

**Electropneumatic Converters**  
**Current-to-Pressure Converter Type 6126**  
**Voltage-to-Pressure Converter Type 6126**



*Fig. 1 · Type 6126 Current-to-Pressure Converter with pressure gauge and bracket*

## **Mounting and Operating Instructions**

**EB 6126 EN**

Edition July 2010



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- ▶ *The devices may only be mounted, started up or serviced by fully trained and qualified personnel, observing the accepted industry codes and practices. Make sure employees or third persons are not exposed to any danger.  
All safety instructions and warnings in these mounting and operating instructions, particularly those concerning assembly, start-up and maintenance, must be observed.*
  - ▶ *Any hazards which could be caused in the device by the signal pressure are to be prevented by means of the appropriate measures.*
  - ▶ *Proper shipping and appropriate storage of the device are assumed.*
  - ▶ *The device with the CE marking fulfills the requirements of the Directive 94/9/EC and the Directive 89/336/EEC.  
The declaration of conformity is available on request.*
-

**Article code**

Article code	Type 6126-	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<b>Explosion protection:</b> Without	0														
<b>Pneumatic connection</b>															
¼ - 18 NPT	1														
ISO-228/1 - G ¼	2														
<b>i/p module</b>															
Type 6109 <sup>1)</sup>	1							0							
Type 6112	2														
<b>Input</b>															
4 to 20 mA			1												
0 to 20 mA, without electronics <sup>2)</sup>			2	2											
4 to 20 mA, without electronics <sup>2)</sup>				3											
0 to 10 V, 24 V DC auxiliary power <sup>5)</sup>				4											
2 to 10 V, 24 V DC auxiliary power				5											
<b>Output</b>															
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: <sup>3), 4)</sup>															
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										
<b>Operating direction</b>															
Increasing/increasing								0							
Increasing/decreasing								1							
<b>Degree of protection</b>															
IP 54									0						
IP 65									1						
<b>Output pressure gauge</b>															
Without										0					
With										1					
<b>Temperature range:</b> T <sub>min</sub> ≥ -25 °C											0				
<b>Special version:</b> Without												0	0	0	

- 1) Only with output 0.2 to 1 bar (3 to 15 psi)
- 2) Without switch-off electronic function and without zero point and span correction, not possible with Type 6109 i/p module, output 0.2 to 1 bar (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) Input 0 to 5 V possible as special version

## Accessories

<b>Mounting accessories for</b>	<b>Order no.</b>
– Mounting bracket for wall mounting stainless steel (1.4301) (included in the scope of delivery)	1400-7432
– Wall and pipe mounting (2" pipes)	1400-6216
– Attachment to cast yokes acc. to NAMUR	1400-6217
– Attachment to valves with rod-type yokes according to NAMUR	1400-6218

## Pressure gauges for retrofitting

– Pressure gauge: 0 to 1.2 bar range	0080-0185
– Pressure gauge: 0 to 6 bar range	0080-0186
– Pressure gauge: 0 to 10 bar range	8520-0032
– For all pressure gauges: Screw fitting	0250-1090
– Male connector G 1/4 onto 4x1 mm hose, brass	8582-1452
– Male connector 1/4 NPT onto 4x1 mm hose, brass	8582-1523
– T-piece screw fitting for 4x1 mm hose, brass	8582-1480

# 1 Description

## 1.1 Application

The devices are used to convert a direct current input signal into a pneumatic signal for measuring and control. They are especially suitable as intermediate elements between electrical measuring devices and pneumatic controllers or between electrical control devices and pneumatic control valves.

The input is a load-dependent direct current from 4 or 0 to 20 mA or a DC voltage signal from 2 or 0 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).

