

# Application Report Flow Sensors

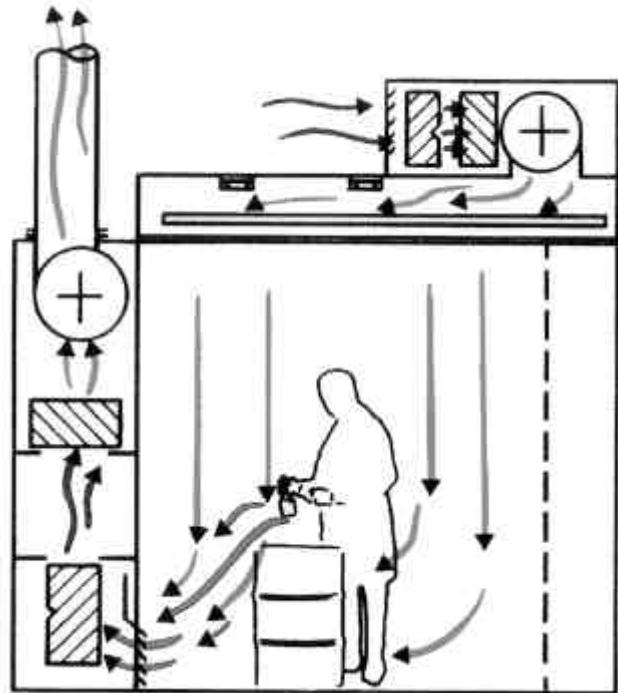
## Laminar Flow Workspace

### Description of the application:

A continuous air flow from the ceiling to the floor ensures that pollutants evaporating during the manufacturing process are kept away from the operator and are removed from the room through a duct.

If the air flow falls below a minimum level, an alarm signal is given thus forcing the operator to exit from the dangerous area.

Depending on the type of pollutant the exhaust air may be lead back after being filtered or may be exhausted completely after having been treated.



### Task of the sensor:

Measuring of the speed of the laminar air flow (measuring range 0,1 to 1 m/s).

### Sensor type used:

SS 20.501  
0..1 m/s      160 mm  
0..20 mA

### Location of the sensor:

Either in the incoming air tube or under the ceiling at the air outlet.

### Reason to choose a SCHMIDT sensor:

- Can even detect lowest air speeds
- Highly precise measurements with high repeatability
- Linear output signal
- Built in signal converter
- Good performance/price ratio

### Branch:

Cleanroom

# Application Report

## Flow Sensors

### Flowbox

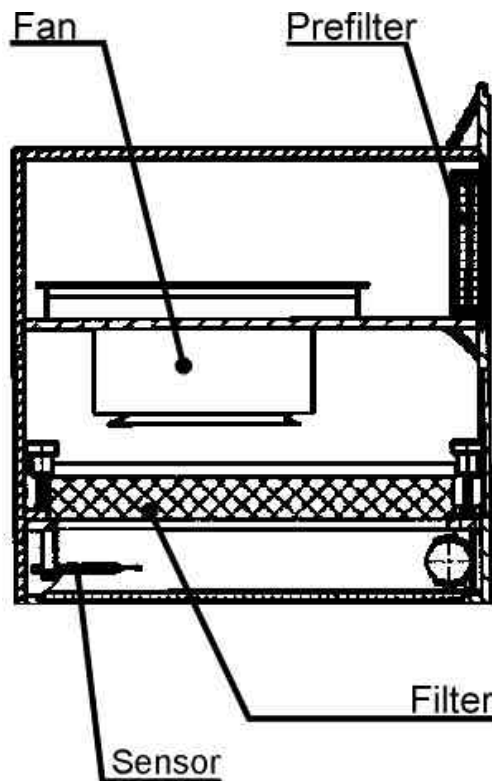
#### Description of the application:

The Flowbox is a fan unit for a cleanroom application, in this case a wet cleaning cabinet for silicon wafers.

