MERCURY INSTRUMENTS
Analytical Technologies

UT-3000 NG mobile

Mercury Analyzer for Natural Gas
with
Sample Conditioning System

- Easy transport
- Detects elemental, ionic and bound mercury
- Auto Range function installed
- Large measuring range:
  0.1 ng/m³
  - 30.000 ng/m³
- Gas alarm
- Calibration system
  (manual)

Introducing the UT-3000 NG mobile system by Mercury Instruments

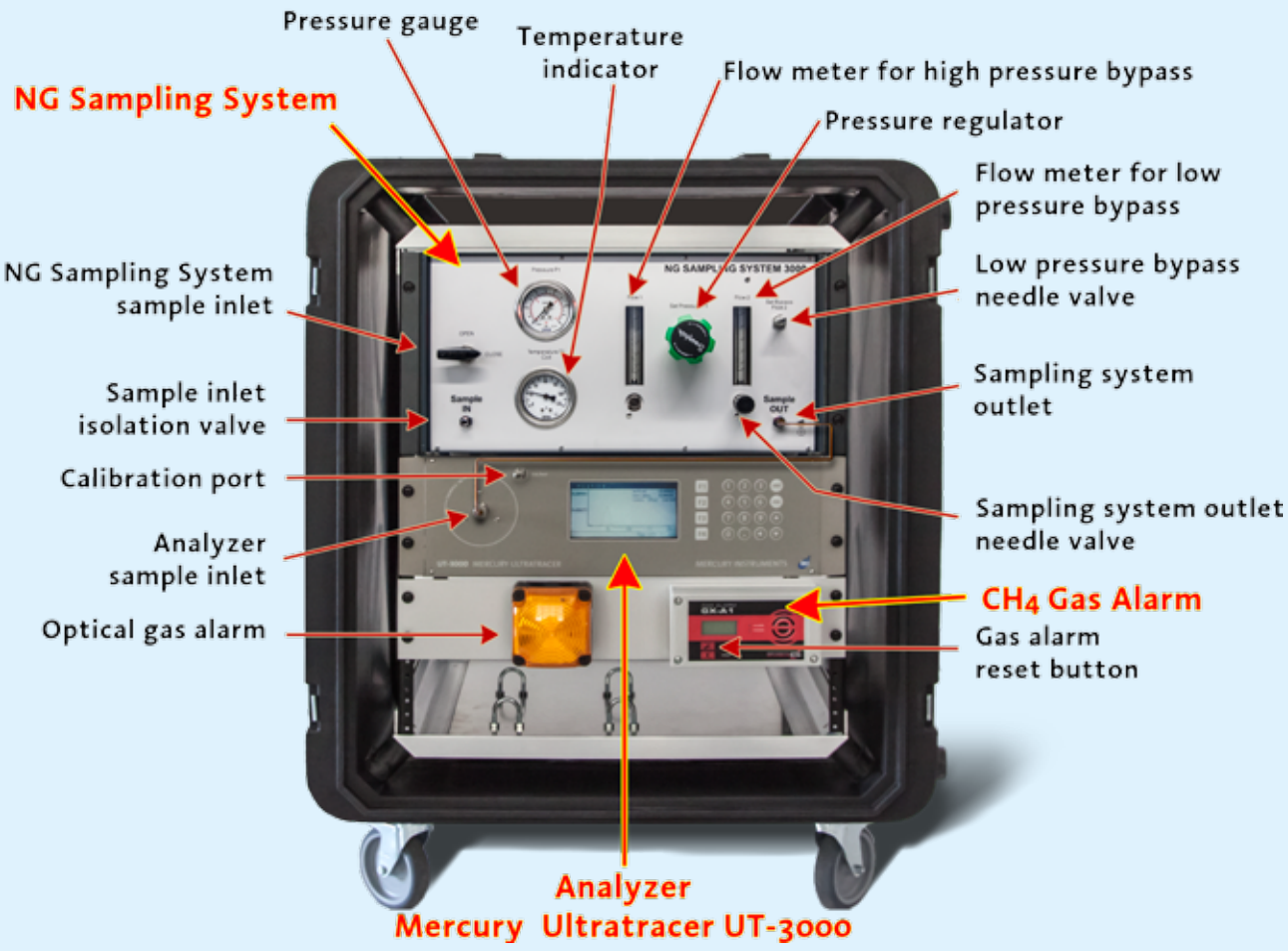
The UT-3000 NG mobile system has been designed for measurement of mercury concentrations in natural gas at varying measurement points.

