires
- **Field units** for offshore applications for mounting using a bracket
 - Mounting bracket (stainless steel), item number: 1400-7432 (included in the scope of delivery)
 - Pneumatic connections: $\frac{1}{4}$ NPT
 - Electrical connection: M20 x 1.5

Dimensions · Type 6111 as rail-mounting unit and field unit · Dimensions in mm

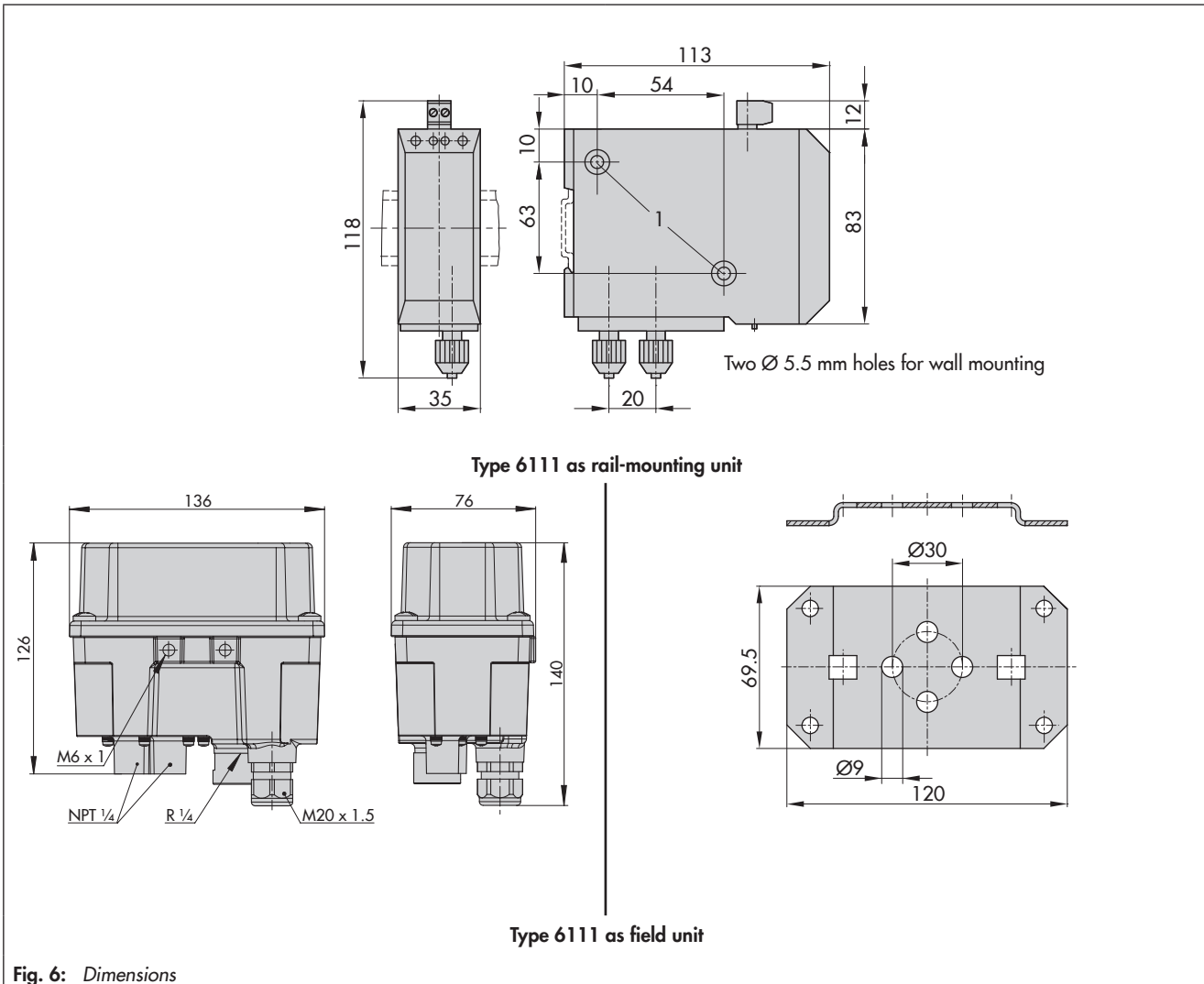


Fig. 6: Dimensions

Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
samson@samson.de · www.samson.de

T 6111 EN

2017-09-14 · English

T 6116 EN

Type 6116 i/p Converter

Electropneumatic Converter for Direct Current Signals



Application

Used to convert a direct-current input signal into a pneumatic output signal for measuring and control tasks · Particularly suitable as intermediate element between electric measuring devices and pneumatic controllers or between electric control devices and pneumatic control valves.

The Type 6116 i/p Converter proportionally converts the electric input signal into a pneumatic output signal.

The signal converter accepts a load-independent 4 to 20 mA direct-current input signal.

Depending on the supply air pressure, the converter supplies a pneumatic output signal of 0.2 to 1 bar (3 to 15 psi), 0.4 to 2 bar (6 to 30 psi) or pressure ranges up to 8 bar (120 psi). Depending on the signal range, the Type 6116 is equipped with a Type 6109 or Type 6112 i/p Converter module (see 'Technical data').

Special features

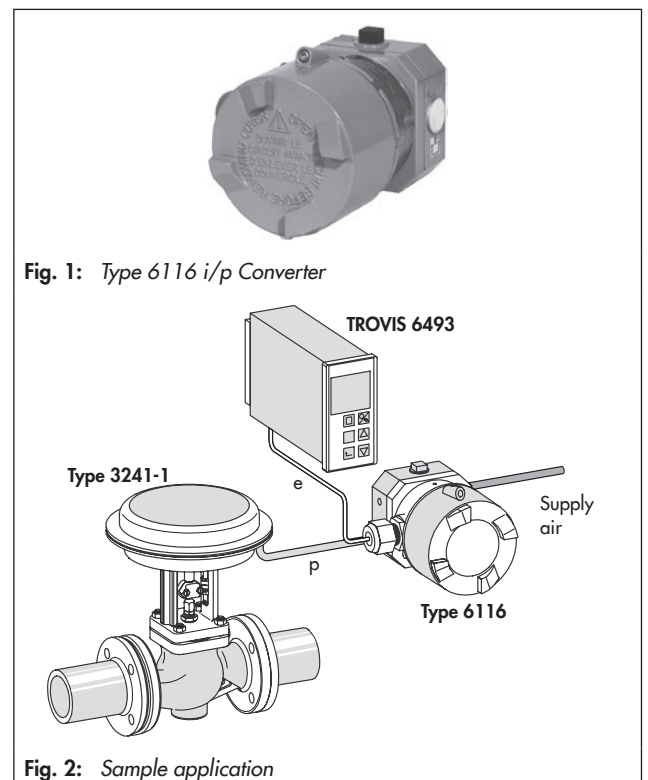
- Continuous, linear characteristic
- High accuracy and excellent dynamic response
- Extremely low air consumption
- Operation without supply pressure regulator possible
- Switch-off electronics guarantee venting at zero point

