



A SNG-50 sonic nozzle gallery consists of the inlet manifold block with the manifold, 4 sensor connections (2 x pressure, temperature and relative humidity) and up to 9 connections for nozzle adaptors, whereupon the connection on the (opposite) front side of the inlet manifold carries the nozzle of maximum throat diameter, if required. Every nozzle adaptor can be equipped with a critical plug-in nozzle (cf. SNZ_data_e.pdf). These correspond for throat diameters from 0,1 to 3 mm to the standard DIN ISO EN 9300 or satisfy its requirements for throat diameters smaller than 0,1 mm.

- Nozzle Gallery for Calibration of Flow Meters
- Equipped with 4 (up to max. 9) Critical Nozzles
- Nominal Width of Manifold DN 50
- Throat Diameters from 10 µm to 3 mm
- Vacuum or Overpressure Operation
- Short Response Time and High Accuracy
- Very Well Long-Time Stable Because No Moving Parts

Technical Description

Combining different critical nozzles in a nozzle gallery, it becomes possible to establish air or gas flows on various levels with very high stability. This allows calibration of flow meters for volume flow or mass flow, like for example gas counters, LFE, mass flow meters and all other kinds of flow meters over a wide range with a single compact measuring system.

The functional principle of a critical nozzle - a gas flows through the narrowest point of certain geometry with speed of sound - guarantees a constant volume flow ignoring changes of inlet pressure almost completely (cf. SNZ_data_e.pdf). Mass or standard volume flow remain however variable. But they can be determined from the measurement of pressure and temperature or the calculated density of the gas, respectively.

As a matter of principle a nozzle gallery can be equipped with critical nozzles of arbitrary throat diameter, in order to use them for example individually, i.e. independently from each other. Though usually a binary approach is followed: the nominal flow of the used n nozzles conforms to that of the smallest nozzle (Q_1) and is $2^0, 2^1, \dots 2^{(n-1)}$ times the flow of Q_1 . Depending on the interconnection of the individual nozzles the nominal flow of the nozzle gallery then is 1, 2, 3 to $(2^n - 1)$ times the flow of Q_1 or at most about twice the nominal flow of the largest used nozzle.

During operation the medium is led through the mid blocks whose (switching) valve is open, to one of the at most two outlet manifold blocks and from there to the (common) outlet. Every mid block has a pressure tapping to determine the minimum critical pressure relation if required.

Every outlet manifold block has 3 connections for sensors (1x pressure and 2x temperature). The corresponding measuring values allow to control the critical pressure relation and to see if strong temperature gradients appear. The tightness of the nozzle gallery is assured by O-rings at the relevant joints.

SNG-50 nozzle galleries can be operated manually but they are also available in the scope of a complete calibration system together with sensors, controller S320 as well as the calculation and control software for it. This allows to fully automatize the system with pneumatic valves.

To be applied as calibration standard SNG series nozzle galleries are designed according to the requirements of DIN ISO EN 9300 and can be delivered with DAkkS (Deutsche Akkreditierungsstelle) calibration certificate or with factory calibration certificate.

Specifications

Flow Rates

Nominal flow (inlet): 0 .. 15 m³/h (air equivalent)

Nominal Widths

Piping nominal width: DN 50 for pressure state 0 .. 10 bar
Throat diameter: 10 µm to 5 mm

Accuracy

Fabrication accuracy: ± 5 % of setpoint value (standard)
Calibration accuracy: $\pm 0,25$ % o.R. for $Q < 10 \text{ Nm}^3/\text{h}$
(best possible) $\pm 0,12$ % o.R. for $Q \geq 10 \text{ Nm}^3/\text{h}$
Recalibration period: 5 years for $Q < 2 \text{ Nm}^3/\text{h}$
(best possible) 10 years for $Q \geq 2 \text{ Nm}^3/\text{h}$

Pressure Ranges

Inlet pressure: 1 bar to 10 bar absolute

Temperature Conditions

Operating: 0 .. +50 °C

Process Connections

Inlet block: 2 x G1½"i, 3 x G½"i und 1 x G¼"i
Outlet block: 2 x G1½"i, 2 x G½"i und 1 x G¼"i
Mid block: 1 x G¼"i

Media Compatibility

Air and gases compatible with stainless steel.

Material

The nozzle bodies are made of stainless steel by default, other materials on request.

Special Features

Calibration Options

Type: Overpressure or vacuum calibration.
Medium: Air or pure gases.
Certificate: DAkkS or factory calibration