The Flowbox creates a laminar air flow inside the cleaning cabine. This laminar air flow directly influences the cleaning process and effects the security of the installation.

The flow speed normally lies within a range of 0,3 to 0,45 m/s

The air speed deviation must be less than 10% of the selected value. If the selected air speed can not be achieved, this indicates that the filter is soiled and must be replaced immediately.



#### Function of the sensor:

Measuring of the speed of the laminar air flow. (Measuring range 0,1 to 1 m/s)

#### Location of the sensor:

Under the filter.

#### Branch:

Cleanroom

#### Sensor type used:

SS 20.502  
0..1 m/s      90 mm  
0..10 V

#### Reasons to choose a SCHMIDT sensor:

Was the best in a comparison test made by the customer.

Can even detect lowest air speeds

Highly precise measurements with high repeatability

Linear output signal

Signal transformer integrated

# Application Report Flow Sensors



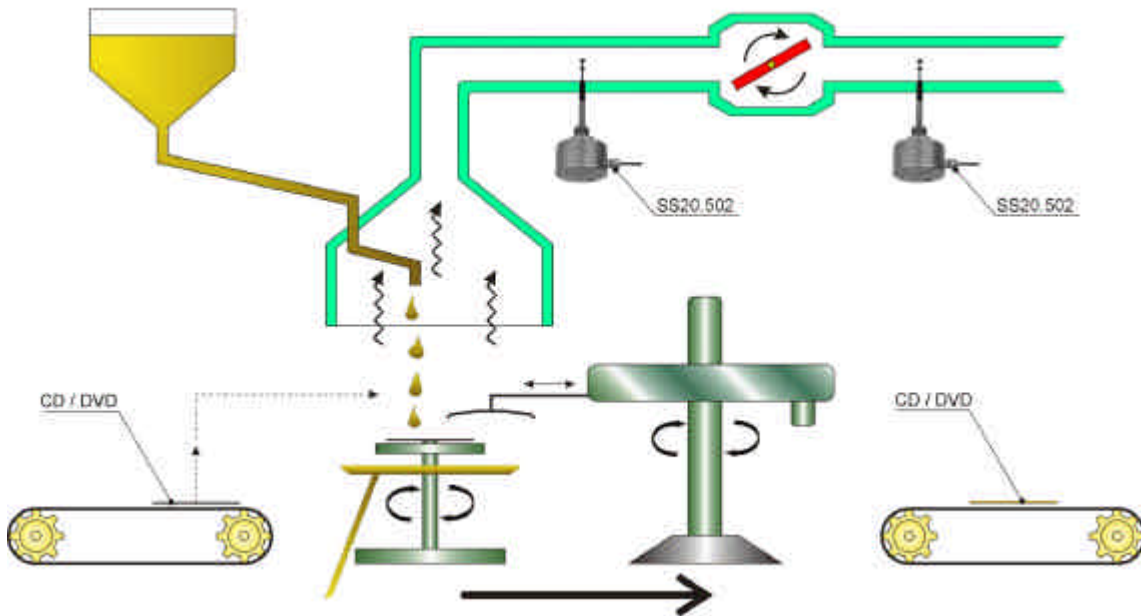
## Notices:

This application is very similar to Filter Fan Modules. FFMs are a standardized components with standardized sizes, which are used to build

- ◆ Flowboxes
- ◆ Laminar Flow Workspaces

Clean Workbenches.

## CD Coating



### Description of the application:

During the manufacturing process of a CD-R there is one step called Dye Coating. The application of the dye has to be done under absolute clean air and a continuous air stream is used to accelerate the drying process and to take away the evaporating solvent. The air speed must be very accurate in order to get a constant result of the coating process especially the thickness of the dye. Deviations in air speed may lead to products with bad or unusable characteristics. The air speed signal of the SCHMIDT sensor is used to control the air speed.

### Function of the Sensor:

Measuring of the speed of the drying air flow. The air speed indication is done via operating panel of the machine

### Location of the Sensor:

In the exhaust air tube.

