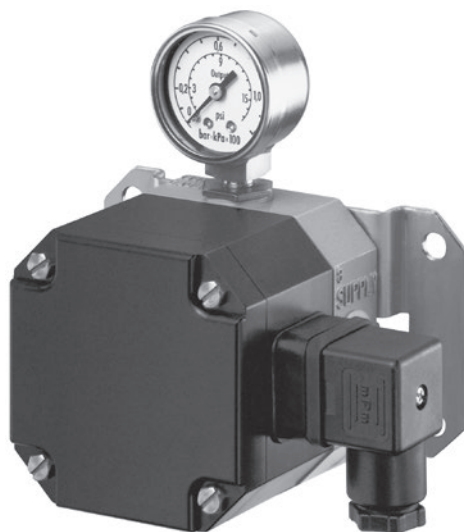


# System 6000



Electropneumatic Converters  
Type 6126 i/p Converter  
Type 6126 u/p Converter



Type 6126 i/p Converter with pressure gauge and mounting bracket

## Mounting and Operating Instructions

**EB 6126 EN**

Edition October 2016



## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersaleservice@samson.de).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website ([www.samson.de](http://www.samson.de)) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.



### **WARNING!**

*Damage to health relating to REACH Regulation.*

*If a SAMSON device contains a substance which is listed as being a substance of very high concern on the candidate list of the REACH Regulation, this circumstance is indicated on the SAMSON delivery note.*

*Information on safe use of the part affected, see ► <http://www.samson.de/reach-en.html>*

## Definition of signal words



### **DANGER!**

*Hazardous situations which, if not avoided, will result in death or serious injury*



### **NOTICE**

*Property damage message or malfunction*



### **WARNING!**

*Hazardous situations which, if not avoided, could result in death or serious injury*



### **Note:**

*Additional information*



### **Tip:**

*Recommended action*

1	<b>General safety instructions</b> .....	4
2	<b>Description</b> .....	5
2.1	Application .....	5
2.2	Principle of operation .....	5
3	<b>Installation</b> .....	8
3.1	Mounting .....	8
4	<b>Connections</b> .....	9
4.1	Electrical connection.....	9
4.2	Pneumatic connection .....	10
5	<b>Operation</b> .....	11
6	<b>Maintenance</b> .....	12
7	<b>Troubleshooting</b> .....	13
8	<b>Dimensions</b> .....	14
9	<b>Technical data</b> .....	15
10	<b>Ordering data</b> .....	17
10.1	Accessories .....	18



### 1 General safety instructions

- The device must be mounted, started up, or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up, and maintenance, must be strictly observed.
- According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- Devices with a CE marking fulfill the requirements of the Directive 2004/30/EU. Devices with a CE marking have an EC declaration of conformity, which includes information about the applied conformity assessment procedure. This declaration of conformity can be provided on request.
- To ensure appropriate use, only use the device in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the device at the ordering stage.
- The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Proper transport, storage, installation, operation, and maintenance are assumed.

## 2 Description

### 2.1 Application

The devices are used to convert a direct current input signal into a pneumatic output signal for measuring and control tasks. They are particularly suitable as intermediate element between electric measuring devices and pneumatic controllers or between electric control devices and pneumatic control valves.

The input is a load-dependent direct current from 0/4 to 20 mA or a DC voltage signal from 0/2 to 10 V with an auxiliary power of 24 V DC. The output is, for example, a pneumatic signal of 0.2 to 1 bar (3 to 15 psi) or 0.4 to 2 bar (6 to 30 psi) or special ranges up to 5 bar (75 psi).

### 2.2 Principle of operation

The device consists of an i/p converter module and a downstream volume booster.

When operated, the supplied direct current  $i$  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 (SUPPLY 8) flows to the bottom chamber of the volume booster (8). A certain amount of air determined by the diaphragm position flows past the sleeve (9) and leaves through the output (OUTPUT 36).

