

DensFlow

Flow-Measurement
for Densephase-Conveying

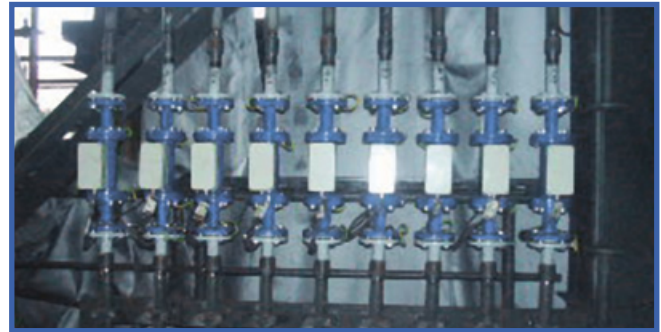


Using

DensFlow is a measuring system especially developed for measuring the flow rate of conveyed solids in densephase.

DensFlow is used for the online-measuring of:

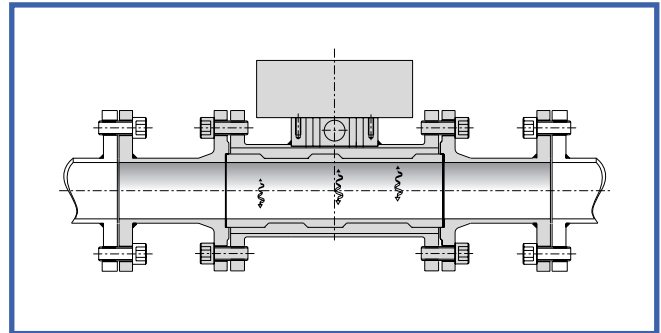
- types of powder or granulates
- pneumatically densephase-conveyed materials
- after mechanical conveying systems, e.g. chutes, slides or pipes
- with large flow rates



Function

In the measuring pipe a homogeneous measuring field is produced by special linking of a high frequency, electromagnetic alternating field. Solids, which are within this measuring field, absorb the energy of this alternating field. This leads to a measuring signal according to the concentration of the conveyed material in the measuring pipe (kg/m^3).

By means of the same sensor technology within the measuring tube on two further places the change of the alternating field is measured. These two sensors have a defined distance.



The evaluation unit with its integrated correlator determines the time of the conveyed material between the two sensors. With the known distance the velocity of the solids is then determined (m/sec).

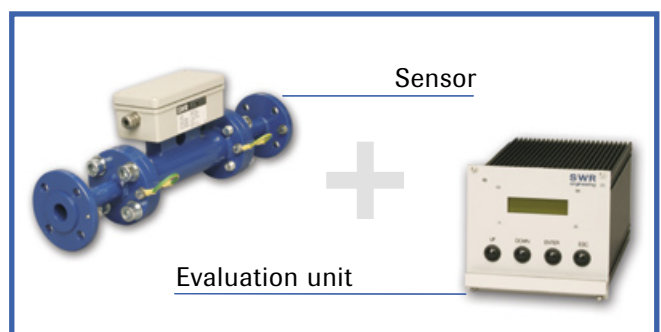
From the two measured values concentration (K) and velocity (V) as well as the known cross section (A) of the measuring pipe then the flow rate is determined according to: $Q = K \times V \times A$ and evaluated as a 4...20 mA-signal.

System

A complete measuring unit consists of the following components:

- Sensor (Measuring pipe) DMS 100 for installation into the pipe
- Evaluation unit DME 100

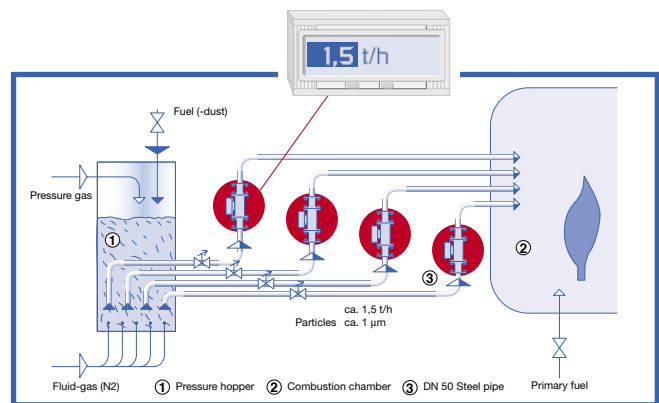
The evaluation unit is connected to the pipe by means of a 5-wired, shielded cable. The maximum distance between pipe and evaluation unit is 300m.



Applications – Practical Examples

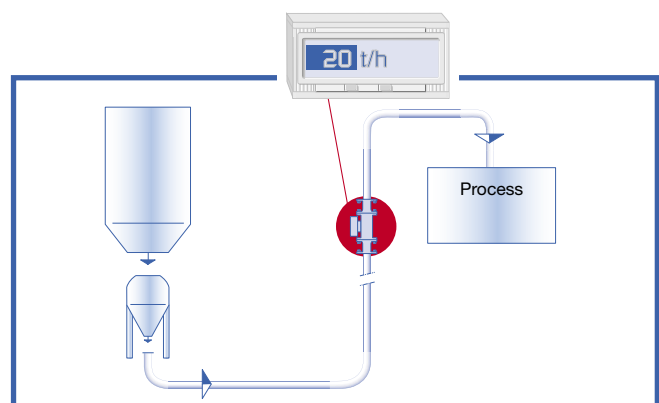
• Fuel conveying

At blast furnaces or combustion plants fuels are supplied in a densephase conveyed manner by several fuel lines to the combustion. Combustion is optimal and most efficient, if the flow rate is equal in all pipes. DensFlow measures the instantaneous mass flow in each single pipe, which then can be regulated by control valves.