### Branch:

Cleanroom / CD replicators

### Sensor type used:

**SCHMIDT® SS 20.502**  
0..20 m/s      160 mm remote tip  
0..10 V

### Reasons to choose a SCHMIDT sensor:

- Highly precise measurements with high repeatability
- Sensor resistant against used solvent
- Linear output signal
- Remote tip ideal for mounting

### Ground-air purification station

#### Description of the application:

When ground is contaminated with volatile substances like solvents and others this machinery is used to clean the ground by sucking of the ground-air and purifying the air.

Stacks are drilled in the earth from where the air is guided by tubes to an extraction system. Blowers suck off the air and conduct it to the purifier, which may be an active carbon filter or a catalyst. These plants are operated for many years until the contamination is reduced to an acceptable value.

Purification plants consist of different components, where each one is suited to extract certain contaminants. Air flow sensors are not only used in the ground-air suck off tubes, but may also be found in :

- Air Intake of Catalysts
- Air Intake of Strippers



#### Function of the Sensor:

Metering the volume of sucked off air. The flow rate is continuously adapted to the contamination quota of the ground-air. The registered ground-air volume together with the contamination analysis is a scale for the purification work done.

#### Location of the Sensor:

In the extraction channel in front of the blower.

#### Branch:

Environmental / Plant construction

#### Sensor type used:

**SCHMIDT<sup>®</sup> SS 20.502**  
0..20 m/s      90, 160 mm  
0..10 V

#### Reason to choose a SCHMIDT Sensor:

- Sensor resistant against pollutants in the air
- High operating life since no moving parts.
- Precise measurement with high repeatability
- Linear output signal
- Simple and cost efficient install

# Application Report Flow Sensors

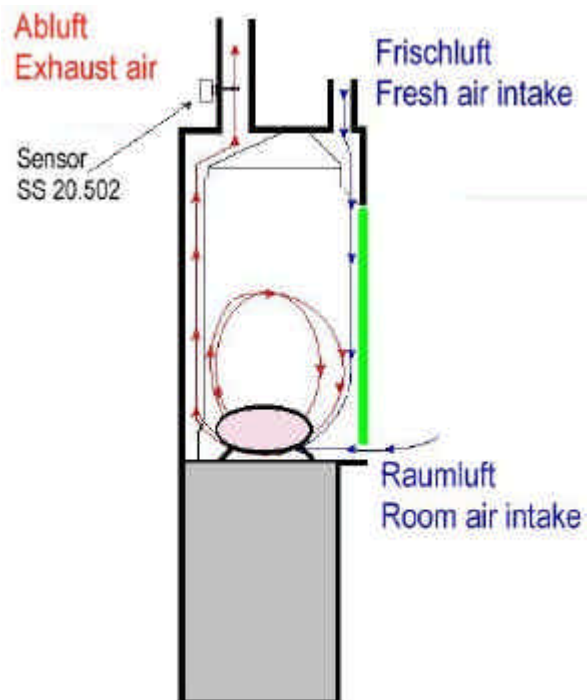
## Laboratory exhaust air

### Description of the application:

The work with dangerous material in laboratories take place in closed lab cabinets in order to protect the workers.

The air will be sucked off the lab cabinet permanently to prevent harmful substances from seeping into the working area. The quantity of the sucked off air will be adjusted to avoid energy waste and draught.

To avoid dangerous situations when exhaust air is too low, the exhaust air flow is monitored permanently with **SCHMIDT** Flow Sensors.