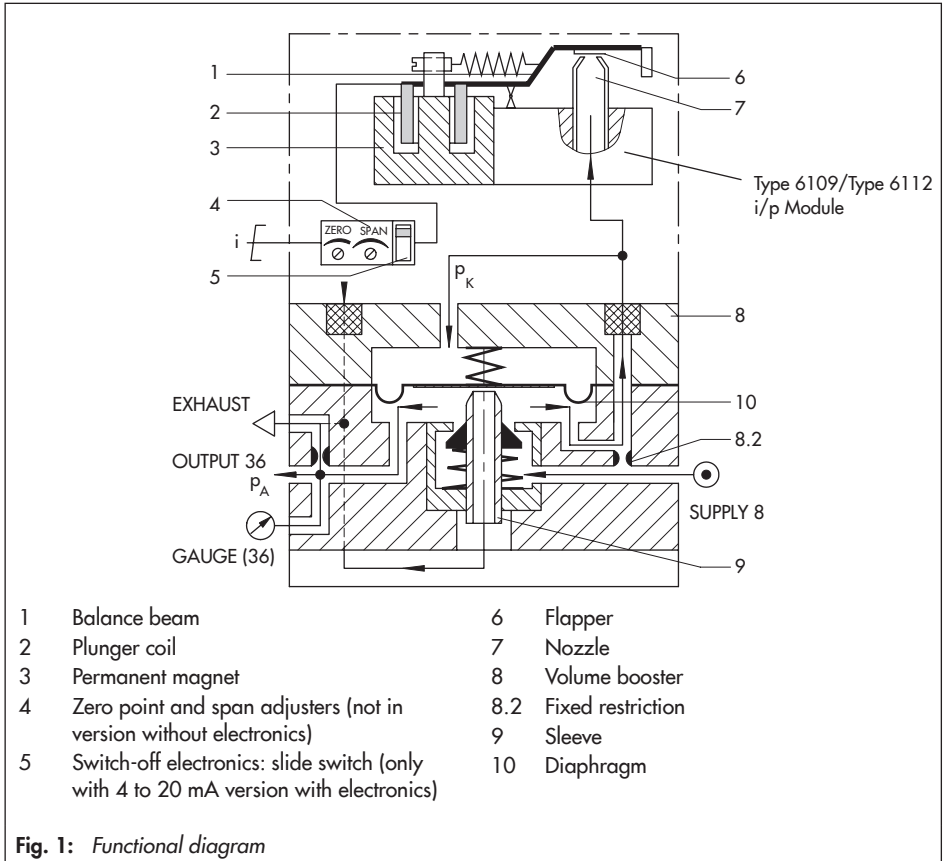
## Description

As the input current and the forces acting on the plunger coil increase, the flapper (6) moves closer to the nozzle (7). 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) downwards. As a result, the supply air causes

the output pressure  $p_A$  to increase 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.



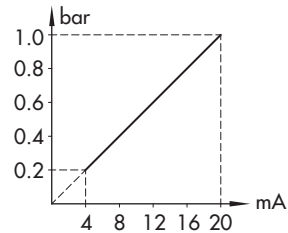
**Switch-off electronics** (see Fig. 2)

Devices with an input range from 4 to 20 mA have a slide switch which activates the switch-off electronics. This function allows the input signal to be set to 0 mA when the signal falls below the switching point of  $4.08 \pm$  tolerance. This causes the pneumatic output to be vented to approximately 100 mbar. This guarantees, for example, the tight shut-off function of a valve.

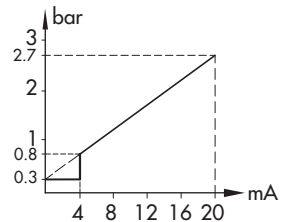
This function requires a characteristic which passes through the zero point, for example, for the version with 4 to 20 mA/0.2 to 1 bar.

If the characteristic line does not pass through zero, for example, for an allocated output signal from 0.8 to 2.7 bar, then the pneumatic output is vented to a remaining pressure of approx. 0.3 bar when the switch-off electronics are activated.

Output 0.2 to 1 bar  
Remaining pressure approx. 0.1 bar



Output 0.8 to 2.7 bar  
Remaining pressure approx. 0.3 bar



**Fig. 2:** *Switch-off electronics and remaining pressure*

## **3 Installation**

### **3.1 Mounting**

The converter can be mounted to a wall, a pipe or directly to a control valve as illustrated in the dimension diagrams on page 14.