## 1.2 Technical data

Type 6126-0	
Input	0(4) to 20 mA or 0(2) to 10 V (input resistance 30 k $\Omega$ ) Load $\leq$ 6 V (corresponds to 300 $\Omega$ at 20 mA, versions without electronics 200 $\Omega$ at 20 mA $\leq$ 4 V)
Output	0.2 to 1 bar (3 to 15 psi) with Types 6109 and 6112 i/p modules 0.4 to 2 bar (6 to 30 psi) with Type 6112 i/p module Special ranges up to 5 bar (75 psi) with Type 6112 i/p module
Air output capacity <sup>1)</sup>	2.0 m <sup>3</sup> /h at 0.6 bar output (0.2 to 1 bar) 2.5 m <sup>3</sup> /h at 1.2 bar output (0.4 to 2 bar)
Auxiliary power Supply air	Instrument air at least 0.4 bar above the upper signal pressure range value, maximum 5.4 bar without upstream pressure regulator
Air consumption <sup>2)</sup>	0.08 m <sup>3</sup> /h at 1.4 bar; 0.1 m <sup>3</sup> /h at 2.4 bar
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
Performance	Characteristic: Output linear to the input
Hysteresis	$\leq$ 0.3 % of final value, more accurate specifications on request
Deviation from terminal-based conformity	$\leq$ 1 % of final value, more accurate specifications on request
Influence in % of final value	Supply air: 0.1 %/0.1 bar Alternating load, supply air failure, interruption of input current < 0.3 % Ambient temperature: Lower measuring range value < 0.03 %/K, span < 0.03 %/K
Dynamic response (IEC 770)	Limiting frequency: 5.3 Hz Phase shift: $-130^\circ$
Effect of variable mounting position	Max. 3.5 %; $\pm$ 1 % when mounted horizontally with Type 6109 Max. 1 %; $\pm$ 1 % when mounted horizontally with Type 6112
Ambient temperature	$-25$ to $70$ $^\circ\text{C}$
Degree of protection	IP 54/IP 65
Materials	Enclosure: Die-cast aluminum, chromated, plastic coated, glass fiber reinforced polyamide, other parts made of corrosive-resistant material
Weight	Approx. 0.6 kg

<sup>1)</sup> Measured with 2 m hose 4 x 1 mm

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

### 1.3 Principle of operation

The converter consists of an i/p converter module and a connected volume booster. 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 proportional to the current, is balanced against the force of the dynamic back-pressure. The back-pressure is produced on the flapper plate (6) by the air jet leaving the nozzle (7). The air supply (SUPPLY 8) flows into the lower diaphragm chamber, during which a certain amount of air determined by the diaphragm position flows past the sleeve (9) to the output (OUTPUT 36). When the input current increases and, as a result, the

forces at the plunger coil increase as well, the flapper plate (6) moves closer to the nozzle (7). This causes the dynamic back-pressure and the cascade pressure  $p_K$  forming in front of the restrictor (8.2) to increase. The cascade pressure increases until it is equal to the input current. When the cascade pressure increases, the diaphragm (10) and the sleeve (9) are pushed downwards, causing the supply air to increase the output pressure  $p_A$  until a new state of equilibrium is reached in the diaphragm chambers. When the cascade pressure drops, the diaphragm moves upwards, releasing the sleeve and allowing the output pressure  $p_A$  to pass through the sleeve to be vented (EXHAUST port) until the forces at the diaphragm are equal again.

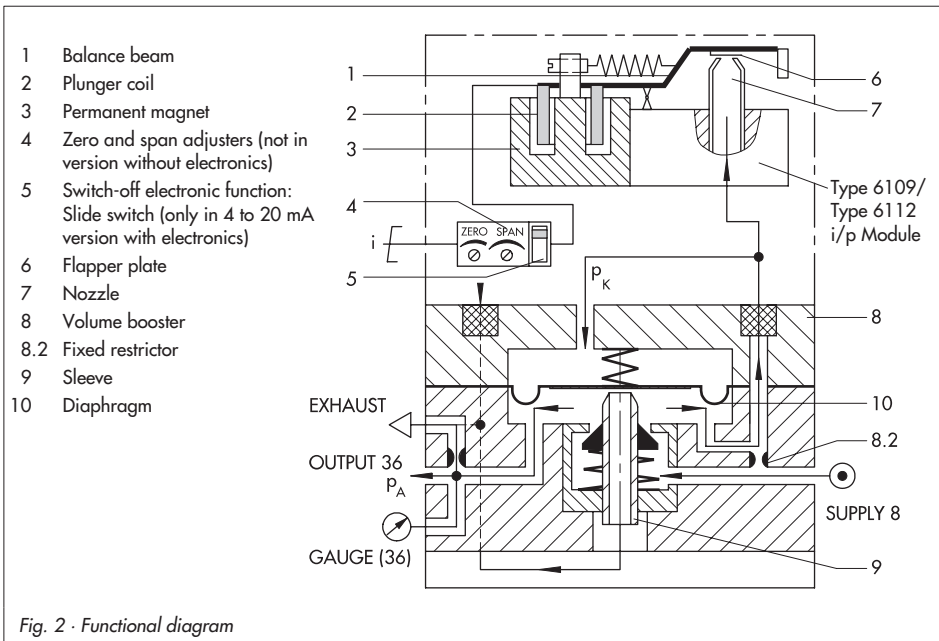
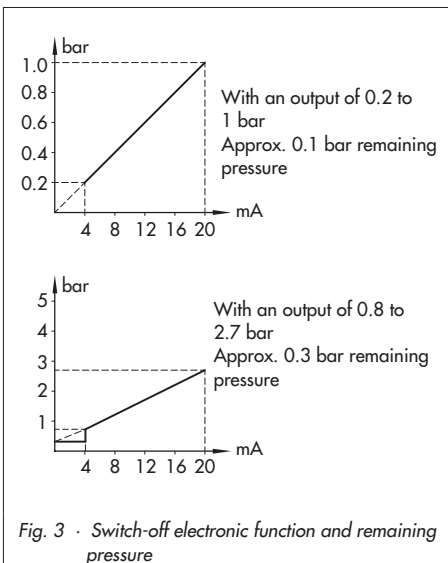


