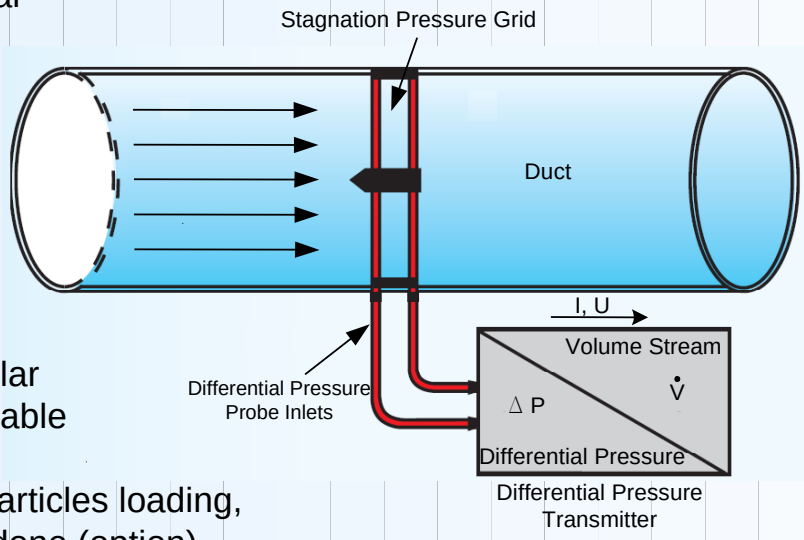
Stagnation Pressure Grid Flow-Meter

- Volume measurement of gaseous media in ducts, especially for comdustion air for firing applications
- Volume measurement of waste gases under use of optional materials practicable
- With a minimum of differential pressure loss, compared to the conventional technology
- Short length of inlet- and outlet-stretch for laminar flow. Long air-ducts are not required anymore
- Stainless steel material
- Basic temperature range up to 400 °C
- Free of maintenance for use in clean air application
- Rectangular and circular grid versions are available
- With increased dust particles loading, flushing back can be done (option)
- Connection to the Differential Pressure Transmitter by impulse piping or on customer‘s request



Function

The principle is based to the Bernoulli theory, which means, that the total kinetically energy of the flow-stream neglecting the friction, - stays the same, namely the sum of the dynamic and static pressure. The Stagnation Pressure Grid covers partially the area of the duct, so that it increases the flow-speed in reference and relation of the static pressure. This pressure is measured on special positioned openings. The on this way measured pressure difference is 2- to 3 - times higher, then the middle dynamically pressure in the duct flow-stream, for which the flow-speed has to be within of 7 and 40 m/sec.

The parallel adjusted pipes (with closed ends) build up an open grid across the duct area rectangular to the stream axis. Some of these pipes have openings to read the total pressure, other pipes are taking the reference pressure. These two pressures are feed into separate summing-pipes and also to separate connecting stubs. The pressure difference of these two values define the transmitter output signal.

Advantages against other measuring principles

Pressure loss generated by the Stagnation Pressure Grid are very small, compared to other integrating measuring devices (orivice, venturi tube etc.). The length of inlet- and outlet-stretch for laminar flow can be substancial shorten, with the advantage that long air-ducts are not required anymore and an upgrade for existing application is possible.

Construction

The grid consists of stainless steel, the single pipes with closed ends are connected to the summing-pipes. These pipes are complete welded and are qualified for temperatures up to 400 °C. Grids can be delivered in circular versions with or without flanges. Rectangular versions do not use flanges in general.

Installation and maintenance

For applications in clean air the Stagnation Pressure Grid operates without maintenance. In plants and applications with increased dust particles in the flow-stream the installation should be done with the access for cleaning. By using a 5-way valve-block armature the Stagnation Pressure Grid is prepared for flushing back their pipes. Solid dust particles have a negative impact to the measurement accuracy. The Stagnation Pressure Grid should not be used for applications with sticky particles floating in the air flow-stream.

Positioning

The Stagnation Pressure Grids are marked by an arrow which points out the flow direction. The pressure outlet stubs connection of the grid to the diff. pressure transmitter are 12 mm impulse tubes or are done with the armatures of the customer‘s special request.