Versions

- For safe areas: Type 6116-0...
- For hazardous areas:
 - **Type 6116-1...** Ex i according to ATEX and EAC Ex
 - **Type 6116-2...** Ex d according to ATEX, IECEx and EAC Ex
 - **Type 6116-3...** Explosion-proof acc. to CSA and FM standards
 - **Type 6116-4...** Intrinsically safe according to CSA and FM standards
 - **Type 6116-5...** Explosion-proof/IECEX/Korea
 - **Type 6116-6...** Intrinsically safe/IECEX

Further versions

- **Type 6116-x2xxxxxxxx2xxx:** temperatures down to -45 °C
- **Type 6116-0...**
 - AS-interface connection with Type 6150 Slave



- Voltage input (e.g. 0 to 10 V) with Type 6151 u/i Module
- Electropneumatic converter without booster or switch-off electronics
- Converters can be combined with SAMSON Type 3760, Type 3766-000 (model index .02 and higher) and Type 4765 Pneumatic Positioners.
- **Type 6116-xx060111000xxxx** for attachment to p/p positioners (½ NPT connection)
- **Type 6116-xx060112000xxxx** for attachment to p/p positioners (M20x1.5 connection)

Principle of operation (see Fig. 4)

The electropneumatic converter consists of an i/p converter module, which operates according to the force-balance principle and a downstream volume booster.

When operated, the supplied direct current (4) flows through the plunger coil (2) located in the field of a permanent magnet (3). At the balance beam (1), the force of the plunger coil, which is in proportion to the current, is balanced against the force of the dynamic backpressure. The backpressure is produced on the flapper plate (6) by the air jet leaving the nozzle (7).

The nozzle is supplied with air from the pneumatic output (36). With an input signal of 0 mA, an output pressure of approximately 100 mbar is already issued due to the offset spring.

The supply air (8) flows in the lower diaphragm chamber and a certain amount flows to the output. When the current increases, the flapper moves closer to the nozzle. The force of the resulting backpressure pushes both the diaphragm (5) and sleeve (8) downwards, allowing additional air to enter the chamber. The passing air volume increases until the forces on the diaphragm obtain a state of equilibrium. When the current decreases, this action is reversed. The backpressure created by the nozzle and flapper decreases and the diaphragm is pressed upwards. In this process, it releases the sleeve, if applicable and opens the vent (EXHAUST) until the forces on the diaphragm are balanced again.

Switch-off electronics (see Fig. 5)

Converter modules with an input signal range from 4 to 20 mA have a slide switch which activates the switch-off electronics. The electronics cause the pneumatic output to be vented up to approx. 100 mbar when the input signal falls below ± 4.08 mA tolerance. In this way, the tight shut-off function of a valve can be guaranteed.

Combined with a Type 3760, Type 3766-000 or Type 4765 Pneumatic Positioner

The Type 6116-xx06011x000xxxx i/p Converter without booster or switch-off electronics can be combined with the above listed positioners to form a version in a flameproof enclosure (Ex d). With Type 3760 and Type 4765 Positioners, the i/p converter is attached to the control valve according to NAMUR and hooked up to the positioner (see Fig. 6).

The Type 3766-000 Positioner can be connected directly to the i/p converter. The positioner type must be specified when ordering any accessories.

Electrical connection

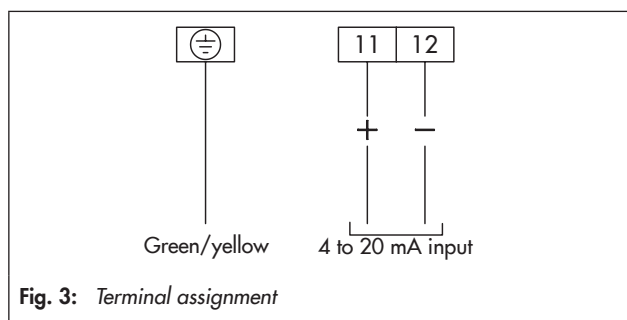


Fig. 3: Terminal assignment

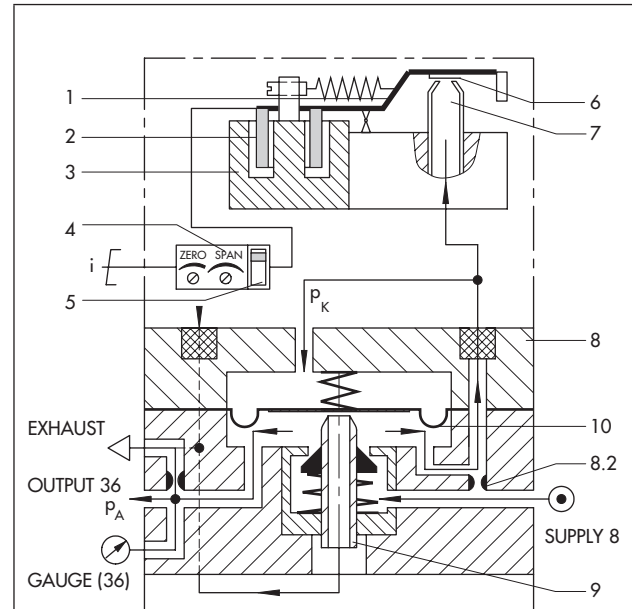
For connection to intrinsically safe circuits, the specifications stated in the certificate of conformity apply as well.

Installation

The converter can be mounted to a wall, pipe or directly to the control valve according to NAMUR.

Ideally, the converter is to be installed horizontally, with the pressure gauge (or screw plug) facing upward. If a different mounting position is used, the zero point must be corrected using the ZERO adjuster.

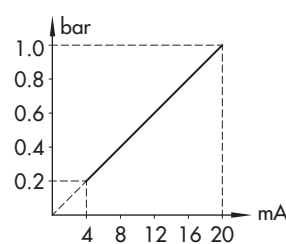
With degree of protection IP 54, the vent plug must always be installed facing downward.



- 1 Balance beam
- 2 Plunger coil
- 3 Permanent magnet
- 4 Zero point and span adjusters (not in version without electronics)
- 5 Slide switch for switch-off electronics
- 6 Flapper plate
- 7 Nozzle
- 8 Volume booster
- 9 Sleeve
- 10 Diaphragm