### Function of the Sensor:

Measuring of the volume flow or air velocity of the contaminated air sucked off. (measuring range from 0,1 to 1 m/s)

### Sensor type used:

SS 20.502  
0..1 m/s      160 mm  
0..20 mA

### Location of the Sensor:

direct in the exhaust air duct

### Reason to choose a SCHMIDT Sensor:

- measure smallest air velocities
- Sensor resistant against chemicals
- Precise measurement with high repeatability
- Linear output signal
- Built-in signal converter

### Branch:

Plant construction / laboratory technologie

ApplicationReport\_SS\_05\_LabExhaust.doc

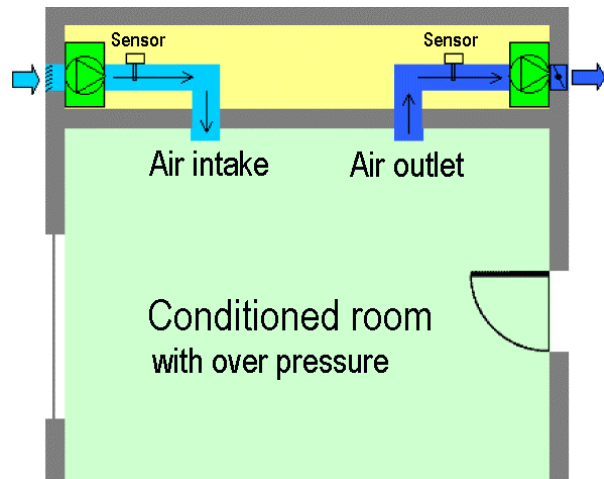
### Ventilation control

#### Description of the application:

A printing room is ventilated in that way, that a continuous over-pressure is created in order that no dusty air may intrude from neighbour rooms.

For this purpose as well the air inlet as also the exhaust air have their separate ventilator each having it's own control.

The measurement of the volume flow in air intake and exhaust air are separately measured with a **SCHMIDT® air flow sensor SS 20.01**. The volume flow control is done using a Siemens S7 PLC, which also includes the algorithm to linearize the output signal of the SS 20.01.



#### Advantage of this solution:

Stable and continuous flow rate not disturbed by sudden pressure losses as caused by door opening. Integrated control for humidity and temperature.

#### Function of the Sensor:

Measuring of the air velocity of air inlet and exhaust air.  
(measuring range 0,1 to 20 m/s)

#### Sensor type used:

SS 20.01  
160 mm

#### Location of the Sensor:

In the air duct between air intake with filter and ventilator.

#### Reason to choose a SCHMIDT Sensor:

- Large turn down ratio of air velocity
- Highly precise measurements with high repeatability
- Quick response time, fitting well to control characteristic.

#### Branch:

HVAC

ApplicationReport\_SS\_06\_VentControl.doc

# Application Report Flow Sensors



## Ventilation Control in Cattle Barns

### Description of the application:

In livestock husbandry it is necessary to keep the barns ventilated using electric ventilators.

Due to climatic influences the ventilation air flow fluctuates, which must be compensated by the means of a volume-flow controller.

The air-flow sensor in the exhaust-air duct measures the volume flow and the connected controller keeps exhaust-air flow on the required level.

As surveys show, a correctly adjusted ventilation is very important for the health of the animals and additionally it saves a lot of energy.

The advantage of the SCHMIDT thermal air-flow sensor shows best during winter times. Then the air-flow is kept at a level, where other measuring systems do no longer work.



### Function of the Sensor:

Measures volume-flow of exhaust air.  
Exhaust-air is controlled by a specialised control, which adopts exhaust-air to need.

### Location of the Sensor:

Exhaust-air duct.

### Branch:

Ventilation in agriculture

### Sensor type used:

**SCHMIDT® SS 20.011 or SS 20.016**

0..20 m/s      360 mm

0..10 V

### Reason to choose a SCHMIDT Sensor:

- Sensor withstands aggressive contents in the exhaust air
  - Measures smallest possible velocities
  - No flow resistance, saves ventilator power
- Dust repellent surface

# Application Report Flow Sensors



## Biological Waste Treatment

### Description of the application:

To reduce the volume of household waste the organic components will be washed out by a bio-mechanical method called BIOPERCOLAT method. For this the garbage is hacked and then overflowed with water. The water washes out the biological components which afterwards are reduced by aerobic bacteria (called Perkolation process).

