

In air ducts and processes

# MEASUREMENT OF VOLUME FLOWS

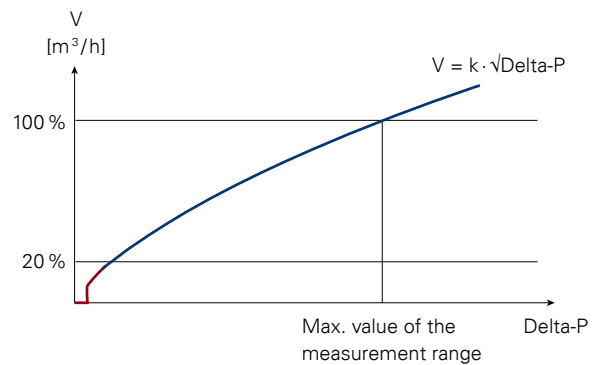
# VOLUME FLOW MEASUREMENT

In building and process technology, it is necessary to measure the quantities of air flowing into rooms or processes or being circulated in the plant. The quantity of air transported in a given period of time is known as the volume flow (most common unit: m<sup>3</sup> or ft<sup>3</sup> per hour). Accuracy to the last decimal point is usually not critical in these applications. The key features are reliability, robust build quality and good value for money.

The most commonly used method of measuring volume flows is based on the principle of differential pressure. This has a number of specific advantages:



- low investment costs, especially for ducts with medium or large cross-sections
- minimal calibration costs
- process technology: Also suitable for use in plants where the temperature deviates significantly from the room conditions

The differential pressure method of measuring volume flow cannot accurately record very small volume flows. These low measurement values are therefore suppressed (*creep suppression*), e.g. the lowest 3% of the differential pressure measurement range. However, in typical air conditioning and ventilation systems, as well as in most process technology plants, the volume flows lie between 20 and 100% of the maximum measurement range so this does not result in any significant limitations.



## SUITABLE DEVICES

halstrup-walcher offers a selection of high quality pressure transmitters with root extracted output. Please select a primary element to complete the measurement point (see p.40). To ensure that the theoretical design of the measurement equipment matches the practical application, we offer calibration of the complete system in our flow rate calibration laboratory (see p.43) – with a factory calibration or DAkkS calibration certificate.

Product	P26	P34	P29
Details on	p. 16	p. 17	p. 18
			
Special feature	Scalable, large selection of units	Similar to P26, specifically designed for the control cabinet	Similar to P26, can be used in applications with natural gas
Volume flow & Differential pressure	✓	✓	✓
Volume (consumption)	✓ (optional, see p.40)	-	-
Accuracy	✓✓	✓✓	✓✓
Pressure / temperature compensation	-	✓ (optional: Absolute pressure sensor on board, temperature analogue input)	-
20-point curve	-	✓ (can be stored)	-

## CONVERSION TABLE

	m <sup>3</sup> /h	m <sup>3</sup> /min	ft <sup>3</sup> /h	ft <sup>3</sup> /min
m <sup>3</sup> /h	1	0.0167	35.3147	0.5886
m <sup>3</sup> /min	60	1	2 118.8800	35.3147
ft <sup>3</sup> /h	0.0283	0.0005	1	0.0167
ft <sup>3</sup> /min	1.6990	0.0283	60	1

Please read the lines from left to right.  
Example: 1 m<sup>3</sup>/h corresponds to 35.3147 ft<sup>3</sup>/h.

## SELECTION OF THE PRIMARY ELEMENTS

The primary element can be redesigned and supplied by halstrup-walcher. In addition, our differential pressure transmitters can be coupled with an existing, pre-installed primary element. Talk to us. Here is a short description of the process and the information we need:

### Complete package of primary element and differential pressure transmitter from halstrup-walcher:

- Customer data: max. volume flow [ $\text{m}^3/\text{h}$  or  $\text{ft}^3/\text{h}$ ] and air duct dimensions (width x height or diameter)<sup>1)</sup>
- halstrup-walcher: Selection of the differential primary element, calculation of the max. differential pressure, selection of the appropriate measurement range for the differential pressure transmitter

<sup>1)</sup> **Process technology:** Please also state the air temperature and pressure.