Fig. 4: Functional drawing of Type 6116

For 0.2 to 1 bar output
Remaining pressure
approx. 0.1 bar



For 0.8 to 2.7 bar output
Remaining pressure approx.
0.3 bar

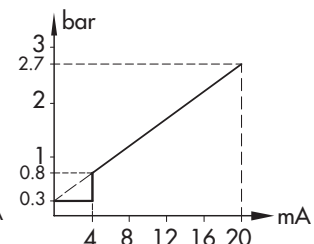


Fig. 5: Switch-off electronics

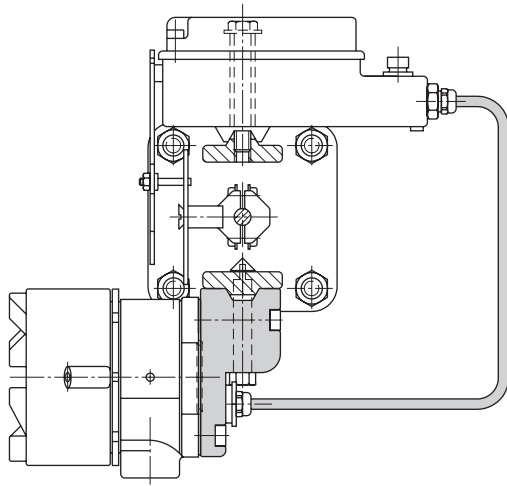


Fig. 6: NAMUR attachment to valve with Type 4765 Positioner

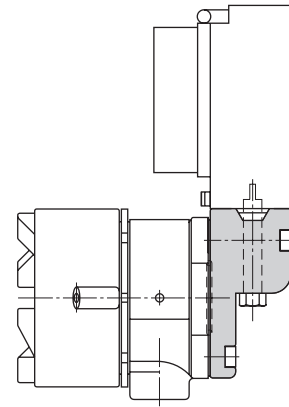



Fig. 7: Direct attachment to Type 3766-000 Positioner

Table 1: Technical data

Type	No explosion protection	6116-0																												
	With explosion protection	Types 6116-1/-2/-3/-4/-5/-6 (see summary of explosion protection certificates in Table 3)																												
Input ⁵⁾	4 to 20 mA, other signals on request Minimum current >3.6 mA, load impedance ≤6 V (corresponding to 300 Ω at 20 mA) Versions with explosion protection: load impedance 7 V (corresponding to 350 Ω at 20 mA) Versions without switch-off electronics: R _i = 200 Ω ± 7.5 %																													
Output ⁵⁾	0.2 to 1 bar (3 to 15 psi) (Type 6109 i/p Converter Module) 0.4 to 2 bar (6 to 30 psi) (Type 6112 i/p Converter Module) Special ranges adjustable according to customer specifications: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Output range = Initial value¹⁰⁾</th> <th style="text-align: left;">+ Span Δp</th> <th style="text-align: left;">With Type 6112 i/p Module</th> </tr> </thead> <tbody> <tr> <td>0.1 to 0.4 bar</td> <td>+ 0.75 to 1.0 bar</td> <td>Module A</td> </tr> <tr> <td>0.1 to 0.4 bar</td> <td>+ 1.0 to 1.35 bar</td> <td>Module B</td> </tr> <tr> <td>0.1 to 0.4 bar</td> <td>+ 1.35 to 1.81 bar</td> <td>Module C</td> </tr> <tr> <td>0.1 to 0.8 bar</td> <td>+ 1.81 to 2.44 bar</td> <td>Module D</td> </tr> <tr> <td>0.1 to 0.8 bar</td> <td>+ 2.44 to 3.28 bar</td> <td>Module E</td> </tr> <tr> <td>0.1 to 0.8 bar</td> <td>+ 3.28 to 4.42 bar</td> <td>Module F</td> </tr> <tr> <td>0.1 to 1.2 bar</td> <td>+ 4.42 to 5.94 bar</td> <td>Module G</td> </tr> <tr> <td>0.1 to 1.2 bar</td> <td>+ 5.94 to 8.0 bar</td> <td>Module H⁹⁾</td> </tr> </tbody> </table>			Output range = Initial value ¹⁰⁾	+ Span Δp	With Type 6112 i/p Module	0.1 to 0.4 bar	+ 0.75 to 1.0 bar	Module A	0.1 to 0.4 bar	+ 1.0 to 1.35 bar	Module B	0.1 to 0.4 bar	+ 1.35 to 1.81 bar	Module C	0.1 to 0.8 bar	+ 1.81 to 2.44 bar	Module D	0.1 to 0.8 bar	+ 2.44 to 3.28 bar	Module E	0.1 to 0.8 bar	+ 3.28 to 4.42 bar	Module F	0.1 to 1.2 bar	+ 4.42 to 5.94 bar	Module G	0.1 to 1.2 bar	+ 5.94 to 8.0 bar	Module H ⁹⁾
Output range = Initial value ¹⁰⁾	+ Span Δp	With Type 6112 i/p Module																												
0.1 to 0.4 bar	+ 0.75 to 1.0 bar	Module A																												
0.1 to 0.4 bar	+ 1.0 to 1.35 bar	Module B																												
0.1 to 0.4 bar	+ 1.35 to 1.81 bar	Module C																												
0.1 to 0.8 bar	+ 1.81 to 2.44 bar	Module D																												
0.1 to 0.8 bar	+ 2.44 to 3.28 bar	Module E																												
0.1 to 0.8 bar	+ 3.28 to 4.42 bar	Module F																												
0.1 to 1.2 bar	+ 4.42 to 5.94 bar	Module G																												
0.1 to 1.2 bar	+ 5.94 to 8.0 bar	Module H ⁹⁾																												
Max. air output capacity ³⁾	2.0 m ³ /h with an output of 0.6 bar (0.2 to 1.0 bar) 2.5 m ³ /h with an output of 1.2 bar (0.4 to 2.0 bar) 8.5 m ³ /h with an output of 5.0 bar (0.1 to 8.0 bar)																													
Supply air	At least 0.4 bar above the upper signal pressure range value Max. 10 bar without supply pressure regulator Max. 6 bar with devices in Ex d version																													
	Air quality acc. to ISO 8573-1: 2001 Air consumption ²⁾	Maximum 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 0.08 m _n ³ /h at 1.4 bar 0.1 m _n ³ /h at 2.4 bar Max. 0.26 m _n ³ /h at 10 bar																												

Characteristic	Characteristic: Output linear to input	
Hysteresis	≤0.3 % of final value	
Deviation from terminal-based conformity	≤1 % of upper range value (for upper range values up to 5 bar); more exact values on request ≤1.5 % of upper range value (for upper range values above 5 bar)	
Effect in % of the upper range value	Supply: 0.1 %/0.1 bar ²⁾	
	Alternating load, supply air failure, interruption of the input current: <0.3 %	
	Ambient temperature: lower range value <0.03 %/K, span <0.03 %/K	
Dynamic response	Limiting frequency	5.3 Hz
	Phase shift	-130°
Variable position	Max. 3.5 % depending on how the device is attached: ±1 % in horizontal position (Type 6109) Max. 1 % depending on how the device is attached: ±0.3 % in horizontal position (Type 6112)	
Ambient conditions, degree of protection, compliance and weight		
Storage temperature	-45 to +80 °C	
Ambient temperature ¹⁾	With Type 6109	-30 to +70 °C ⁶⁾ ; -30 to +60 °C ¹⁾
	With Type 6112	-40 to +70 °C ^{6) 7)} ; -40 to +60 °C ^{1) 7)}
Degree of protection	IP 54 ⁴⁾ , IP 65 ⁸⁾ , NEMA 4	
Compliance		
Weight	Approx. 0.85 kg	
Explosion protection		
ATEX, IECEx, ...	Refer to Table 3	
Materials		
Enclosure	Die-cast aluminum, chromated and plastic coated	
Cable gland (standard)	Black polyamide (6 to 12 mm clamping range, -20 to +80 °C) ¹²⁾	

¹⁾ Details (including electric specifications and installation instructions) can be found in the EC type examination certificate

²⁾ Measured with average output pressure

³⁾ Measured with 2 m hose with 4 mm inside diameter

⁴⁾ Observe recommended mounting position

⁵⁾ See Table 2 when combined with a positioner

⁶⁾ Devices without explosion protection

⁷⁾ Special version down to -45 °C, temperature range on request

⁸⁾ Possible by using accessories

⁹⁾ Max. possible output pressure 8 bar

¹⁰⁾ Initial value raised up to 3.0 bar (special version)






¹¹⁾ Metal cable glands and vent plugs are required for temperatures below -20 °C.

