



# Moisture measurement in the production of Liquefied Natural Gas (LNG)

## Ensuring reliable process operation and protecting equipment from damage

### Background

Liquefied Natural Gas (LNG) is an efficient way to store and transport natural gas, as it is highly condensed and has around 1/600 of the volume of the gaseous state. The process involves removing contaminants such as dust, gases other than methane, heavy hydrocarbons and water.

The gas is liquefied at near-atmospheric pressure by cooling it to  $-162^{\circ}\text{C}$  so removal of moisture is crucial to avoid ice crystals from forming. Additionally, if cold LNG comes into contact with water there is a risk of a 'rapid phase transition explosion' – basically the liquid expands to its gaseous state very quickly, releasing a lot of energy.



In most cases of LNG production, dehydration columns of molecular sieve desiccant are used, as this is the most effective method to reach the very low moisture content levels of less than  $0.1 \text{ ppm}_v$  moisture content required for the feed gas entering the cryogenic liquefaction process.

The dehydration process most often comprises 3 or 4 columns that operate in sequence whereby a single column is being regenerated whilst others remain in operation. Effective monitoring of each dehydration column is required during operational periods. The common header outlet feeding into the liquefaction process is also monitored on-line, as a further assurance.

The moisture analyzers installed to the individual dehydration columns cannot be exposed to the process gas conditions during the regeneration cycles which rise to a temperature approaching  $300^{\circ}\text{C}$  and high moisture concentration as the desiccant pellets release adsorbed moisture. For this reason the sample tapping points for each column should be immediately downstream of the process isolation valve at entry towards the common outlet header, which is closed for the duration of the regeneration cycle.



## Moisture in LNG measurement options:

Michell Instruments offers a selection of process moisture analyzers and dew-point transmitters with calibrations traceable to NIST and NPL. Michell's sensing technology enables measurement of sub-ppm<sub>v</sub> moisture levels.



### Promet EExd Process Moisture Analyzer

A complete analyzer package, flame-proof certified for use in IEC Zone 1 and 2/NEC Class 1 Div. 1 and 2 hazardous areas. Measurement range is from -120°C to +30°C dew point (10ppb<sub>v</sub> to 23,000 ppm<sub>v</sub>).



### Promet I.S. Intrinsically Safe Process Moisture Analyzer

A heavy-duty industrial hygrometer system which offers multi-channel measurements, with up to four moisture meters in one package. Certified for use in hazardous areas by ATEX, IECEx, FM, CSA and GOST.



### Easidew PRO XP Explosion-Proof Moisture Transmitter

The Easidew PRO XP is a robust and reliable moisture sensor for explosion-proof and flame-proof applications. It allows installation without the need to fund, site and install an I.S. barrier system.



### Easidew PRO I.S. Intrinsically Safe Moisture Transmitter

The Easidew PRO I.S. is an intrinsically safe two-wire dew-point sensor, certified for use in hazardous areas around the world. ATEX, IECEx, cCSAus, FM & TC TR Ex certified.



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