Transmitter

The transmitter converts the diff. pressure into an electrical unit for the signal output. According to the converter version the output signal is 0 - 20 mA, 4 - 20 mA or 0 - 10 Volt. In combination with Stagnation Pressure Grid any conventional diff. transmitter can be used, which requires this specification.

Technical Data

The grids are made by specifications of the customers. Therefore the technical data can be indicated only generally. In the case of concrete offers, and/or supplies a data sheet made particularly for the appropriate grid is provided.

Material

Stainless steel 1.4404
(other materials on request)

Weigth

after size

Pneumatic connection

Cutting ring connection SV12
(other types of connection on request)

Installation types

- Flange connection
- Welding execution
- Clamping connection for „Jacobrohr“

Applicable temperature range

+5°C...+400°C
(other temperature ranges on request)

Measuring media

All not aggressive, not explosive, gaseous media with well-known density

System pressure

-0,5...+0,5 bar (negative/positive pressure)

Repetition accuracy

Generally repetition accuracy </= +/- 1% from measured value.

Measuring accuracy

- Calibrated grids on the test assembly </= +/- 1% from measured value.
- Calculated grids +/- 5% from measured value.
- Calibrated grids local </= +/- 2% from measured value.
-

Pressure loss

The pressure loss is computed particularly for each size and indicated in the documentation relating to orders.

Table - Intake distances

Type of obstruction	Tolerance +/-1 % Intake distance D	Tolerance +/- 3 % Intake distance D	Tolerance +/- 5 % Intake distance D
Right-angled deflection	6	5	3
90° bend of radius of 1 D or less	5	4	2
30° bend	3	2	1
Counter-acting multileaf dampers	4	3	2
Gradual constriction	2	1	1
Abrupt constriction	3	1	1

The tolerance figures related to the measurement value

Available dimensions grid circular version Item No. 654RU...

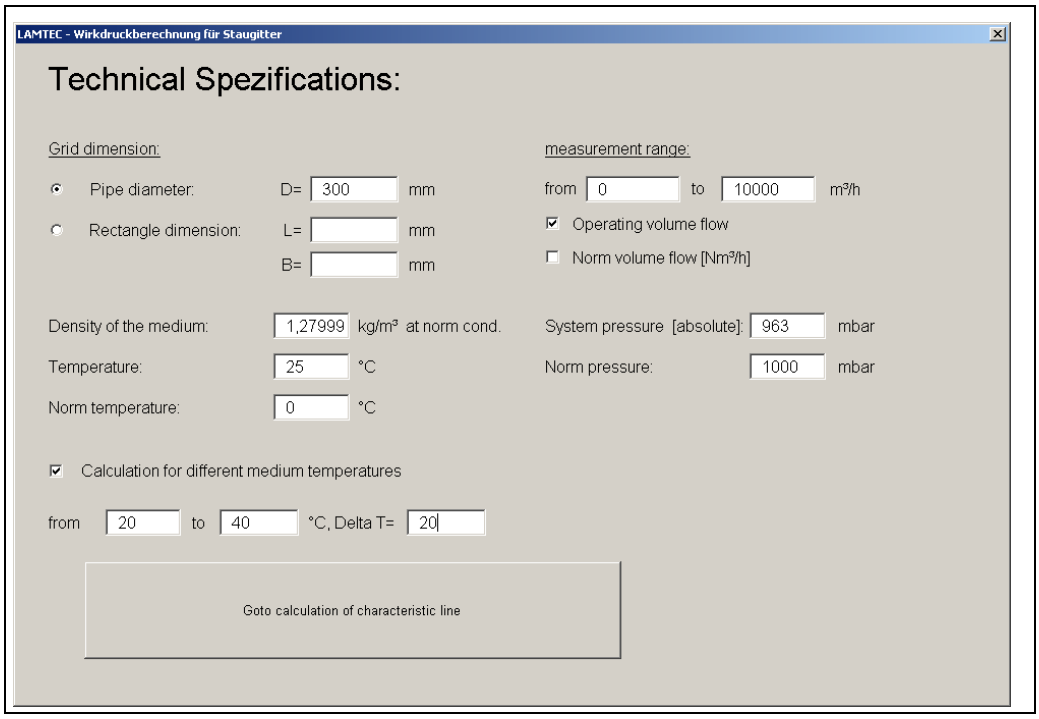
Diameter in mm	
200	Duct stretch L = 100mm
300	
400	Material thickness 3mm
500	
600	Optional: With flange and counter flange
700	
800	
900	
1000	
1300	
1600	