¹²⁾ Devices with type of protection "Flameproof enclosure" are delivered without cable gland.

Table 2: Technical data (positioner attachment)

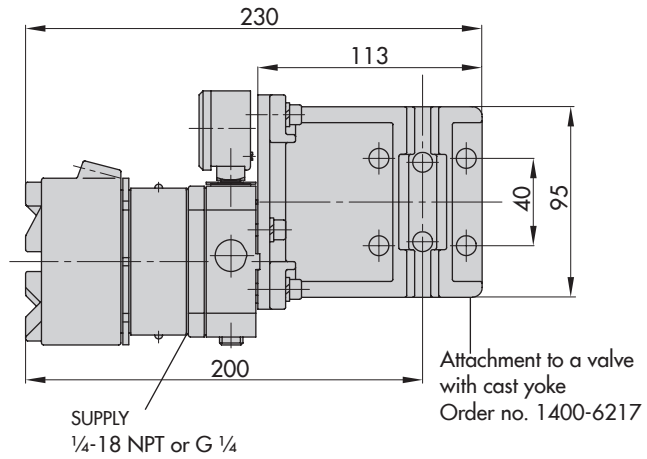
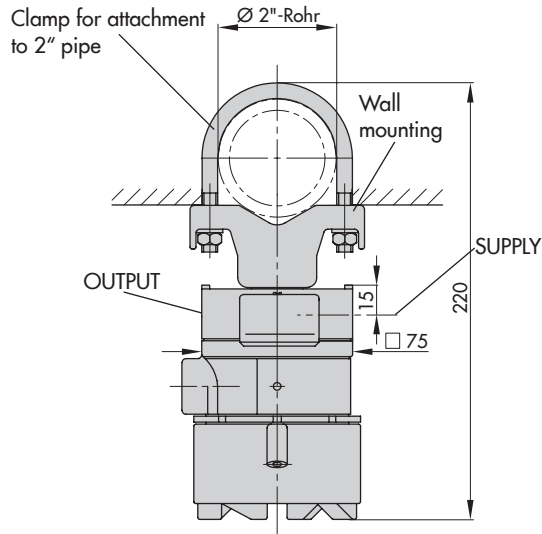
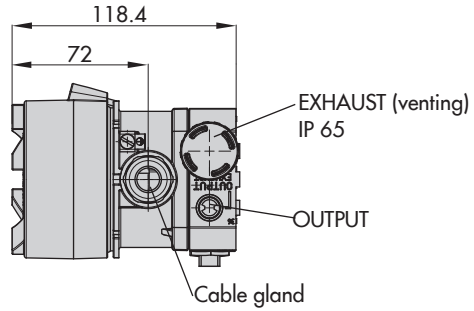
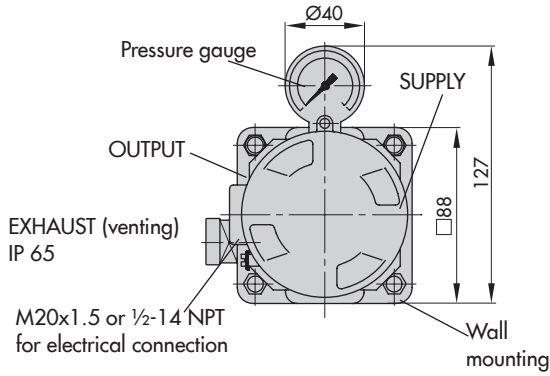
Type 6116-xx06011x000xxxx (for positioner attachment) · Further data same as in Table 1	
Input	4 to 20 mA, other signals on request Internal resistance approx. 200 Ω at 20 °C
Output	0.2 to 1 bar for positioner

Table 3: Summary of explosion protection certificates for Type 6116 i/p Converter ¹⁾

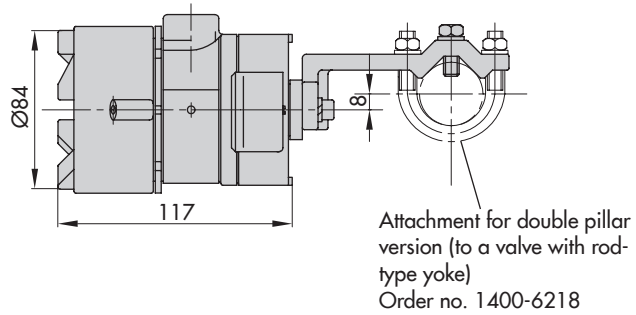
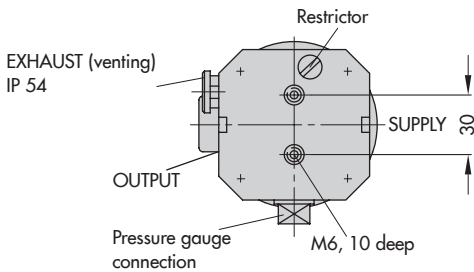
Type	Certification	Number	Date	Valid until	Type of protection/comments	
6116	STCC	Number	ZETC/22/2018		0Ex ia IIC T6 X 1Ex d IIC T6	
		Date	2018-04-27			
		Valid until	2021-04-26			
	-1	 EC type examination certificate	Number	PTB 02 ATEX 2199		II 2 G Ex ia IIC T6 Gb
			Date	2003-03-07		
	-2		On request			1Ex ia IIC T6/T5/T4 Gb X
	-3	 EC type examination certificate	Number	PTB 98 ATEX 1024 X		II 2 G Ex d IIC T6
			Date	2002-07-03		
		 EC type examination certificate	Number	BVS 14 ATEX E 104 X		II 2 G Ex d IIC T6/T5/T4 Gb
			Date	2014-06-27		
	-4	IECEX	Number	IECEX BVS 14.0066X		Ex d IIC T6/T5/T4 Gb
			Date	2014-07-01		
	-5		On request			1Ex d IIC T6/T5/T4 Gb X
-6	CSA	Number	1471157		Class I, Groups B,C,D; Class II, Groups E,F,G; Class III; Type 4 Enclosure	
		Date	2014-11-14			
-7	FM	Number	1W5A4.AE		Class I,II,III; Div. 1, Groups B,C,D,E,F,G Class I, Div. 2, Groups B,C,D Class II, Div. 2, Groups F,G Class III Type 4X Enclosure	
		Date	1993-04-01			
-8	CSA	Number	1607866		Ex ia IIC T6; Class I, Zone 0: Class I, Div. 1, Groups A,B,C,D; Class II, Div. 1, Groups E,F,G; Class III; Class I, Div. 2, Groups A,B,C,D; Class II, Div. 2, Groups E,F,G; Class III; Type 4 Enclosure	
		Date	2005-09-16			
-9	FM	Number	3020228		IS, Class I,II,III; Div. 1, Groups A,B,C,D,E,F,G Class I, Zone 0, AEx ia IIC NI, Class I, Div. 2, Groups A,B,C,D; S, Class II, Div. 2, Groups F,G; S, Class III; Type 4X Enclosure	
		Date	2015-10-12			
-10	KCS Korea	Number	11-KB4BO-0213		Ex d IIC T6/T4	
		Date	2011-10-24			
		Valid until	2021-10-24			
-11	IECEX	Number	IECEX TSA 05.0015		Ex d IIC T6/T4	
		Date	2005-04-22			
-12	IECEX	Number	IECEX TSA 05.0008X		Ex ia IIC T6 Ex nA IIC T6	
		Date	2005-04-04			
-13	JIS (no longer available since 2020)	Number	TC 13622		Ex d IIC T6	
		Date	2017-05-20			
		Valid until	2020-05-19			

¹⁾ The approvals are listed on our website at ► www.samsunggroup.com > Products & Applications > Product selector > Signal converters > 6116.