### Pre-installed primary element + differential pressure transmitter:

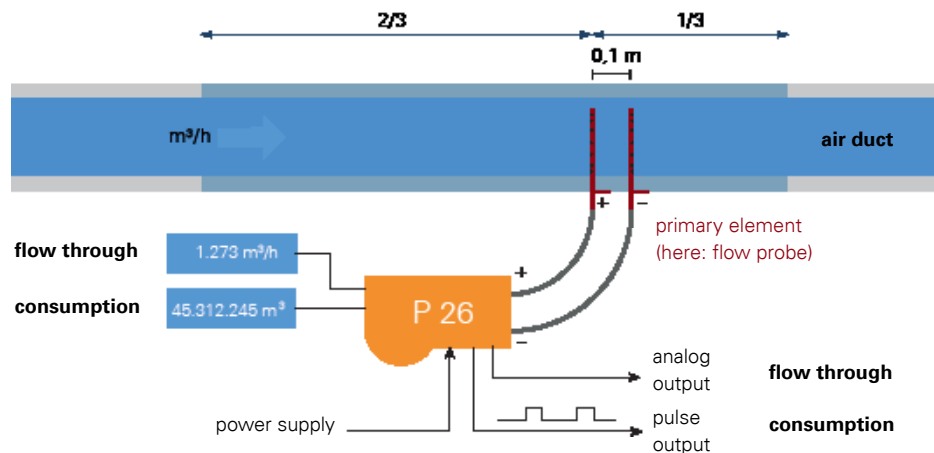
- Customer data: max. volume flow [ $\text{m}^3/\text{h}$  or  $\text{ft}^3/\text{h}$ ] and the associated max. differential pressure<sup>1)</sup>
- halstrup-walcher: selection of the differential pressure transmitter measurement range over this max. differential pressure value

## P 26 AIR METER/MEASUREMENT OF AIR CONSUMPTION

It is very rare to calculate the consumption data for the individual users of an air-conditioning system. Costs are often assigned by dividing the total costs by the area occupied by the respective tenant. For example, if a tenant rents 23 % of the total area, he will also pay 23 % of the air-conditioning costs. Particularly in commercial properties with a number of tenants, air consumption is often viewed in the same way as other consumables (electricity, water).

There is a need for a fairer assignment of costs based on actual consumption. The same applies to industrial companies with an energy management system.

The P 26 air meter takes the following approach: Based on the volume flow measurement using the principle of differential pressure, the P 26 air meter adds up and displays the volumes consumed ( $\text{m}^3$  of air) and makes the data available via a pulse output.



### AIR METER FEATURES

- Security: code-protected function, no unauthorised operation
- The total consumed (and a meter recording the operating hours) can be reset after entering a code either to zero or to a "total before reset" saved as a backup.
- The pulse valency ( $\text{m}^3$  per pulse), pulse length and pulse interval can be set separately
- An internal meter recording the operating hours provides a time reference – operational security without batteries.

Technical data P26 and order code: see p. 16.



Measurement ranges (also ± measurement ranges) others available upon request	10/50/100/250/500 Pa 1/2.5/5/10/20/50/100 kPa freely scalable from 10..100 % within a measurement range
Margin of error (0.3 Pa margin of error for the reference)	± 0.2 % or ± 0.5 % of max. value
Temperature coefficient span	0.03 % of max. value/K (10..50 °C)
Temperature coefficient zero point	± 0 % (cyclical zero-point correction)
Max. system pressure/ Overload capacity	600 kPa for measurement ranges ≥ 2.5 kPa 200 x for measurement ranges < 2.5 kPa
Medium	air, all non-aggressive gases
Sensor response time	25 ms
Time constants	25 ms..40 s (adjustable)
Operating temperature	10..50 °C
Storage temperature	-10..70 °C
Power consumption	approx. 6 VA
Weight	approx. 750 g
Cable glands	3 x M 16
Pressure ports	for tubing NW 6 mm, others available on request
Protection class	IP 65, with USB: IP 40
Certificates	CE