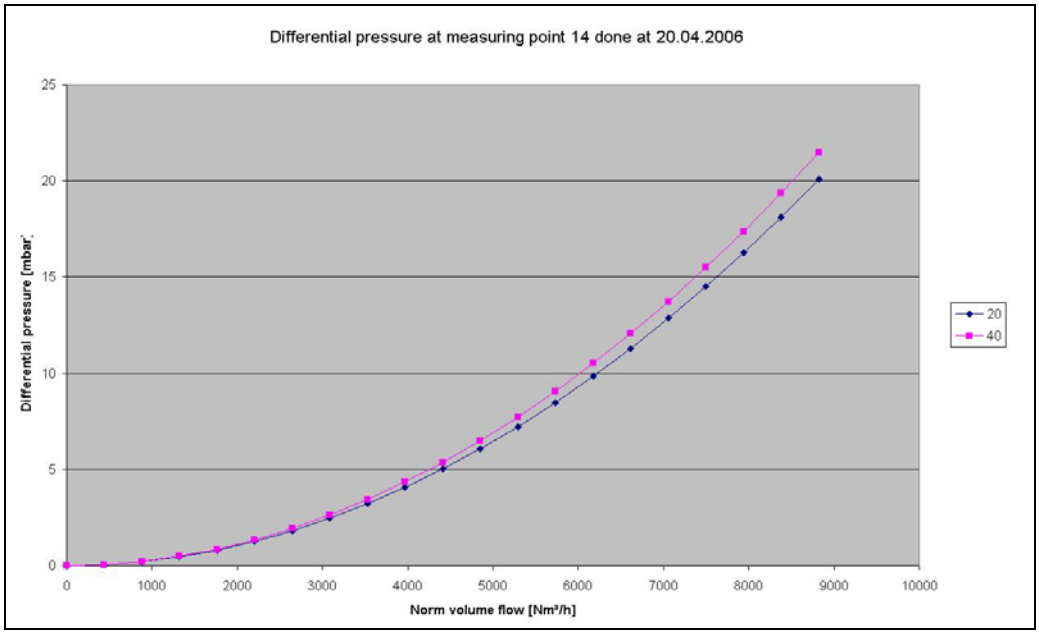
Other dimensions on request

Available dimensions grid rectangular version Item No. 654RE...

hight x width in mm		
300 x 300	550 x 650	Diff. Pressure connection, on hight-sideconnection, piping stubs 12 mm Steel sheet stiffener and counter fixing for width side dimensions > 600 mm
350 x 350	600 x 600	
400 x 400	600 x 700	
450 x 450	700 x 700	
500 x 500	800 x 800	
500 x 600	900 x 900	
550 x 350	1000 x 1000	
550 x 550	1100 x 1100	