Wall and pipe mounting · Order no. 1400-6216

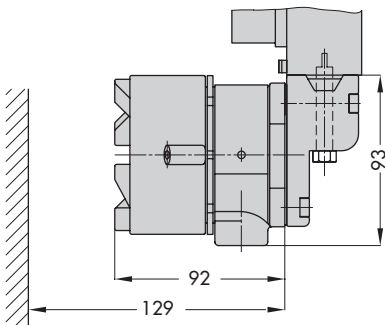


Rear view, without mounting parts

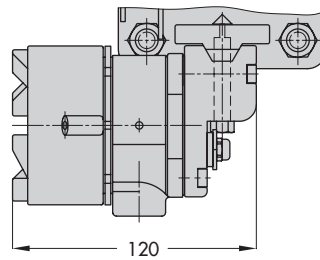


Type 6116-xx06011x000xxxx without booster for positioner attachment

Combined with Type 3766-000 Positioner
Accessories order no. 1400-6227



Attachment according to NAMUR with Type 4765 and Type 3760



Accessories order no. 1400-6223 (Type 4765)
Accessories order no. 1400-6224 (Type 3760)

Article code

Order no.	Type 6116-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Explosion protection	Without	0																
	ATEX ^{1) 2)} II 2G Ex ia IIC T6 Gb	1																1/2
	ATEX ³⁾ II 2G Ex d IIC T6; II 2G Ex d IIC T6/T5/T4 Gb	2																
	CSA ^{5) 12)} Class I, Groups B, C, D; Class II, Groups E, F, G; Class III; Type 4 Enclosure	3				0	1...5			1/2								0...3
	FM ^{5) 12)} Class I, II, III; Div. 1, Groups B, C, D, E, F, G; Class I, Div. 2, Groups B, C, D; Class II, Div. 2, Groups F, G; Class III; Type 4X Enclosure									1								0/3
	CSA ¹⁾ Ex ia IIC T6; Class I, Zone 0; Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III; Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2, Groups E, F, G; Class III; Type 4 Enclosure	4																3
	FM ¹⁾ IS, Class I, II, III; Div. 1, Groups A-G; Class I, Zone 0, AEx ia IIC; NI, Class I, Div. 2, Groups A, B, C, D; Type 4X Enclosure																	
	IECEX ^{4) 6)} Ex d IIC T6/T4	5				0	1/2			1								0/2
	IECEX ¹⁾ Ex ia IIC T6; Ex nA IIC T6	6	2															2
	JIS ^{4) 13)} Ex d IIC T6	7				0	1/2											
i/p converter module	Type 6109 ⁴⁾	1	0	1	0	1	1											
	Type 6112	2																
Input	4 to 20 mA		0	1														
	4 to 12 mA ^{1) 11)}	2	0	3														
	12 to 20 mA, without switch-off electronics ^{1) 7) 11)}	2	0	4														
	0 to 20 mA, without switch-off electronics ⁷⁾	2	0	5														
	4 to 20 mA, without switch-off electronics ⁷⁾ for positioner attachment		0	6														
Output	0.2 to 1.0 bar				0	1												
	3 to 15 psi				0	2												
	0.4 to 2.0 bar	2			0	4												
	6 to 30 psi	2			0	5												
Special ranges ⁸⁾	Initial value 0.1 to 0.4 bar; span 0.75 to 1.00 bar	2			1	1												
	Initial value 0.1 to 0.4 bar; span 1.00 to 1.35 bar	2			1	2												
	Initial value 0.1 to 0.4 bar; span 1.35 to 1.81 bar	2			1	3												
	Initial value 0.1 to 0.8 bar; span 1.81 to 2.44 bar	2			1	4												
	Initial value 0.1 to 0.8 bar; span 2.44 to 3.28 bar	2			1	5												
	Initial value 0.1 to 0.8 bar; span 3.28 to 4.42 bar	2			1	6												
	Initial value 0.1 to 1.2 bar; span 4.42 to 5.94 bar	2			1	7												
	Initial value 0.1 to 1.2 bar; span 5.94 to 8.00 bar	2			1	8												
Direction of action	Increasing/increasing									1								
	Increasing/decreasing ¹⁾									2								
Electrical connection	1/2 - 14 NPT											1						
	M20x1.5											2						
Pneumatic connection	Positioner attachment (without booster) ⁹⁾			0	6	0	1	1			0	0	0					
	1/4 - 18 NPT										1							
	ISO-228/1 - G 1/4										2							
Degree of protection	Without (vent for positioner attachment)			0	6	0	1	1			0	0	0					
	IP 54											1						
	IP 65											2						
	NEMA 4 ¹⁰⁾											3						
Output pressure gauge	Without																	0
	With ¹⁾																	1
Temperature range	T _{min} ≥ -25 °C (Type 6109 standard)	1																0
	T _{min} ≥ -45 °C (Type 6112 subjected to routine test, metal cable gland)	2																1
	T _{min} ≥ -40 °C (Type 6112 standard)	2																2

Order no.	Type 6116-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Special version	Without	|															0 0 0
	IECEX approval: Ex d IIC T6/T5/T4 Gb	2															2 5 1
	EAC Ex approval: on request	1/2															2 5 2
	KCS approval, Korea: on request	5															2 6 2

- 1) Not for positioner attachment
- 2) With degree of protection IP 54/IP 65 only
- 3) Supply pressure max. 6 bar; output 5.6 bar
- 4) Only with 0.2 to 1 bar/3 to 15 psi
- 5) With ½ NPT electrical connection, degree of protection NEMA 4 or positioner attachment
- 6) With ½ NPT electrical connection, degree of protection IP 65 or positioner attachment
- 7) Without switch-off electronics and without potentiometer for zero point and span correction
- 8) Specify setting range, e.g. "set to 0.1 to 4 bar"; output pressure max. 8 bar. Initial value raised to max. 3.0 bar (special version)
- 9) Only with Ex d or explosion-proof according to CSA and FM standards
- 10) Only explosion-proof or intrinsically safe according to CSA and FM standards
- 11) 4 to 12 mA and 12 to 20 mA input only up to 4.0 bar span
- 12) Only with 0.2 to 1 bar (3 to 15 psi) and 0.4 to 2 bar (6 to 30 psi) output
- 13) No longer available since 2020