• Careful conveying in densephase

Many solids, which are mostly very expensive, are transported in a slow, material-careful densephased conveyed manner. DensFlow supplies precious measured values for the velocity of the solids and the quantity in order to optimize the transport of solids.



Benefits

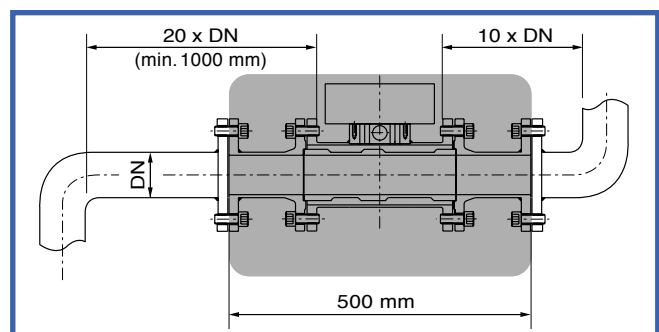
- Installation cross section free, therefore columns and built up impossible
- Flow rates unlimitedly measurable
- Measurement independent of the material's velocity
- Easy retrofitting
- Maintenance free
- Measuring system without contact (no mechanics)

Mounting and Installation

With pneumatically densephase conveyed materials the fitting position will be determined according to the necessary inlet and outlet section.

When mounting the measuring system after mechanical conveyed feeders there is usually no special inlet section necessary, for the material flow is uniform* after the feeder (* equal direction of the material flow, no turbulences or different flow directions of solid particles).

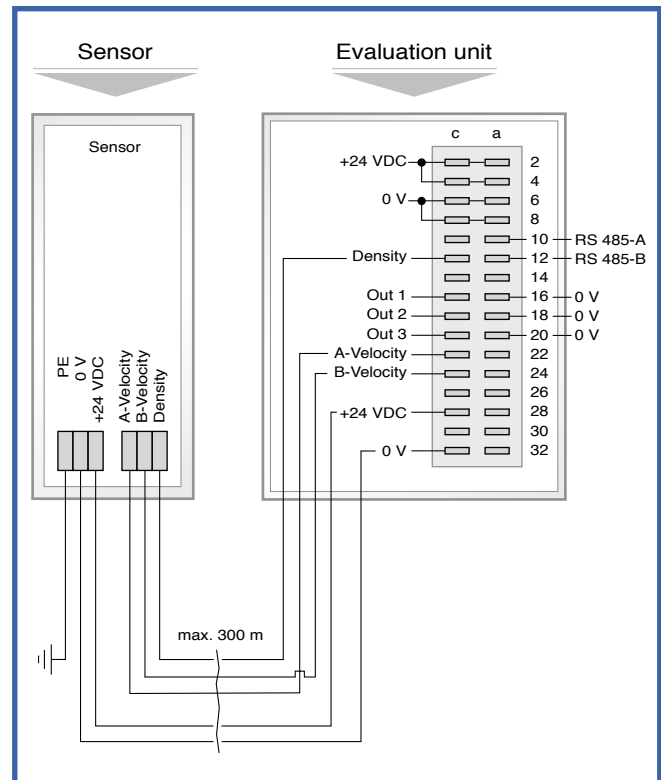
At the determined mounting position the measuring pipe will be fixed by means of a flange. Measuring pipes are available standard in nominal diameters from 10 up to 125 mm with flange connections according to DIN 2576.



Technical Data

Sensor pipe	
Housing	Steel St 52, powder-coated (optional Stainless steel 1.4541 DN 10...125 mm (bigger diameters on demand) Flange DIN 2576
Inner pipe	POM, PTFE
Protection category	IP65
Ambient temperature	Sensor electronic: -20... +60 °C
Mediums temperature	Sensor pipe: -20... +80 °C (higher temperatures on demand)
Max. working pressure	16 bar, optional 25 bar
Working frequency	100 kHz
Weight	Depending on the nominal diameter
Velocity range	1...10 m/s
Dimension	Ø DN + 90 mm, L 500 mm
Accuracy	± 2...5 % in calibrated range
Evaluation unit	
Supply voltage	24 VDC
Power consumption	12 W
Operating temperature	-10 ... +45 °C
Dimension	19"-rack system (3HE, 28TE, L 227 mm)
Weight	Approx. 0,7 kg
Additional Data	
Input	2 x Velocity 0...20 mA 1 x Density 0...20 mA
Connection	Connector (DIN 41612) Type B 32 pol.
Current output	Flow rate: 4...20 mA Velocity: 4...20 mA Density: 4...20 mA Load < 500 Ω
Serial output	RS 485, Mod Bus Protocoll
Control unit	LCD-Display, lighted, 16 x 2 Digits, 4 x Push button
Data protection	EEPROM

Electrical Connection



Evaluation unit

Terminal No. Connection

Connection of the supply voltage

2a/c + 4a/c	Input supply voltage +24 VDC
6a/c + 8a/c	Input supply voltage GND

Connections

RS 485	10 a	RS 485 Mod Bus Data A
	12 a	RS 485 Mod Bus Data B
I-OUT 1 Flow rate	16 c	Output 4...20 mA +
	16 a	Output 4...20 mA - (GND)
I-OUT 2 Density	18 c	Output 4...20 mA +
	18 a	Output 4...20 mA - (GND)
I-OUT 3 Velocity	20 c	Output 4...20 mA +
	20 a	Output 4...20 mA - (GND)

Sensor

12 c	Density	4...20 mA
22 c	Velocity A	4...20 mA
24 c	Velocity B	4...20 mA
28 a/c	Output supply voltage +24 VDC	+24 VDC
32 a/c	Output supply voltage 0 V	GND