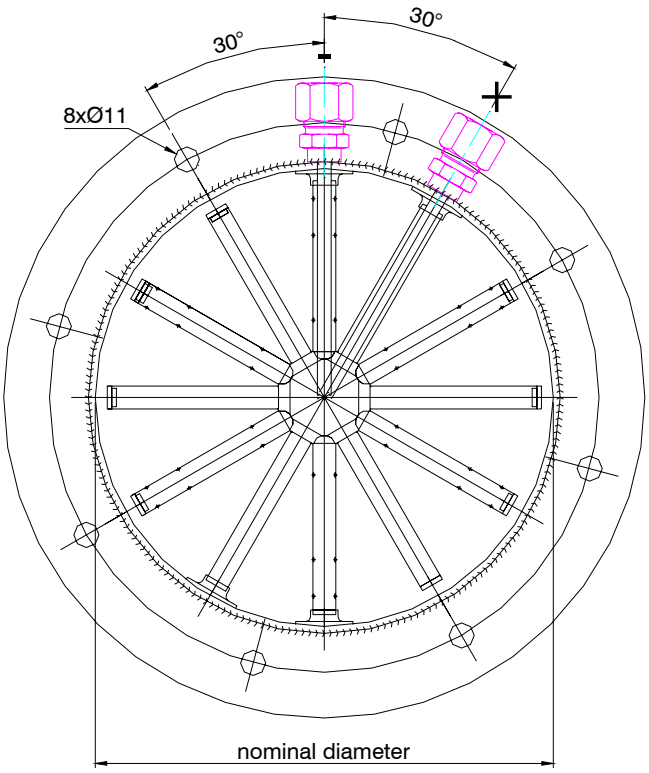
Software for calculation

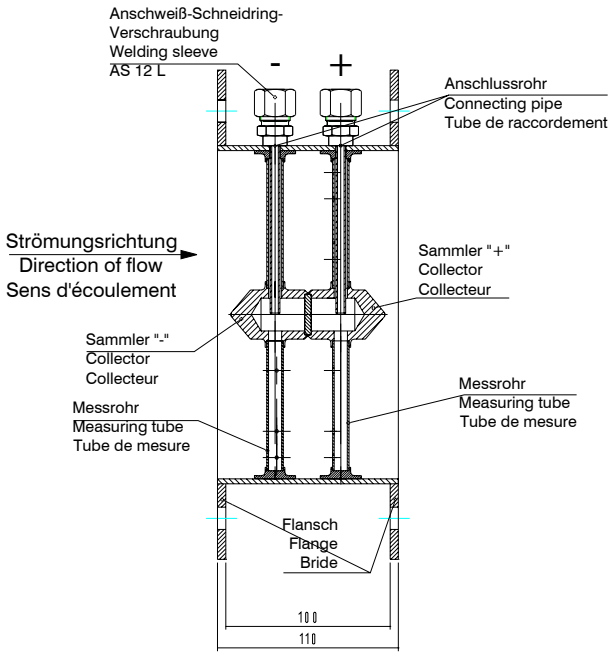




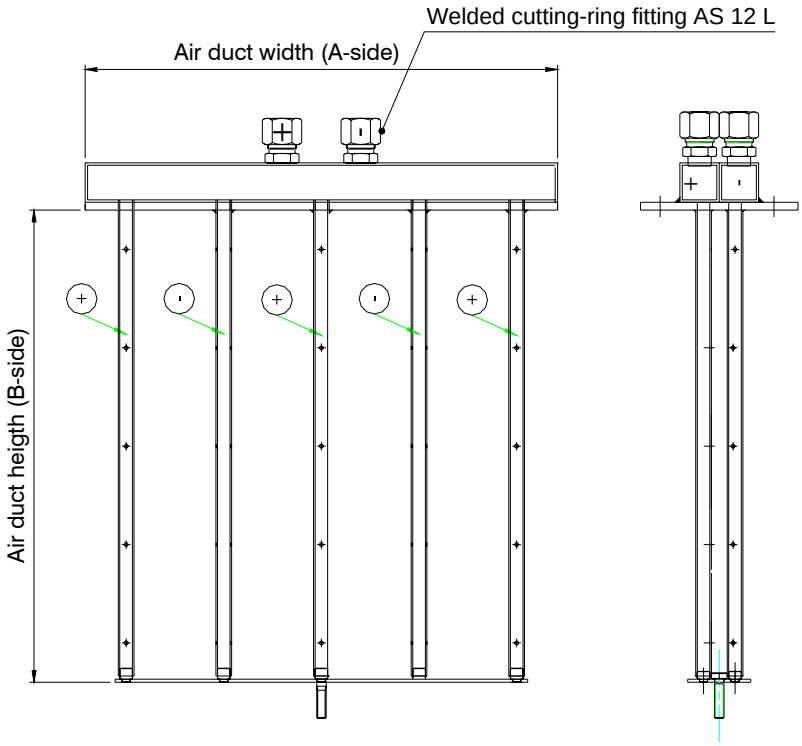
The software for calculation computes particularly for each size the differential pressure curve. For this must lattice geometry, measuring range, measuring medium (density), temperature and system pressure admit to be.

Example for mechanical structure grid circular version





Example for mechanical structure grid rectangular version



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