Accessories	Order no.
Wall and pipe mounting	1400-6216
Mounting bracket (1.4301) for wall mounting	1400-7432
Mounting unit for Type 6116 in various versions	M6116
Attachment to Type 3766 ¹⁾	1400-6227
Attachment to Type 4765 ¹⁾	1400-6223
Attachment to Type 3760 ¹⁾	1400-6224
Mounting on cast yoke according to NAMUR ¹⁾	1400-6217
Mounting on rod-type yoke according to NAMUR ¹⁾	1400-6218
Male screw fitting G ¼ on hose with 4 mm inside diameter and 6 mm outside diameter, brass	8582-1452
Male screw fitting ¼ NPT on hose with 4 mm inside diameter and 6 mm outside diameter, brass	8582-1523
Cable gland M20x1.5, black polyamide (6 to 12 mm clamping range)	8808-1011
Cable gland M20x1.5, blue polyamide (6 to 12 mm clamping range)	8808-1012
Cable gland M20x1.5, nickel-plated brass (6 to 12 mm clamping range)	1890-4875
Cable gland M20x1.5, stainless steel 1.4305 (8 to 14.5 mm clamping range)	8808-0160
Cable gland ½ NPT, black polyamide (6 to 12 mm clamping range)	8808-0145
Cable gland ½ NPT, blue polyamide (6 to 12 mm clamping range)	8808-0146
Cable gland ½ NPT, nickel-plated brass (6 to 12 mm clamping range)	8808-0140
Vent plug G ¼, stainless steel 1.4305, IP 66 (-45 to +80 °C)	1790-7253
Vent plug G ¼, stainless steel 1.4305, NEMA 4 (-45 to +80 °C)	1790-9646

- 1) Only mounting part without assembly and without any possibly required piping. Order together with mounting unit (M6116).

T 6126 EN

Electropneumatic Converter for Direct Current Signals

Type 6126 Current-to-Pressure Converter

Type 6126 Voltage-to-Pressure Converter



Application

Used to convert a direct-current input signal into a pneumatic output signal for measuring and control tasks · Particularly suitable as intermediate element between electric measuring devices and pneumatic controllers or between electric control devices and pneumatic control valves

The signal converter accepts a load-independent 0 to 20 mA direct-current input signal or a 0/2 to 10 V voltage signal.

Depending on the supply air pressure, the converter supplies a pneumatic output signal of 0.2 to 1 bar (3 to 15 psi) or 0.4 to 2 bar (6 to 30 psi).

The electropneumatic converter is available with either a Type 6109 or 6112 i/p Module. Type 6112 offers further output signal ranges (see Technical data).

Special features

- Small dimensions, low weight and rugged housing
- Excellent dynamic behavior
- Relatively large air output with low air supply consumption
- Output pressure up to 5 bar
- Central venting
- Effect of vibration is small
- Versions with reversed characteristic available (only with Type 6112 i/p Module)
- Option of connecting a pressure gauge parallel to the output
- Operation possible without an upstream pressure regulator
- Zero reset at specific mA value when switch-off electronics are activated (function can be activated as required)
- Zero point and span can be adjusted at potentiometers in devices with electronics

Versions

For **non-hazardous areas**:

- **Type 6126-0** with electronics, i. e. switch-off electronic function and potentiometer for zero and span
- **Type 6126-0** without electronics

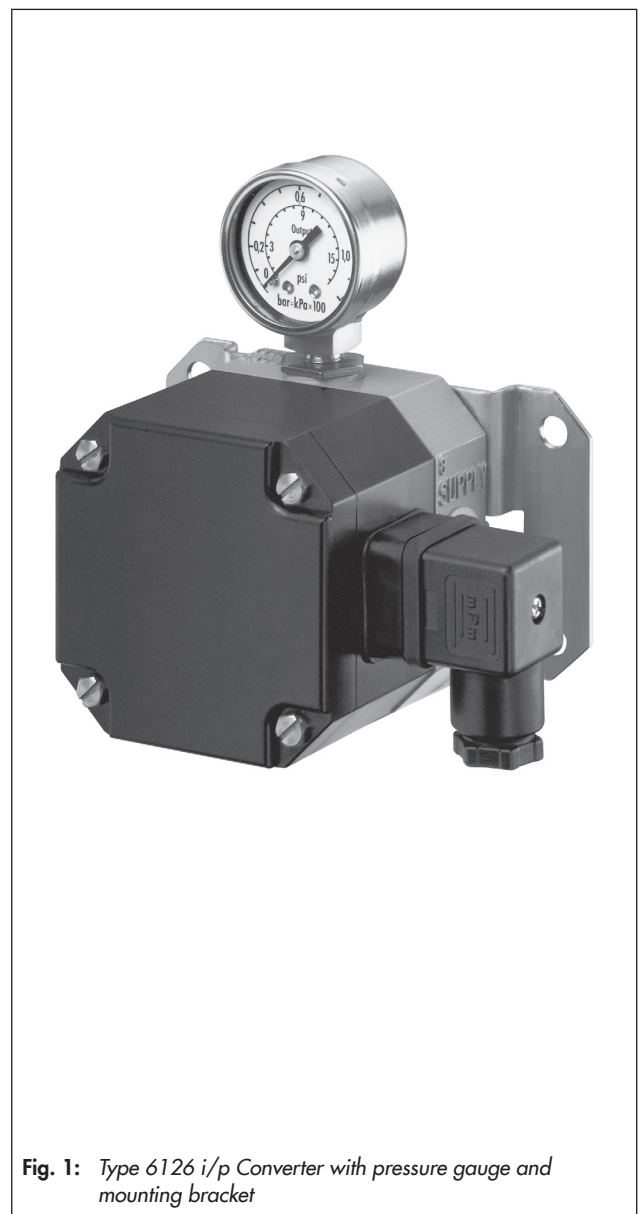


Fig. 1: Type 6126 i/p Converter with pressure gauge and mounting bracket

Principle of operation

The electropneumatic converter consists of an i/p converter module, which operates according to the force-balance principle and a downstream volume booster.

When operated, the supplied direct current (4) flows through the plunger coil (2) located in the field of a permanent magnet (3). At the balance beam (1), the force of the plunger coil, which is in proportion to the current, is balanced against the force of the dynamic backpressure. The backpressure is produced on the flapper plate (6) by the air jet leaving the nozzle (7).

The supply air (8) flows to the bottom chamber of the volume booster. A certain amount of air determined by the diaphragm position flows past the sleeve (9) and leaves through the output (36).

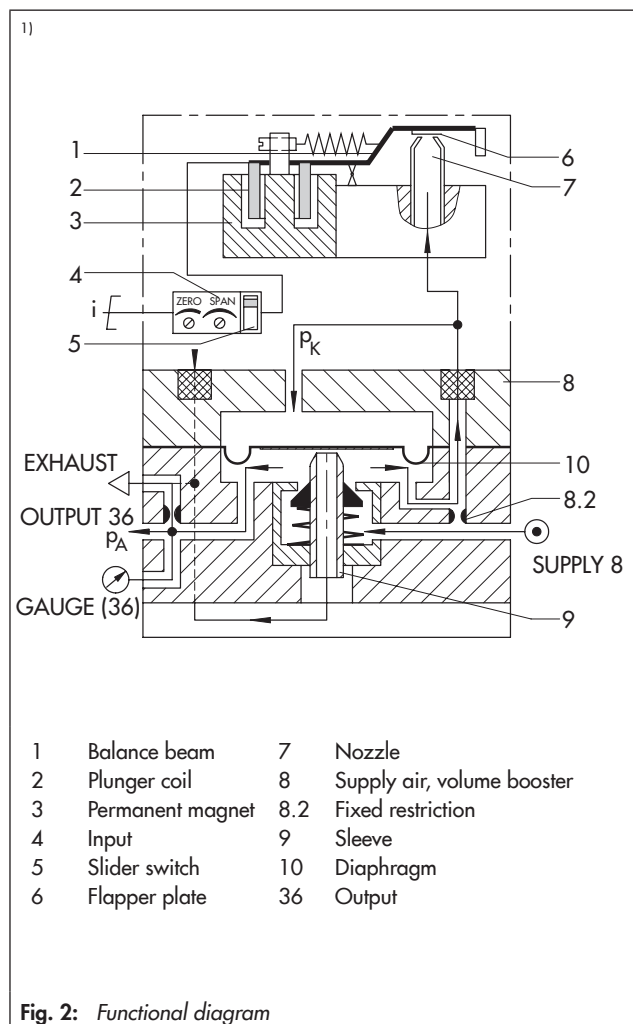
As the input current and the forces acting on the plunger coil increase, the flapper moves closer to the nozzle. This causes the backpressure and the cascade pressure p_k upstream of the restriction (8.2) to increase until the cascade pressure corresponds with the input current. The increasing cascade pressure pushes the diaphragm (10) and the plug sleeve (9) downward. As a result, the output pressure p_A increases until a new state of equilibrium is reached in the diaphragm chambers. When the cascade pressure drops, the diaphragm moves upward, releasing the plug sleeve and thus allowing the output pressure p_A to escape through the venting (EXHAUST) until the forces are equal again.

