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# Dew Point Measuring

in Gas Pressure  
Control Stations





# Measuring the Dew Point at a Natural Gas Pressure Regulation Station



**Natural gas is an important source of energy in Europe. It provides nearly a quarter of the energy used to heat homes and generate power. Natural gas is transported over long distances using pipelines. To keep the diameter of the pipe small, the gas must be compressed to 70 bar, which is 70 times greater than normal atmospheric pressure. Before reaching the end user the pressure of the gas is greatly reduced. The process of reducing the pressure of the gas can cause problems. Monitoring the dew point and temperature helps alleviate many of these but the location is typically hazardous. The EE300Ex sensor with ATEX classification can monitor the environment safely and reliably.**

## Challenges in a Gas Pressure Control System

Before arriving at an end-user the pressure of the natural gas must be dramatically reduced. During the transfer from the primary pipeline the pressure of the gas will be reduced from upwards of 70 bar to as little as millibars (normal atmospheric pressure). Substations located along the major pipelines reduce the pressure through an expansion system and are typically monitored remotely. Expanding gases cool according to the Joule-Thomson Effect. This can cause the pipe to become cooler than the surrounding substation air.

## Joule-Thomson Effect.

The Joule-Thomson Effect describes the change in temperature of a gas that occurs when that gas expands. Nearly all gases cool during expansion and the intensity of this change is unique to each gas. Gas molecules have a natural attraction to one another. As molecules move further apart, this attraction is reduced and results in cooling.



EE300Ex - Humidity and Temperature Transmitter for Intrinsically Safe Applications

Depending on the time of the year, condensation will build. Condensation can create significant issues on the gas pressure control system, which include:

- Excess moisture in the natural gas can corrode the inside of the pipe
- Corrosion on the outside of the pipe
- Methane hydrate can form creating blockages in the gas line and fittings
- Freezing of the water can impair the function of other items

These issues can be prevent by heating the gas at the substation prior to expansion. A small amount of the gas is redirected to a boiler and this heat is used to increase the temperature of the gas in the pipe.

#### **Field Proven Solution: The EE300Ex**

Monitoring the dew point temperature of the substation air is critical to prevent the pressure regulators from freezing. Using the intrinsically safe EE300Ex sensor from E+E Elektronik, the exact dew point can be measured. When the temperature of the gas approaches the dew point the gas is heated to prevent condensation.

The EE300Ex is installed directly in the substation. It measures both the humidity and temperature to calculate the dew point. A boiler can be turned on to keep the gas at a temperature about 2°C above the dew point. This extra heat ensures that as the gas expands and cools its final temperature does not allow condensation to form. During colder months this also prevents ice from clogging control and gate valves, thus ensuring that the natural gas continues to flow through the system.

As an intrinsically safe sensor, the EE300Ex was specifically developed for use in potentially explosive areas. This meets the proper classifications developed for Europe (ATEX), International (IECEx), USA / Canada (FM), China (NEPSI) and Korea (KCs).

Another benefit to using the EE300Ex is that the boiler does not have to be run continuously. As the temperature of the gas approaches the dew point, the boiler can be activated on-demand and reduce total consumption. This optimizes energy usage and allows environmental compliance for ISO 50001 and ISO 14001 standards.

## **The Challenge.**

- Prevent ice development on natural gas gate and control valves
- Reduce the energy needed to preheat the gas before expansion
- Monitor dew point temperature on-site and remotely
- Provide an explosion-proof device

## **The Solution.**

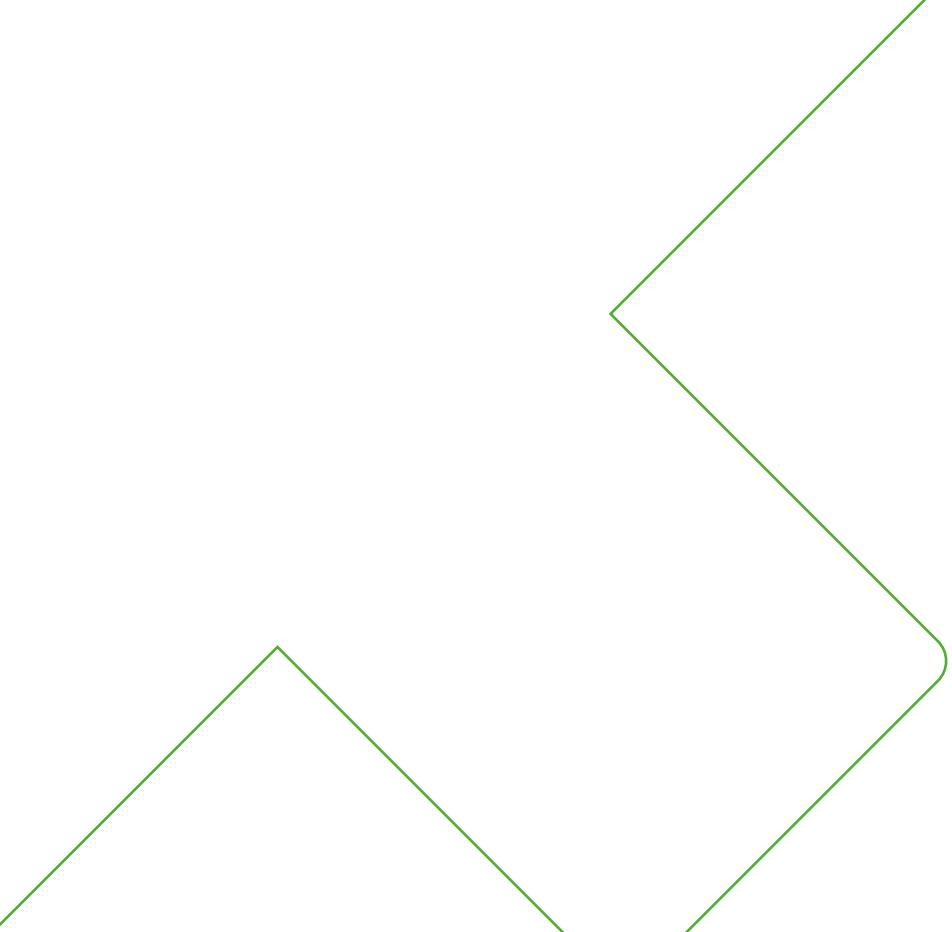
- A humidity and temperature sensor that calculates dew point accurately
- Robust enough to work in extreme climates
- Excellent accuracy coupled with long-term stability
- ATEX certification in a compact design

## **Product Benefits.**

- Decades of experience in the field of humidity and temperature measurement
- Ability to take accurate measurements over long periods of time
- Calculate the dew point using humidity and temperature readings
- Easy and quick assembly
- Good price to performance ratio

## **Overall Value.**

- Operates safely and securely
- Energy savings during the pre-expansion heating
- Robust design to reduce maintenance costs
- Work with the sensor on-site or monitor remotely using analog outputs
- Helps comply with ISO 50001 and ISO 14001 standards



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