Fig. 2 · Functional diagram

### Switch-off electronic function

Devices with an input range of 4 to 20 mA have a slide switch which activates the switch-off electronic function. This function causes the input signal to be set to 0 mA when the switch point falls below a  $4.08 \pm$  tolerance. This function causes the pneumatic output to be vented up to approx. 100 mbar, ensuring, for example, the tight shut-off of a control valve. The function requires a characteristic which passes through zero as is the case, for example, for an output signal from 0.2 to 1 bar.

If the characteristic line does not pass through zero like, 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 electronic function is activated.



## 2 Installation

### 2.1 Mounting

The converter can be mounted to a wall, a pipe or directly to a control valve as illustrated 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 valve with cast yoke, order no. 1400-6217
- ▶ Attachment to valve with rod-type yoke, order no. 1400-6218

### Mounting position

Mount the device horizontally with the pressure gauge (or stopper plug) pointing upwards. If a different mounting position is used, the zero point must be readjusted for the 4 to 20 mA version with the switch-off electronic function.

For converters with a degree of protection IP 54, it is essential to direct the EXHAUST port downwards to face the floor.

### 3 Connections

#### 3.1 Electrical connection



*As far as the electrical installation of the device is concerned, the relevant national regulations governing the installation of electrical equipment and the national accident prevention regulations of the country of destination must be adhered to.*

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

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

1. Unscrew the fixing screw (1) of the connector plug and pull the plug insert (3) out of the plug base at the enclosure.
2. Pull the screw out of the plug and remove the seal (5).
3. Place a screwdriver at the recess (4) and lever the plug insert (3) out of the plug housing.
4. Run the wires for the input signal over the cable gland of the plug housing to the terminals of the insert marked 1 (+), 2 (-) and screw them down.