Typical applications

- Natural gas platforms
- Natural gas exploitation
- Natural gas processing plants

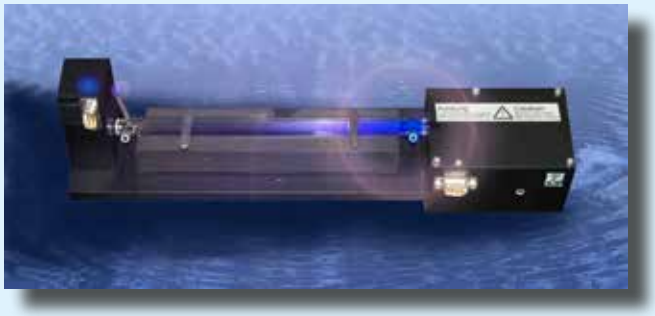
System setup

The UT-3000 NG mobile Version consists of the Mercury Ultratracer UT-3000 and the Natural Gas Sampling System which are built into a rigid plastic cabinet. To provide increased safety for the user a flammable gas sensor is installed in the same enclosure, providing acoustic and visual alarm in case of leakage.



UT-3000 Ultratracer

The UT-3000 uses the Mercury Instruments GoldTrap to capture total gaseous mercury (TGM) directly from the sample. At room temperature mercury is adsorbed by gold. As the gas continuously flows through the trap all the mercury contained in the gas is trapped by the gold. After the mercury has been captured, the GoldTrap is heated very rapidly, thereby releasing mercury as a gas (thermal desorption). The gaseous mercury is then swept by the flow of purified mercury free air into the optical cell of the detector where the mercury concentration is measured by atomic absorption spectrometry (AAS).



Basis for determination of the mercury concentration by AAS is the resonance absorption of the Hg-atoms at a wavelength of 253.7 nm. The sample gas is carried into the optical cell by a built-in pump. The optical cell is entirely made of synthetic quartz glass. Radiation of a mercury lamp passes through the cell and is measured by a solid state detector. The attenuation of the UV light reaching the detector depends on the number of mercury atoms in the optical cell. The microprocessor performs the quantitative evaluation of the mercury concentration in the sample. In order to get an extremely stable baseline, the UV-light source is controlled by a reference beam and reference detector device. In addition to this, the UV detectors of the UT-3000 are thermostatically controlled. Heating the optical cell and the GoldTrap makes the UT-3000 insensitive to volatiles like water vapor and hydrocarbons.

Auto Range function

The UT-3000 features an Auto Range function. If activated the sample volume will be automatically be adjusted according to the mercury concentration of the sample. After starting the measurement the smallest possible sample volume will be selected automatically. If the absorbance signal is too low, the sample volume will be increased until the absorbance is within the optimum range.

Manual calibration made easy

The UT-3000 NG mobile comes with a Static Calibration Unit.

To calibrate the UT-3000 connect it to the calibrator. Then simply draw a defined volume from the calibrator using a special syringe (included on delivery) and inject the defined volume into the calibration port of the analyzer.