Converter modules with an input signal range from 4 to 20 mA have a slide switch which activates the switch-off electronics. The electronics cause the pneumatic output to be vented less than 100 mbar when the input signal falls below 4.08 mA tolerance. In this way, the tight shut-off function of a valve can be guaranteed.

Installation

The converter can be mounted to a wall, pipe or directly to the control valve. The bracket for wall mounting is included in scope of delivery (see Ordering data).

The converter is to be installed horizontally, with the pressure gauge (or screw plug) facing upward. If a different mounting position is used, the zero point in devices with electronics must be corrected using the ZERO adjuster.



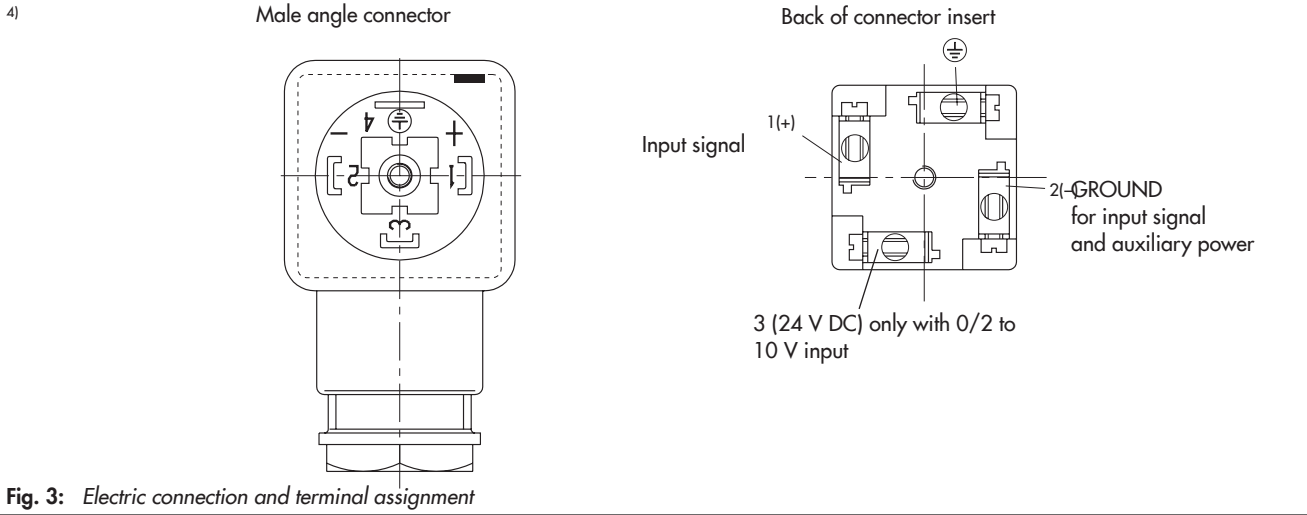
Technical data

Type	No explosion protection	Type 6126-0
Input		0/4 to 20 mA 0/2 to 10 V (30 k Ω input resistance) with 24 V DC power supply Load impedance ≤ 6 V (corresponding to 300 Ω at 20 mA)
Output		0.2 to 1 bar (3 to 15 psi) with Type 6109 or Type 6112 i/p Module 0.4 to 2 bar (6 to 30 psi) with Type 6112 i/p Module (special ranges up to max. 5 bar (75 psi) with Type 6112 i/p Module)
	Air output capacity ¹⁾	2.0 m ³ /h at an output of 0.6 bar (0.2 to 1.0 bar) 2.5 m ³ /h at an output of 1.2 bar (0.4 to 2.0 bar)
Supply air	Pneumatic	At least 0.4 bar (6 psi) above the upper signal pressure range value, max. 5.4 bar (80 psi) without supply pressure regulator
	Air quality acc. to ISO 8573-1: 2001	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
	Air consumption ²⁾	0.08 m _n ³ /h at 1.4 bar (20 psi) 0.1 m _n ³ /h at 2.4 bar (35 psi)
	24 V DC (with voltage-to-pressure converter)	10 to 28 V DC 9 to 25 mA (max. 30 mA) for 0/2 to 10 V input
Characteristic		Characteristic: Output linear to input
	Hysteresis	≤ 0.3 % of final value
	Deviation from terminal-based conformity	≤ 1 % of final value
	Effect in % of the upper range value	Supply air: 0.1 %/0.1 bar ²⁾ Alternating load, supply air failure, interruption of the input current: <0.3 % Ambient temperature: lower range value <0.03 %/K, span <0.03 %/K
Dynamic response (measured according to IEC 60770-1)		
	Limiting frequency	5.3 Hz
	Phase shift	-130 °
Variable position		Max. 3.5 % depending on attachment: ± 1 % when horizontal (Type 6109) Max. 1 % depending on attachment: ± 0.3 % when horizontal (Type 6112)
Ambient conditions, degree of protection, compliance and weight		
Ambient temperature		-25 to +70 °C
Degree of protection		IP 54/IP 65
Compliance		CE ENEC
Weight		Approx. 0.6 kg
Materials		
Enclosure		Die-cast aluminum, chromated and plastic coated/glass-fiber-reinforced polyamide
Other parts		Corrosion-resistant material