The device is delivered with a stainless steel bracket for wall mounting.

The following mounting accessories are required depending on the type of mounting to be used:

- Pipe mounting, order no. 1400-6216
- Attachment to a valve with cast yoke, order no. 1400-6217
- Attachment to a valve with rod-type yoke, order no. 1400-6218

#### **Mounting position**

The converter is to be installed horizontally, with the pressure gauge (or screw plug) facing upward.

If a different mounting position is used for the 4 to 20 mA version with switch-off electronics, the zero point must be readjusted as described in section 4.

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



## 4 Connections

### 4.1 Electrical connection



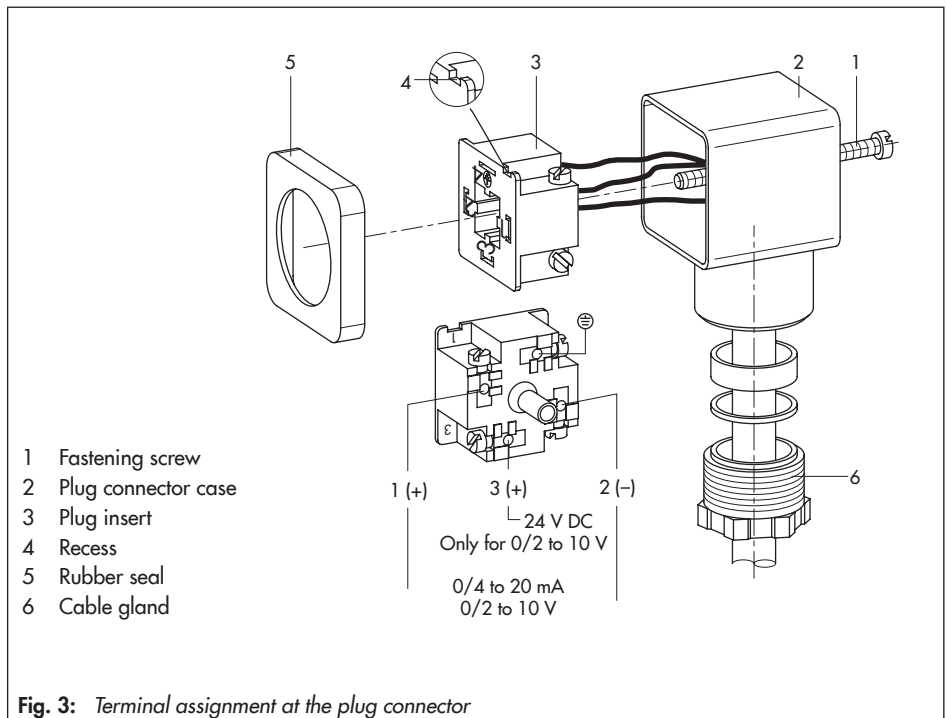
**DANGER!**

*Risk of electric shock and/or the formation of an explosive atmosphere. For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.*

In Germany, these are the VDE regulations and the accident prevention regulations of the employers' liability insurance.

A male angle connector conforming to DIN EN 175301-803 A is used for electrical connection.

1. Unscrew the fastening screw (1) of the plug connector and pull the plug insert (3) out of the plug base at the case.
2. Pull the fastening screw out of the plug connector and remove the rubber seal (5).



3. Place a screwdriver at the recess (4) and lever the plug insert (3) out of the plug connector case.
4. Run the wires for the input signal through the cable gland of the plug connector case to the terminals of the insert marked 1 (+) and 2 (-). Secure them with screws.
  - For **u/p converters** (devices with [V] input), additionally run the wire for the auxiliary power 24 V DC (+) to terminal 3.
  - **i/p converters** (devices with [mA] input) do not require a supply voltage.
5. Push the insert into the plug connector case, making sure that the cable gland points in the correct direction after the plug connector case has been reassembled (the plug connector case can be mounted in all four directions, turned at 90° angles around the insert).
6. Plug the plug connector onto the device and screw tight the screw (1).