This bacteria need air for their live wich is injected through lances. The fresh air volume flow must be supervised, since it is of high influence to the efficiency of the process. Additionally this exact regulation saves energy.

The output of the SCHMIDT flow sensor is connected to an on-site volume flow display and at the same time connected to a PLC, which monitors and controls the flow rate of the fres air injection lances.



Sensor SS 20.60 in right main pipe



On-site display of volume flow

### Function of the Sensor:

Measurement of volume flow in the main pipes of fresh-air intake to the Percolator.

### Location of the Sensor:

Main air pipes DN 150.

### Branch:

Plant construction / Environmental technology

### Sensor type used:

**SCHMIDT® SS 20.60**  
0..40 m/s, 180 mm, 4..20 mA

### Reasons to choose SCHMIDT:

- Simple and quick mounting
- No pressure loss
- Goor price / performance ratio

ApplicationReport\_SS\_08\_BioWaste.doc

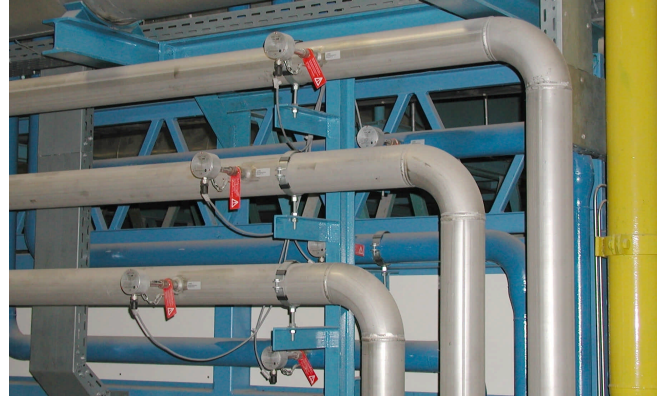
# Application Report Flow Sensors

## Ceramic Kiln

### Application:

In high precision kilns for technical ceramics the customers require a very precise regulation of the temperature profile over a very high power range. To reach this goal, this SCHMIDT customer has selected the SCHMIDT Flow Sensor SS 20.60 to measure the mass flow of the combustion air. This allowed him to regulate the air / fuel ratio very precise over a control range never reached before.

Additionally he has also placed the SCHMIDT sensor in the ducts for the inert gases, who prevent the expensive content of the oven chamber to oxidise.



The air intake is equipped with a battery of SS 20.60 sensors.



The nitrogen is also measured by SS 20.60 sensors.

### Function of the Sensor:

Mass flow measurement of combustion air and inert gas

### Sensor type used:

**SCHMIDT<sup>®</sup> SS 20.60**  
0..20 m/s, 4..20 mA

### Location of the Sensor:

Air intake ducts of burners and supply ducts of inert gas (diameters 2 inch to 30 inch / DN 50 to DN 800)

### Reason to choose a SCHMIDT Sensor:

- High turn-down ratio 1:300
- Simple and low-cost mounting
- No pressure loss
- One sensor for different pipes

### Branch:

Plant construction / Kilns

## SCHMIDT® Flow Sensors for Applications in Cleanrooms

### Product Advantages

- ✱ Design matches GMP. No edges, smooth and minimized surface
- ✱ Desinfectible by alcohol and H<sub>2</sub>O<sub>2</sub>
- ✱ Long term stable signal over years
- ✱ Specialised on smallest flow velocities starting at 0,05 m/s
- ✱ Calibration Certificate according ISO 9001 available on request.
- ✱ Released for use in GMP environments from leading manufacturers.