Sampling System

The Natural Gas Sampling System reduces the primary high pressure of the sample source (up to 200 bar) to a pressure below 1 bar so that the gas can be fed to the continuously operating analyzer: UT-3000 Mercury Ultratracer. Pressure reduction is performed with a high precision pressure regulator. To avoid condensation due to the Joule-Thompson cooling effect the pressure regulator is electrically heated. Especially for mercury analysis it is important to precondition all surfaces of the system which come into contact with the sample. To guarantee a suitable preconditioning the sampling system has two bypass flows; one at the high pressure side and one at the low pressure side. Both bypass flows can be adjusted independently with a needle valve. The bypass flows are indicated by flow meters. With a ball valve at Sample IN the sampling system can be isolated from the gas source. A needle valve allows closing the outlet of the sample flow to the analyzer. In order to avoid ingress of water droplets or aerosols into the analyzer a membrane filter is installed in the sample stream.

Gas alarm

For safety reasons the system is equipped with a flammable gas detector. There will be an acoustic pre-alarm every 30 seconds should the methane concentration exceed 1% or a constant acoustic and optic main alarm if the methane concentration exceeds 2.5%.

Explosion-proof cabinet

(Option)

Mercury Instruments is always taking into account the special needs of the customer.

Should there be a demand for a completely EX certified system (for hazardous zones 1 and 2), the UT-3000 NG mobile can be delivered in an explosion-proof steel housing equipped with an automatic calibration unit.

Technical Specifications UT-NG mobile

UT-NG mobile	
Weight	approx. 50 kg
Dimensions	72 x 78 x 78 cm (W x H x D)
Power supply	230 VAC / 50Hz; 115 VAC / 60 Hz (option)
Power consumption	425 VA (UT: 250 VA max ; NG Sampling System: 175 VA)
Gas alarm	Acoustic pre-alarm (30 sec interval): CH_4 >1% Acoustic and optic main alarm (continuous): CH_4 >2.5%
Operating temperature	0 °C ... 40 °C
Operating humidity	max. approx. 90 % R.H., no condensing humidity
CE approval	according to 89/336 and 73/23 EEC
NG Sampling System	
Particle filter	1 micron stainless steel T-filter
Maximum sample inlet pressure	approx. 200 bar
Pressure P1 (secondary side of heated pressure regulator)	0.0 – 1.0 bar (0.28 bar / 4 psi typically)
Flow 1	0 - 5 l/min
Flow 2	0 - 5 l/min
Materials used	Stainless Steel (partially coated), Viton, Ismaprene
UT-3000 Mercury Ultratracer	
Measuring component	Total Gaseous Mercury (TGM)
Measuring principle	Atomic absorption, cold vapor method, preconcentration with GoldTrap
Measurement wavelength	253,65 nm
UV-source	Electrodeless mercury discharge lamp
Method of stabilizing	optically with reference beam; thermally
Auto Range	Automatic control of sample volume
Optical cell	entirely of fused silica Suprasil, l= 230 mm
Cell temperature	approx. 45 °C, heated
Measuring range a) lowest range b) medium range c) screening mode	 a) 0.1 ng/m³-1000 ng/m³ at 10 l sample volume b) 1 ng/m³-3000 ng/m³ at 1 l sample volume c) 10 ng/m³ - 30000 ng/m³ at 0.1 l sample volume
Detection limit according to DIN 32645	1 pg absolutely or 0.1 ng/m³
Linearity over the 0.2 to 15000 ng/m³ range	1.5 % or better
Reproducibility	5 % or better at 14 pg Hg 1 % or better at 1500 pg Hg
Sampling flow	40 l/h
GoldTrap heating flow	10 l/h
Data logger capacity	5000 data sets
Data output	Serial (USB / RS232) for PC / Laptop connection

ISO 9001

Advantages of atomic absorption with amalgamation:

- No carrier gas needed
- Higher sensitivity than systems without GoldTrap
- AA is not prone to quenching effect
- No compensation or background correction provisions required
- No zero drift due to amalgamation technique with Auto-Zero
- Linear range over five orders of magnitude

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