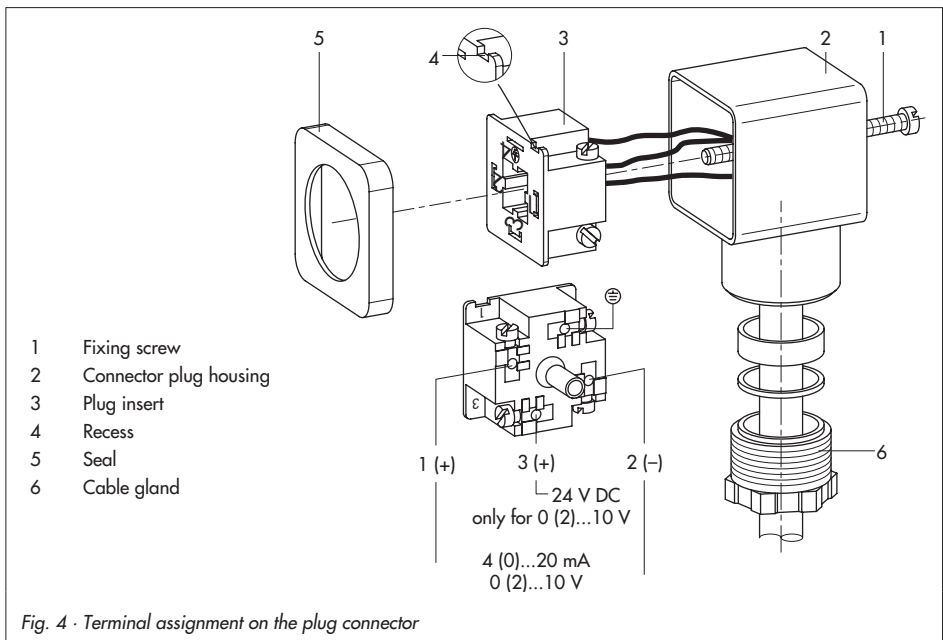


Fig. 4 - Terminal assignment on the plug connector

- For **voltage-to-pressure converters** additionally run the wire for the auxiliary power 24 V DC (+) to terminal 3.
  - **Current-to-pressure converters** do not require a supply voltage.
5. Push the insert into the plug housing, making sure that the cable gland points in the correct direction after the connector plug has been reassembled (the plug housing can be mounted in all four directions, turned at 90° angles around the insert).
  6. Plug the connector plug on the device and screw tight the screw (1).

### 3.2 Pneumatic connection

The connections for supply air (SUPPLY 8) and output air (OUTPUT 36) are designed as bores with G ¼ or ¼-18 NPT thread (see page 14).

#### Note:

*Customary male connectors for metal pipes or plastic hoses can be used. When extending the exhaust by connecting a pipe either to the exhaust angle piece or directly to the G or NPT connection, make sure that no water can enter at the end of the pipe. The pipe must have a sufficiently large cross-section area of at least  $28 \text{ mm}^2 = 6 \text{ mm}$  inside diameter.*

## 4 Operation

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/stopper 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 an input signal of 4 to 20 mA.

1. Unscrew the enclosure cover to access the **ZERO** and **SPAN** potentiometers on the printed circuit board.

#### Zero:

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

Should another value be indicated, readjust the zero point accordingly with the ZERO potentiometer.

**Span:**

6. Set the input signal to 20 mA using a suitable current source. The output signal at the test pressure gauge should indicate the upper range value of 1.0 bar. Should another value be indicated, readjust the span accordingly with the SPAN potentiometer.
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. Since the adjustments of zero point and span influence each other, check both values again and correct them, if necessary.
8. For 4 to 20 mA versions, reactivate the switch-off electronic function, at the switch (5).

**Note for voltage input signal:**

For voltage-to-pressure converters, proceed in the same way as already described. The pneumatic output signal from, for example, 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).

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

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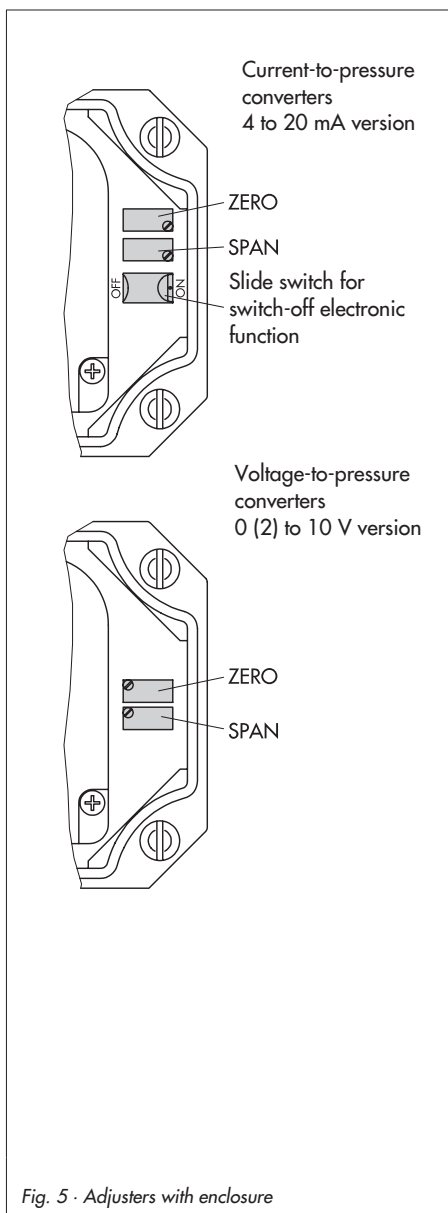


Fig. 5 · Adjusters with enclosure

## **5 Maintenance**

No particular maintenance steps are prescribed.