Output (linear/ root-extracted) <sup>1)</sup>	A
0..10 V (R <sub>L</sub> ≥ 2 kΩ)	1
0..20 mA (R <sub>L</sub> ≤ 500 Ω)	0
4..20 mA (R <sub>L</sub> ≤ 500 Ω)	4
± 5 V (R <sub>L</sub> ≥ 2 kΩ)	5

<sup>1)</sup> output signals can be configured freely

Power supply	B
24 VAC/DC ± 10 %	24ACDC
24 VAC + 6 % (with galvanic separation)	24AC
230/115 VAC - 15 %	230/115

Measurement range	C
Measurement range e.g. 0..10 Pa, -10..50 mbar, ± 100 mmHg (etc.)	

Margin of error	D
± 0.2 % of max. value	2
± 0.5 % of max. value	S

Display + keyboard	E
none	0
multi-coloured LCD and keyboard	LC

Contact points	F
none	0
air meter	1
2 relays (changeover contacts) max. 230 VAC, 6 A	2

Data interface	G
none	0
USB (data cable supplied)	U0
External zero-point calibration	0X
External zero-point calibration and USB (data cable supplied)	UX

Order code	A	B	C	D	E	F	G
P 26	-	-	-	-	-	-	-

Can be pre-set on request:  
Time constant, relay parameter, analogue output root-extracted / linear, deactivation of the cyclical zeroing

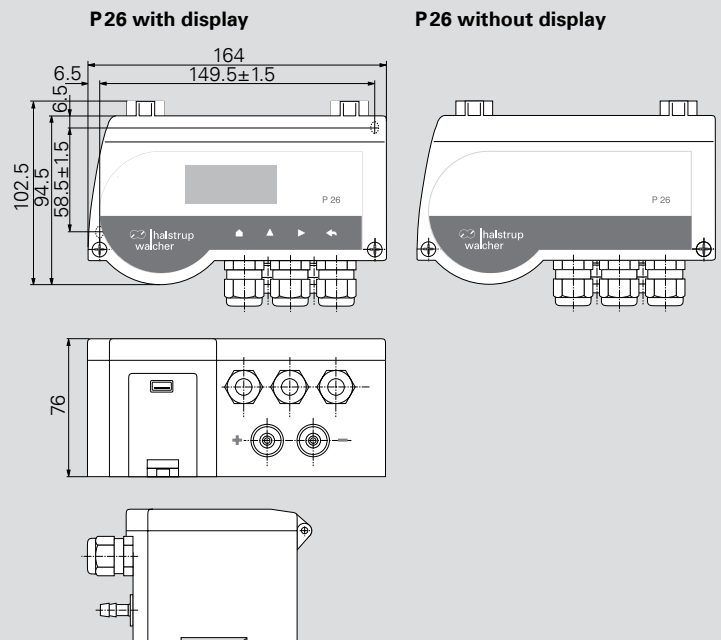


### Features

- High precision differential pressure transmitter for air-conditioning, cleanroom and process
- Top-hat rail or wall mounting
- Wide range of units for pressure and volume flow
- Also ± measurement ranges
- Scalable measurement ranges and units
- Zero-point correction prevents zero-point drift
- Built-in valve provides a high level of overpressure protection
- Multilingual menu (English/French/German/Italian)

### Optional

- Contact points with adjustable switching outputs
- Set the zero-point via an external interface
- USB interface (free parameterisation software at [www.halstrup-walcher.de/en/software](http://www.halstrup-walcher.de/en/software))
- Air meter function (see p. 39)



Measurement ranges others available upon request	250/500 Pa 1/2.5/5/10/20/50/100 kPa freely scalable from 10..100 % within a measurement range
Margin of error (0.3 Pa margin of error for the reference)	±0.2 % of max. value or ±0.5 % of max. value
Temperature coefficient span	0.03 % of max. value/K (10..50 °C)
Temperature coefficient zero point	±0 % (cyclical zero-point correction)
Overload capacity	100 kPa for measurement ranges ≥ 2.5 kPa 200 x for measurement ranges < 2.5 kPa
Medium	natural gas
Max. system pressure	100 kPa for all measurement ranges
Sensor response time	25 ms
Time constants	25 ms..60 s (adjustable)
Operating temperature	10..50 °C
Storage temperature	-10..70 °C
Power consumption	approx. 6 VA
Weight	approx. 750 g
Cable glands	2 x M 16
Pressure ports	2 x laboratory nozzle DIN 12898
Protection class	IP 65
Certificates	CE, EN1127-1:2007