### Range of Sensors for Cleanrooms



SCHMIDT® FlowSensor SS 20.400

#### The Sensor with Direction detection

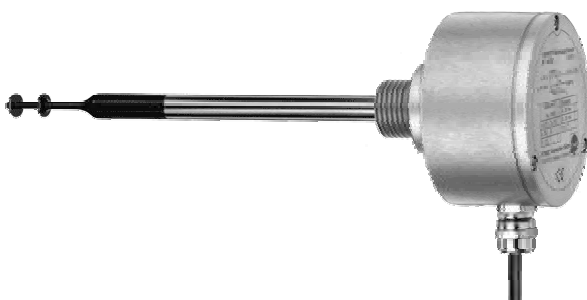
- ✱ With direction detection and bidirectional measuring
- ✱ Electronic integrated in sensor tube
- ✱ Special versions for LF monitoring available



SCHMIDT® Flow Sensor SS 20.515 / 516

#### The Unique Laminar flow Sensor

- ✱ Special Ceiling Mounting, fitting to nearly every frame system
- ✱ Ideal measuring range 1m/s
- ✱ Industry Standard output signals 0..20 mA, 4..20 mA, 0..10 V



SCHMIDT® Flow Sensor SS 20.501 / 502

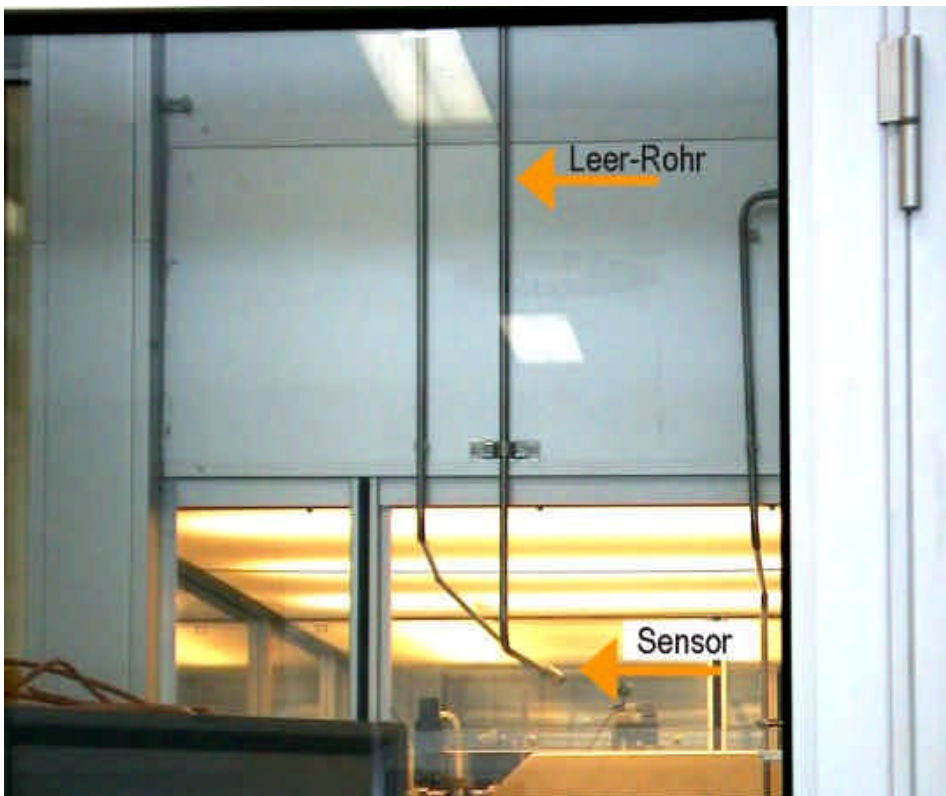
#### The Universal Cleanroom Sensor

- ✱ Universal for Laminar Flow or In-duct measurement
- ✱ Compact sensor or remote sensor Tip
- ✱ Measuring ranges 1 m/s to 35 m/s

## Examples of successful Applications



**Laminar-flow Monitoring SS 20.502** under LF-Ceiling.  
The transformer is mounted in the false ceiling.



Special mounting over filling station with low positioned **Flow-Box**.