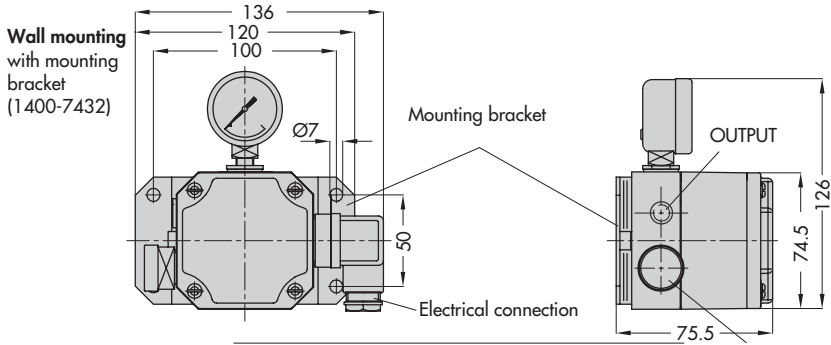
Proper functioning of the converter can only be guaranteed when the instrument air applied to the device is always clean. The air filter and separator of the pressure reducing station should be checked at regular intervals.

The pneumatic connections have filters with plastic rims (order no. 0550-0213) which can be unscrewed and changed or cleaned.

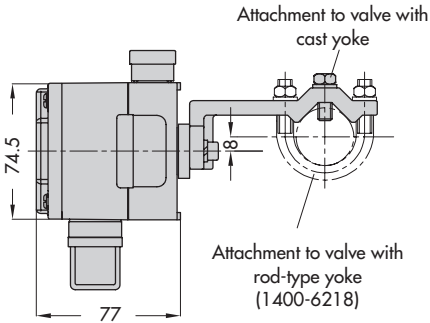
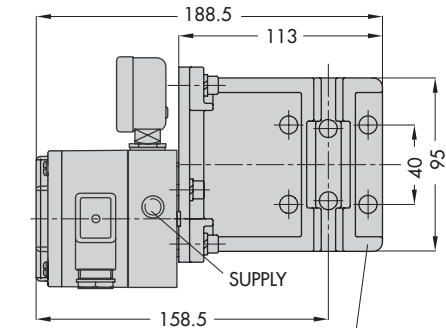
## 6 Troubleshooting

Problem	Possible cause	Countermeasure	Comments
No output signal despite changing the input signal	Supply air not connected	Check supply air connection, see section 3.2	
	Incorrect terminal assignment	Connect + and – terminals correctly, see section 3.1	<b>CAUTION!</b> <i>Current-to-pressure converter does not need any extra voltage!</i> <b>Do not connect 24 V DC!</b> Voltage-to-pressure converter requires a 24 V DC voltage supply! (see section 3.1)
	Incorrect input signal	Connect correct signal	See nameplate: 0 – 20 mA or 4 – 20 mA 0 – 10 V or 2 – 10 V
Converter constantly vents off air loudly	Connections for supply air and output at the converter mixed up	Check pneumatic connection, see section 3.2	
Converter does not reach 100 % output e.g. 20 mA input: Output only 70 % instead of 100 %	Supply air is too low	Supply air must be 0.4 bar greater than the max. output signal (supply air = 0.4 bar)	See nameplate: Output 0.2 – 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 in standard version, e.g. 20 mA, with split-range 12 mA)	<b>CAUTION!</b> <i>Current-to-pressure converter has a load of max. 6 V.</i> Check specification concerning control.

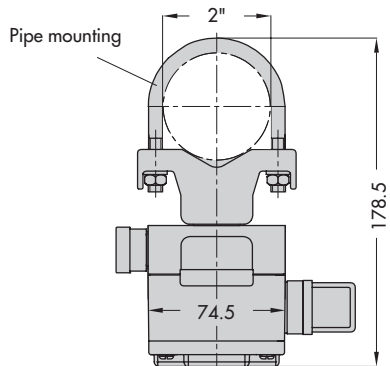
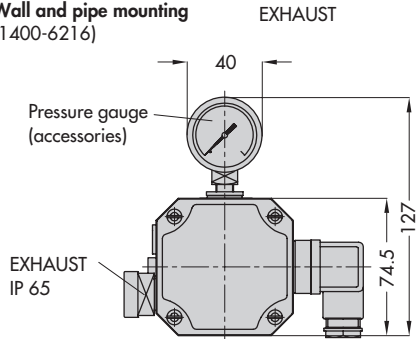
## 7 Dimensions in mm



**Mounting on a control valve with accessories (1400-6217)**



**Wall and pipe mounting (1400-6216)**







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