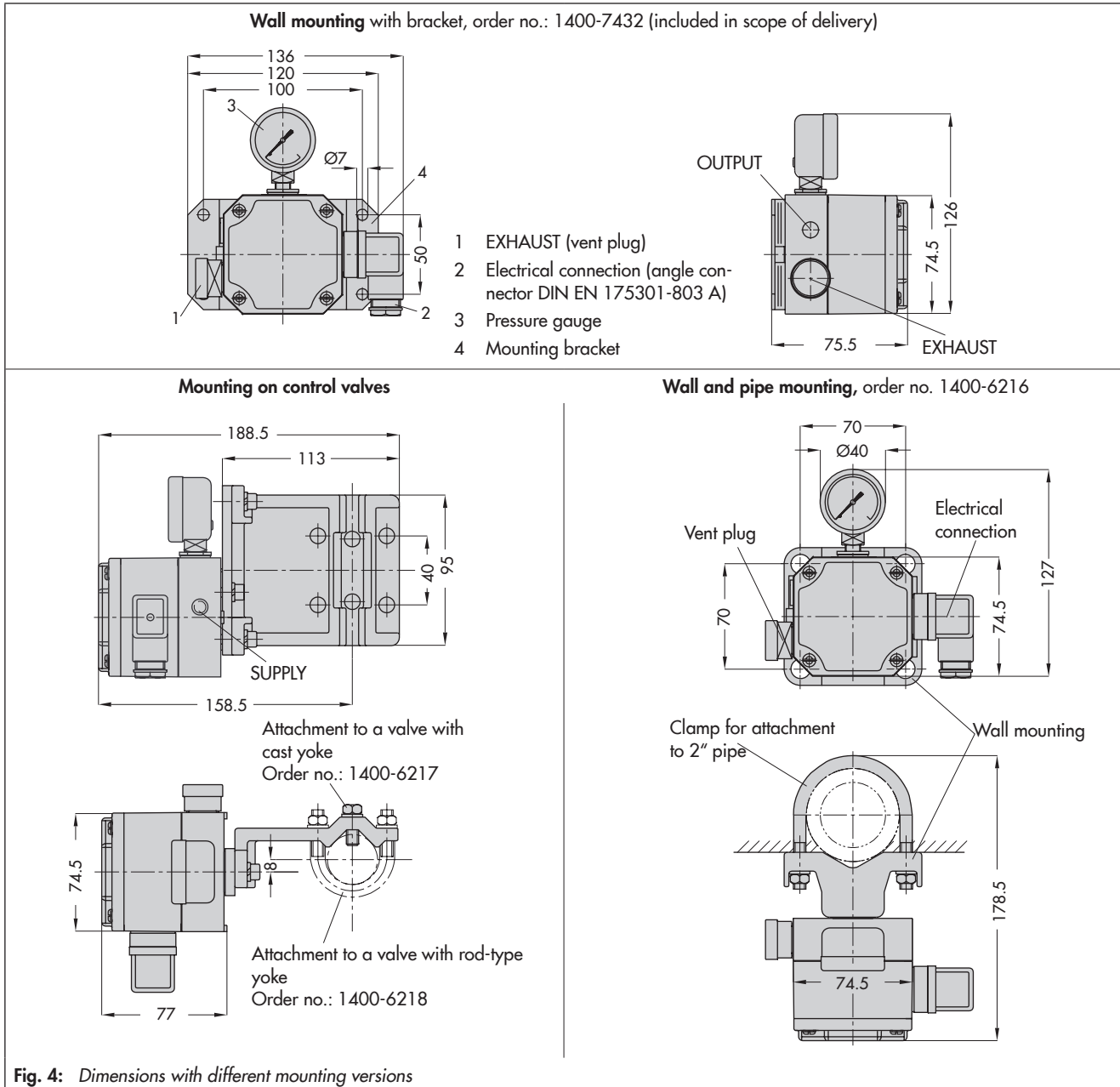
²⁾ Measured with 2 m hose with 4 mm inside diameter and 6 mm outside diameter

³⁾ Measured with average output pressure

Electrical connection



Dimensions in mm



Ordering data

Article code		Type 6126-	...	...	...	...	...	...	...	...	...	...	...	...	...
Explosion protection	Without	0													
Pneumatic connection	1/4 -18 NPT	1													
	ISO-228/1 - G 1/4	2													
i/p converter module	Type 6109 ¹⁾		1						0	0					
	Type 6112		2												
Input	4 to 20 mA				1										
	0 to 20 mA, without switch-off electronics ²⁾		2		2										
	4 to 20 mA, without switch-off electronics ²⁾ (no longer available)				3										
	0 to 10 V, 24 V DC power supply ⁵⁾				4										
	2 to 10 V, 24 V DC power supply				5										
Output	0.2 to 1.0 bar					0	1								
	3 to 15 psi					0	2								
	0.4 to 2.0 bar		2			0	4								
	6 to 30 psi		2			0	5								
Special ranges ^{3) 4)}	Initial value 0.1 to 0.4 bar; span 0.75 to 1.00 bar		2			1	1								
	Initial value 0.1 to 0.4 bar; span 1.00 to 1.35 bar		2			1	2								
	Initial value 0.1 to 0.4 bar; span 1.35 to 1.81 bar		2			1	3								
	Initial value 0.1 to 0.8 bar; span 1.81 to 2.44 bar		2			1	4								
	Initial value 0.1 to 0.8 bar; span 2.44 to 3.28 bar		2			1	5								
	Initial value 0.1 to 0.8 bar; span 3.28 to 4.42 bar		2			1	6								
	Initial value 0.1 to 1.2 bar; span 4.42 to 5.94 bar		2			1	7								
Direction of action	Increasing/increasing							0							
	Increasing/decreasing							1							
Degree of protection	IP 54								0						
	IP 65								1						
Output pressure gauge	Without									0					
	With pressure gauge in bar									1					
	With pressure gauge 0 to 0.6 MPa/0 to 6 kg/cm ²									2					
Temperature range	T _{min} ≥ -25 °C										0				
Special version	Without											0	0	0	
	Type 6109 i/p Module, 4 to 20 mA, without switch-off electronics, 0.2 to 1.0 bar output											0	0	8	
	Raised zero (up to max. 1.5 bar)											3	0	0	
	Raised zero (up to max. 3.0 bar)											3	0	1	

¹⁾ Only with 0.2 to 1 bar (3 to 15 psi) output

²⁾ Without switch-off electronics and without potentiometer for zero point and span correction. Not possible with Type 6109 i/p module, adjusted to 3 to 15 psi

³⁾ Raised zero up to 3 bar (45 psi) possible as special version

⁴⁾ Specify setting range, e.g. set to 0.1 to 4 bar; output pressure max. 5 bar, supply air 5.4 bar

⁵⁾ 0 to 5 V input possible as special version.

Accessories

Mounting material for	Order no.
- Bracket for wall mounting, stainless steel (1.4301)	1400-7432 (included in scope of delivery)
- Wall and pipe mounting (2" pipes)	1400-6216
- Mounting on cast yoke according to NAMUR ¹⁾	1400-6217
- Mounting on rod-type yoke according to NAMUR ¹⁾	1400-6218

¹⁾ Only mounting part without assembly and without any possibly required screw fitting. Order together with mounting unit (M6116).

Pressure gauge retrofit

- Pressure gauge: 0 to 1.2 bar pressure range	0080-0185
- Pressure gauge: 0 to 6 bar pressure range	0080-0186
- Pressure gauge: 0 to 10 bar pressure range	8520-0032
- Pressure gauge: pressure range 0 to 0.6 MPa/0 to 6 kg/cm ²	0800-0204
- For all pressure gauges: screw fitting	0250-1090
- Male screw fitting G 1/4 on hose with 4 mm inside diameter and 6 mm outside diameter, brass	8582-1452
- Male screw fitting 1/4 NPT on hose with 4 mm inside diameter and 6 mm outside diameter, brass	8582-1523
- T-union for hose with 4 mm inside diameter and 6 mm outside diameter, brass	8582-1480