## 4.2 Pneumatic connection

The pneumatic connections for supply air (SUPPLY 8) and output (OUTPUT 36) are designed as threaded ports with G ¼ or ¼-18 NPT thread.



**Note:**

*Customary fittings for metal tubing or plastic hoses can be used.*



**NOTICE**

*Risk of property damage due to water entering the device when a pipe is used to extend the vent pipe. Make sure that no water can enter at the end of an extension pipe (minimum cross-section of 28 mm<sup>2</sup> = 6 mm inside diameter) connected to either vent elbow piece or directly to the G or NPT connection.*

## 5 Operation

See Fig. 1 on page 6.

The device converts the input signal proportionally into the output signal.

The signal ranges are specified on the nameplate.

In case of a mounting position that is not horizontal or when the pressure gauge/screw plug does not face upwards, zero and span can be corrected by approx. 10 % using the electronics. To do this, proceed as follows:

### Example:

The output signal 0.2 to 1 bar is to be assigned to an input signal of 4 to 20 mA.

1. Unscrew the enclosure cover to access the ZERO and SPAN adjusters on the circuit board.

### Zero:

2. Connect a pressure gauge (minimum accuracy class 1) to the converter output.
3. Set the supply air to at least 0.4 bar above the upper output signal range value and apply it to the device.
4. Deactivate the switch-off electronics in the 4 to 20 mA version at the switch (5).
5. Set the input signal to the lower range value (4 mA) using a suitable ammeter. The output signal at the test pressure gauge should indicate a lower range value of 0.2 bar.

If this is not the case, readjust the zero point accordingly with the ZERO adjuster.

### Span:

6. Set the input signal to 20 mA using a suitable ammeter. The output signal at the test pressure gauge should indicate the upper range value of 1.0 bar. If another value is indicated, readjust the span accordingly with the SPAN adjuster.
7. Change the input signal abruptly from the upper range value (20 mA) to 0 mA (or gently tap the device) and check whether the output signal assumes the upper range value, e.g. 1.0 bar. As the adjustment of zero and span influence each other, recheck both values and correct them, if necessary.
8. Reactivate the switch-off electronics in the 4 to 20 mA version at the switch (5), if required.

### Voltage signal as input:

For u/p converters (devices with [V] input) proceed in the same way as already described.

The pneumatic output signal, e.g. 0.2 to 1 bar is assigned to the signal range 0 or 2 to 10 V with the ZERO and SPAN adjusters (see nameplate).



### Note:

*Converters with voltage input do not have the switch-off electronic function.*

---

## 6 Maintenance

No specific maintenance measures need to be carried out.

To guarantee trouble-free operation of the converter, make sure that the supply air is always clean (see section 9 on page 15 for air quality).

Therefore, check the air filter and trap installed in the upstream air reducing station regularly.

The pneumatic connections have filters with plastic rims (order no. 0550-0213) which can be removed for cleaning or replacement.