# Application Report Flow Sensors

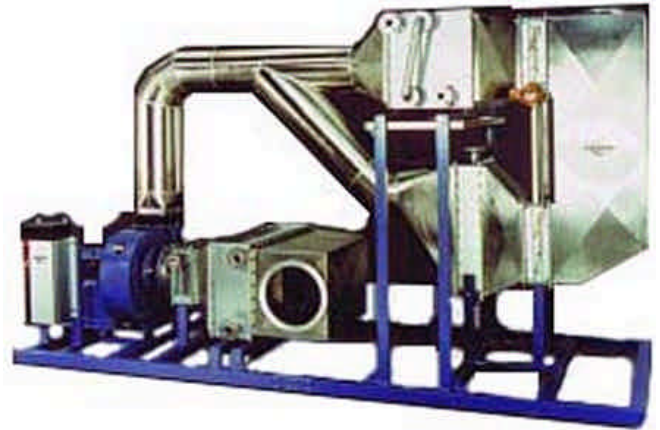


**SS 20.501 in the Isolator** of a filling station for fluid pharmaceuticals. Right picture shows complete filling station.



**Over-pressure monitoring** between two rooms of different zones by measuring the flow through an overflow duct with SS 20.400 mounted in front of the duct.

# Application Report Flow Sensors



**GMP Coating Machine** for pharmaceuticals with sensor SS 20.60 (not shown in picture) used for volume-flow control in air-intake.



**Wafer cleaning machine** where the sensor SS 20.502 is used for control of volume-flow in a flow box. (not shown in picture)

## SCHMIDT® Flow Sensors for Compressed-Air Consumption Measurement

### Product Advantages

- ✱ Direct measurement of normal volume flow
- ✱ High turn-down ration up to 1:800
- ✱ Minimum pressure loss
- ✱ One sensor type for several pipe diameters
- ✱ Retroactive mounting in existing pipes
- ✱ For pressure up to 16 bar

### Range of Products



SCHMIDT® FlowSensor SS 20.60

#### The economic solution for every pipe

- ✱ For pipes from 1 to 40 inches
- ✱ Easy and quick installation



SCHMIDT® Flow Sensor SS 20.60 FB

#### The automation solution

- ✱ Fieldbus-Interfaces  
Profibus DP or DeviceNet
- ✱ Sensor calculates mass-flow in user selected unit:  $m^3/h$ , scfm, l/s and others



SCHMIDT® Display Module SS 20.031

#### The clever display

- ✱ Easy on-site programming
- ✱ Calculates Flow rate and total consumption

# Application Report Flow Sensors



## Examples of successful installations



**Measuring pipe with SS 20.60 at [Swarovski AG](#) (Austria) with a clever bypass solution.**



**Consumption Monitoring at printing plant “Freiburger Druck” with SCHMIDT SS 20.60. Picture showing view of printing machinery.**

## Application Report Flow Sensors



**Compressor room** of the company [Glatt](#), a manufacturer of pharmaceutical machines. The SCHMIDT sensor SS 20.60 is mounted in a pipe at the ceiling (not visible).



**Monitoring the breathing air** in a tunnel construction project of the Underground in Barcelona in conjunction with the drilling machines of the company [Herrenknecht](#)

# Application Report Flow Sensors



**Nitrogen tank** at a manufacturer of machine needles where 16 sensors SCHMIDT SS 20.60 are used for consumption measurement of nitrogen.



**SCHMIDT SS 20.60 FB with Profibus Interface** at the nitrogen intake pipe (diam. 700 mm) of a large ceramics kiln..

# Application Report Flow Sensors



## Helpful web sites for compressed air users



[www.deutsche-energie-agentur.de](http://www.deutsche-energie-agentur.de)



[www.druckluft-effizient.de](http://www.druckluft-effizient.de)



<http://energyefficiency.jrc.cec.eu.int/motorchallenge/>



<http://www.pneurop.org/>



[www.vdma.org](http://www.vdma.org) Branche Druckluft anwählen



<http://www.drucklufttechnik.de/>

**Please ask for the "SCHMIDT customer reference compressed air".**

ApplicationReport\_SS\_11\_CompressedAir.doc