Output (linear/ root-extracted) <sup>1)</sup>	A
0..10 V ( $R_L \geq 2 \text{ k}\Omega$ )	1
0..20mA ( $R_L \leq 500 \Omega$ )	0
4..20mA ( $R_L \leq 500 \Omega$ )	4
±5 V ( $R_L \geq 2 \text{ k}\Omega$ )	5

<sup>1)</sup> output signals can be configured freely

Power supply	B
24 VDC ± 10 %	24 DC

Measurement range	C
Measurement range e.g. 0..250 Pa, 0..100 mmHg (etc.)	

Margin of error	D
±0.2 % of max. value	2
±0.5 % of max. value	S

Display + keyboard	E
none	0
multi-coloured LCD and keyboard	LC



Tubing connections	F
standard for tubing NW 5..8 mm	0
cutting ring coupling 8 mm	S

Order code	A	B	C	D	E	F
P 29						

Can be pre-set on request:  
Time constant, relay parameter, analogue output root-extracted / linear, deactivation of the cyclic zeroing

### TÜV-tested

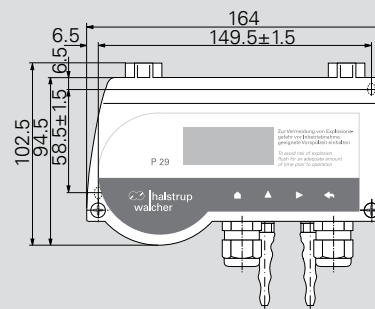
As long as the customer observes the specified flushing process, special electronic encapsulation safely separates any ignition sources from flammable gas.



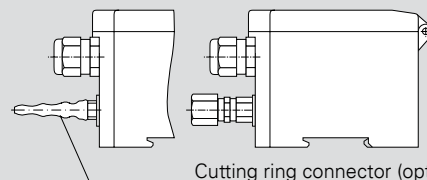
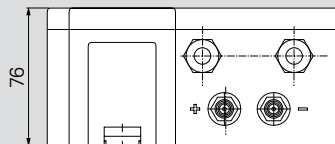
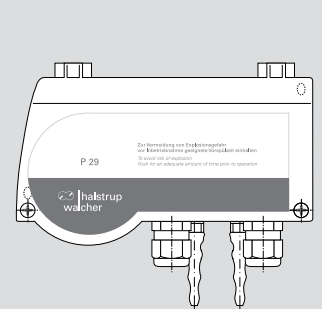
### Features

- TÜV-tested differential pressure transmitter for natural gas
- Design changes and technical modifications keep ignition source and gas mixture safely separated (not suitable for Ex-applications)
- Scalable measurement range and display
- For pressure and volume flow measurement
- Zero-point correction prevents zero-point drift
- Built-in valve provides a high level of overload protection
- Also suitable for top-hat rail mounting
- Multilingual menu (English/French/German/Italian)

P 29 with display



P 29 without display



Laboratory nozzle in accordance with DIN 12898



### Measured data differential pressure

Measurement ranges (also ± measurement ranges) others available upon request	10/50/100/250/500 Pa 1/2.5/5/10/20/50/100 kPa freely scalable from 10..100 % within a measurement range
Margin of error (0.3 Pa margin of error for the reference)	±0.2 % of max. value (for measurement ranges ± 50 kPa) or ±0.5 % of max. value
Temperature coefficient span	0.03 % of max. value/K (10..50 °C)
Temperature coefficient zero point	±0 % (cyclical zero-point correction)
Max. system pressure/ Overload capacity	400 kPa measurement ranges ≥ 2.5 kPa 200 x measurement ranges < 2.5 kPa
Medium	air, all non-aggressive gases
Sensor response time	25 ms
Time constants	25 ms..60 s (adjustable)
Operating temperature	10..50 °C
Storage temperature	-10..70 °C
Power consumption	approx. 6 VA
Weight	approx. 450 g
Connections	Screw terminals (connection capacity 0.25..2.5 mm <sup>2</sup> )
USB interface	USB 2.0 Full-Speed Slave (Mini USB)
Pressure ports	for tubing NW 4 or 6 mm
Protection class	IP20

