

TECHNICAL NOTE

PROCESS & EMISSIONS MONITORING SYSTEMS

Conversion of ppm measurement into mg/Nm³

This Technical Note describes how the LAS 300 XD concentration units are calculated, and how to convert the measurements into mg/Nm³ in order to obtain normalized data.

What LAS 300 XD does and does not report:

- The LAS 300 XD reports absolute gas concentration in ppm, based upon known process parameters: pathlength, gas temperature and gas pressure.
(Natively, the analyzer calculates molar fraction and converts to ppm).
- The analyzer does not use complex calibration curves. The gas concentration accuracy and linearity are inherent within the bounds of the Beer-Lambert law.
- The LAS 300 XD does not provide a normalized concentration output.

How to normalize data output:

Normalization of the concentration value needs to be performed by using PLC / DCS or Data Acquisition System of the plant.

Concentration can be converted from ppm values to mg/Nm³ using the following formula:

European standard:

Normalization conditions: Temperature 0°C,
Pressure 1 atmosphere.

$$\text{mg/Nm}^3 = \text{ppm} * (\text{MW} / 22.41)$$

MW = Molecular Weight

USA standard:

Normalization conditions: Temperature 25°C,
Pressure 1 atmosphere.

$$\text{mg/Nm}^3 = \text{ppm} * (\text{MW} / 24.45)$$

Gas	Molecular weight
CO	28.01 g/mol
HCl	36.46
HF	20.01
O ₂	31.999
NH ₃	17.031

Note:

- If representative dynamic process gas temperature and pressure measurements are available at the installation location, for better concentration accuracy, these measurements can be supplied to the LAS 300 XD. The analyzer will use this data to calculate the molar fraction at the process temperature and pressure which is reported as ppm. However, these readings are not used for data normalization.
- When there are no representative process dynamic temperature and pressure measurements available at the installation location, then constant values for temperature process gas and temperature and pressure can be used. We don't recommended to use of constant values if the process / flue gas is not stable as accuracy can be compromised.