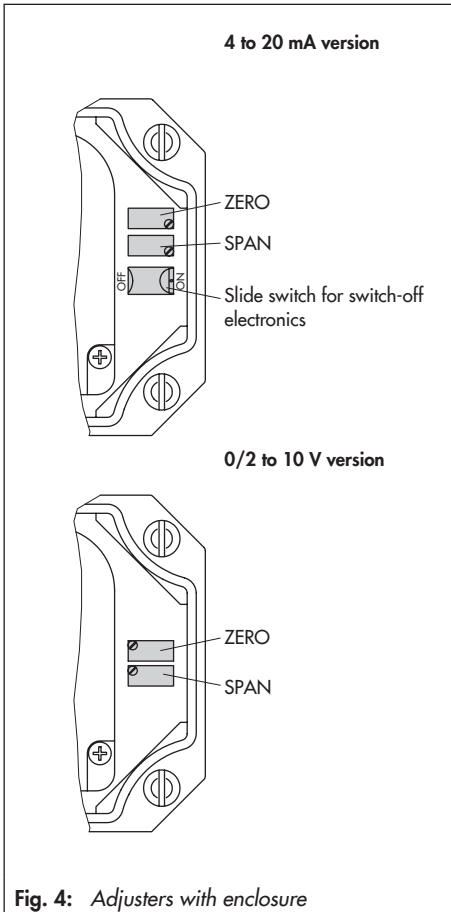
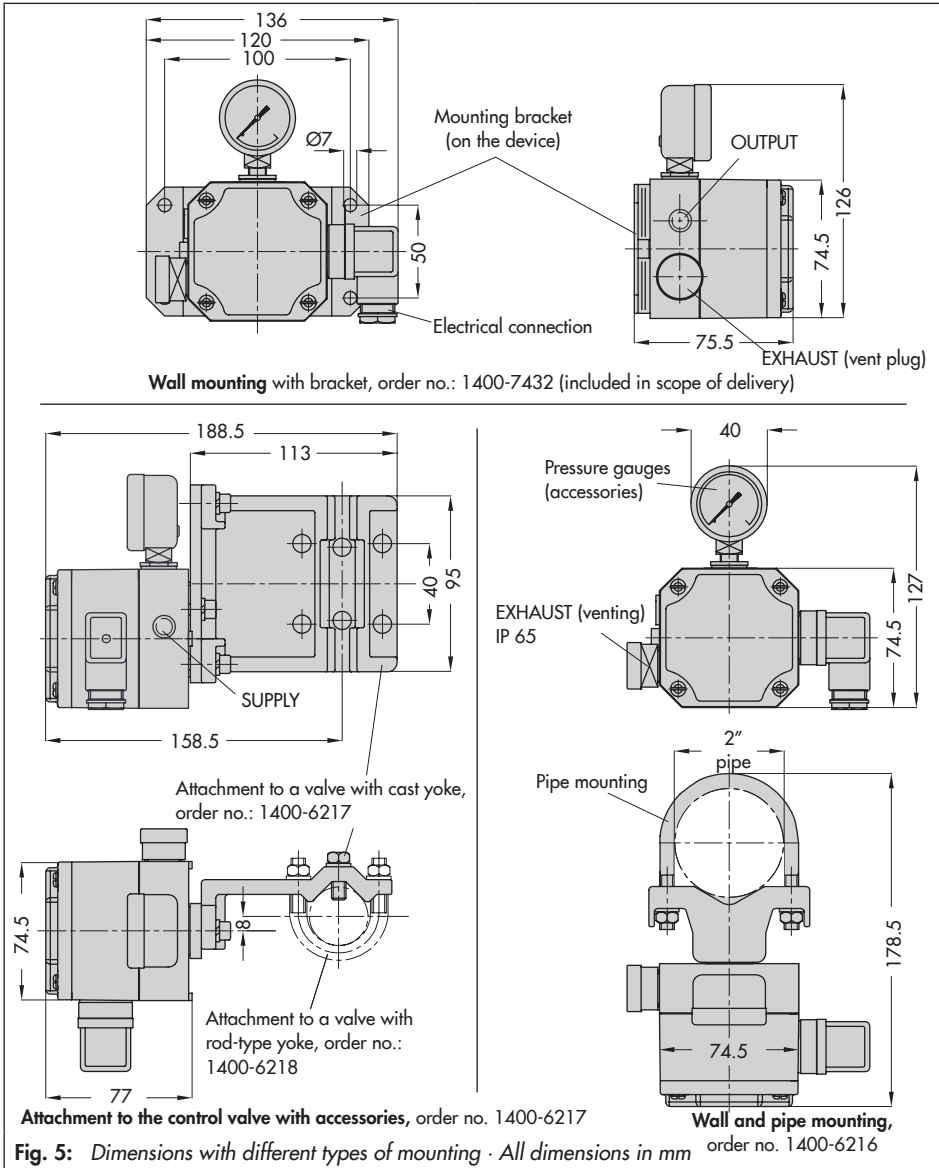