### Measured data for P-/T-compensated volume flow (optional)

Measured range absolute pressure	200 kPa
Accuracy absolute pressure	±2.0 % of max. value
Temperature input	4..20 mA, R <sub>i</sub> = 130 Ω Temperature range freely scalable

### Power supply

24 VAC/DC ± 10 %

Output (linear/ root extracted) <sup>1)</sup>	A	Measurement range	B
0..10 V (R <sub>L</sub> ≥ 2 kΩ)	1	Measurement range e.g. 0..10 Pa, -10..50 mbar, ±100 mmHg (etc.)	
0..20 mA (R <sub>L</sub> ≤ 500 Ω)	0		
4..20 mA (R <sub>L</sub> ≤ 500 Ω)	4		

<sup>1)</sup> output signals can be configured freely

Margin of error	C	Contact points	D
±0.2 % of max. value <sup>2)</sup>	2	none	0
±0.5 % of max. value	5	2 relays (changeover contacts) max. 230 VAC, 6 A	2

<sup>2)</sup> for measurement ranges ± 50 kPa

Application	E
standard	A
P-/T-compensated volume flow	B

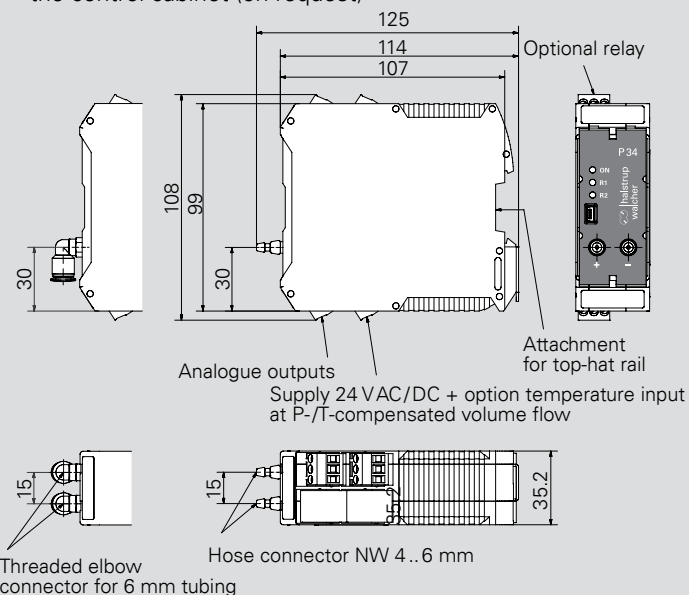
Tubing connectors	F
standard grommet for NW 4 or 6 mm tubing	0
threaded elbow connector for 6 mm tubing	W

Order code	A	B	C	D	E	F
P34	-	-	-	-	-	-

Can be pre-set on request:  
Time constant, relay parameter, analogue output root-  
extracted / linear, deactivation of the cyclic zeroing

### Features

- Differential pressure transmitter with very small dimensions – ideal for control cabinet installation
- Optional: P-/T-compensated volume flow (temperature analogue input and internal stat. pressure sensor)
- Optionally with relay
- Zero-point correction prevents zero-point drift
- Built-in valve provides a high level of overpressure protection
- Volume flow can be configured via k-factor,  $dP_{max}/V_{max}$  or 20 individual values
- USB interface<sup>2)</sup>: via PC-software scaling, characteristic line form and many other parameters can be set
- Free software available at [www.halstrup-walcher.de/en/software](http://www.halstrup-walcher.de/en/software)
- Delivery possible already completely integrated into the control cabinet (on request)



<sup>2)</sup> Accessories: USB cable (Order no. 9601.0254)