

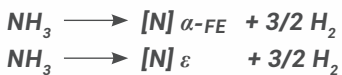
SE-NH3GA-NIT



NH₃ Process Gas Analyzer Nitriding / Nitrocarburizing

At present, the nitriding atmosphere is monitored with an H₂ sensor. Here, the degree of dissociation of the NH₃ is theoretically calculated with the known fresh gas quantities from the hydrogen value of the furnace atmosphere. An equilibrium reaction of the NH₃ is assumed for the calculation.

HETEROGENEOUS GAS REACTION



Possible reactions of the free hydrogen with impurities of the batch and furnace equipment as well as measurement errors of fresh gas quantities are not considered in the calculation of the degree of dissociation of the NH₃.

With this analyzer, the actual residual NH₃ content in the exhaust gas is determined.

The reaction of NH₃ and H₂ can thus be considered when calculating the nitriding potential.

$$Kn = \varphi R (\text{NH}_3) / \varphi R (\text{H}_2)^{3/2}$$

The nitriding potential is in equilibrium with γ' - and ε -nitrides at nitriding temperature. The nitriding potential thus describes which microstructure can be produced with priority at a given temperature.

The measurement of the NH₃ content in the reaction gas is carried out with this sensor system according to the known physical principle of the different thermal conductivity of reaction- and additive-gases from the nitriding process.

A direct comparison, of the calculations of the nitriding potential from H₂ and NH₃ content of the nitriding atmosphere, can thus be carried out for quality assurance of the heat treatment.



TECHNICAL DATA OF THE NH₃ MEASURING SYSTEM

- » Control box with built-in display
- » Sample gas pump for gas extraction
- » NH₃ cracker with 2 ceramic screen flame arresters (ATEX (EX) approval)
- » Supply voltage 230 VAC
- » Temperature controller for NH₃ cracker 750°C constant

TECHNICAL DATA WLD HEAT CONDUCTION GAS SENSOR

Sample gas temperature:	max. 85°C
Measuring cell temperature:	100°C constant
Sample gas pressure:	fixed via sample gas pump
Measuring components:	Hydrogen: 0 – 100 Vol% Nitrogen: 0 – 100 Vol% Ammonia: 0,5 – 100 Vol% Water vapor: traces – 20 Vol% (not condensed)
Measuring range:	0,5 - 100 % NH ₃
Gas connection:	input / output via 4mm hose / tube
Output:	4 – 20 mA linear
Time response:	Output delay approx. 20s
Warm-up time:	approx. 30 min

MEASUREMENT PRINCIPLE

The continuous measurement principle is based on the thermal conductivity of the sample gas in nitrogen, ammonia, hydrogen and carbon-containing gases.

In a divided heat conductivity measuring cell, the process gas is first measured and then fed via a split gas

reactor into the second half of the measuring cell. The difference between the measured values corresponds to the NH₃ content in the furnace atmosphere.

This measurement can be used to correct or determine the nitriding potential.