Fig. 4: Adjusters with enclosure

## 7 Troubleshooting

Problem	Possible reasons	Corrective action to be taken	Comments
No output signal despite changing the input signal	Supply air not connected	Check supply air connection. See section 4.2.	
	Incorrect terminal assignment	Connect + and – terminals correctly. See section 4.1.	<b>NOTICE</b> i/p converters do not need any extra voltage. Do not connect 24 V. u/p converters (device with [V] input) require a 24 V DC voltage supply (see section 4.1).
	Incorrect input signal	Connect correct signal.	Read nameplate: 0 to 20 mA or 4 to 20 mA, 0 to 10 V or 2 to 10 V.
e/p converter constantly vents off air loudly.	Connections for supply air and output at the e/p converter mixed up.	Check pneumatic connections. See section 4.2.	
e/p converter does not reach 100 % output e.g. 20 mA input: output only 70 % instead of 100 %.	Supply pressure too low.	Supply air must be 0.4 bar greater than the max. output signal (supply air 0.4 bar).	Read nameplate: output 0.2 to 1 bar → Supply air at least 1.4 bar, max. 6 bar.
	Input signal faulty	Check whether the input signal at the terminals reaches 100 % (100 % is e.g. 20 mA in standard version and 12 mA for split-range operation)	<b>NOTICE</b> The i/p converters have a load of: – max. 6 V Check specification concerning permissible load at the source of the input signal.

## 8 Dimensions




## 9 Technical data

Type	No explosion protection	Type 6126-0
Input		0/4 to 20 mA 0/2 to 10 V (30 k $\Omega$ input resistance) with 24 V DC power supply Load impedance $\leq 6$ V (corresponding to 300 $\Omega$ 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 <sup>1)</sup>	2.0 m <sup>3</sup> /h at an output of 0.6 bar (0.2 to 1.0 bar) · 2.5 m <sup>3</sup> /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 <sup>2)</sup>	0.08 m <sub>n</sub> <sup>3</sup> /h at 1.4 bar (20 psi) · 0.1 m <sub>n</sub> <sup>3</sup> /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	$\leq 0.3$ % of upper range value
	Deviation from terminal-based conformity	$\leq 1$ % of upper range value
Effect in % of the upper range value		Supply air: 0.1 %/0.1 bar <sup>2)</sup>
		Alternating load, supply air failure, interruption of the input current: <0.3 %
		Ambient temperature: lower measuring 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: $\pm 1$ % when horizontal (Type 6109) Max. 1 % depending on attachment: $\pm 0.3$ % when horizontal (Type 6112)

## Technical data

### Technical data (continued)

<b>Ambient conditions, degree of protection, compliance, and weight</b>	
Ambient temperature	-25 to +70 °C
Degree of protection	IP 54/IP 65
Compliance	
Weight	Approx. 0.6 kg
<b>Materials</b>	
Housing	Die-cast aluminum, chromated and plastic coated/glass-fiber-reinforced polyamide
Other parts	Corrosion-resistant material

<sup>1)</sup> Measured with 2 m hose with 4 mm inside diameter and 6 mm outside diameter

<sup>2)</sup> Measured with average output pressure



## 10 Ordering data

Article code	Type 6126-	...	...	...	...	...	...	...	...	...	...	...	...	...
Explosion protection	Without	0												
Pneumatic connection	¼ -18 NPT	1												
	ISO-228/1 - G ¼	2												
i/p converter module	Type 6109 <sup>1)</sup>		1					0	0					
	Type 6112		2											
Input	4 to 20 mA			1										
	0 to 20 mA, without switch-off electronics <sup>2)</sup>		2	2										
	4 to 20 mA, without switch-off electronics <sup>2)</sup>			3										
	0 to 10 V, 24 V DC power supply <sup>5)</sup>			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							
	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								
Special ranges <sup>3) 4)</sup>	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				
	Pressure gauge in bar									1				
	Pressure gauge 0 to 0.6 MPa/0 to 6 kg/cm <sup>2</sup>									2				
Temperature range	T <sub>min</sub> ≥ -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 adjuster 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.

## 10.1 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 <sup>1)</sup>	1400-6217
– Mounting on rod-type yoke according to NAMUR <sup>1)</sup>	1400-6218

<sup>1)</sup> 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 <sup>2</sup>	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, 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





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

**EB 6126 EN**

2017-11-16 · English