Formaldehyde (HCHO) in Air and Water Monitor Model AL4021

BULLETIN AL-4021

General Description

The Model AL-4021 is a state-of-the-art digital formaldehyde (HCHO) analyzer that is available in several different application-specific configurations. Models are available for air or water HCHO measurement applications.

Features

- Provides absolute concentrations for HCHO (formaldehyde)
- Simple to use, fully automatic operation
- Automated calibration using internal HCHO permeation source or liquid HCHO standards
- Liquid phase ranges: 0 to 30.0 µg/l
  (user programmable) 0 to 300 µg/l
  0 to 1.5 mg/l
- Gas phase ranges: 0 to 20.0 ppbV
  (user programmable) 0 to 200 ppbV
  0 to 2.0 ppmV
- HCHO gas phase detection limit of < 50 ppt
- HCHO liquid phase detection limit of < 100 ng/l
- Rugged design
- RS232 serial interface and PC user software

Applications

- Chemical Research
- Pharmaceutical Production
- Plastics Production and Quality Control
- Environmental Quality Control
- Standards Laboratories

Model AL4021 HCHO Air and Water Monitor

Principle of Operation

The detection of formaldehyde is based on the so-called “Hantzsch“-reaction. The technique is sensitive to formaldehyde in aqueous solutions. Therefore, for the measurement of gaseous formaldehyde, these have to be trapped in aqueous solution first. This is achieved in a *stripping coil* by pumping air and a *stripping solution* (pH-buffered water free of HCHO) continuously, at known flow rates. The air and liquid streams are afterwards separated in a glass separator and the solution is then analyzed for formaldehyde.

The Model AL4021 is capable of measuring HCHO in air and water samples, the HCHO mixing ratio in air is then calculated from the concentration in solution and the ratio of air and stripping solution flow rates.

Formaldehydes in water solutions can be measured directly. In this mode, stripping is not necessary and, consequently, either zero air has to be applied to the *sample inlet* or the internal zero trap must be switched on.

Due to time responses those applications requiring two channels (such as input vs. output process checks) or simultaneous *air and water* measurements use two analyzers ganged together. The fully automated nature of the system allows the system to be tailored to many on line process applications and configurations.

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Specifications

Physical Dimensions	Length 49.6 cm Weight 48.8 cm Height 13 cm Weight 20 kg
Power Requirements	120/240VAC, 80 Watts
Measurement Range (liquid calibration for can be user defined within the given ranges)	Measuring range 1: 0-30.0 µg/l or 1 10^{-6} molar Measuring range 2: 0-300.0 µg/l or 1 10^{-5} molar Measuring range 3: 0-1.50 mg/l or 5 10^{-5} molar
Measurement Range (gas phase provides calibration by liquid formaldehyde standard, if gas phase standards are unavailable)	Measuring range 1: 0-20.0 ppbV* Measuring range 2: 0-200.0 ppbV* Measuring range 3: 0-2.00 ppmV* * These ranges depend on the flow rate of stripping solution and air flow which are user determined from time to time or after replacement of pump tubing and replacement of flow controller.
Measurement Range (provides calibration by gas standard gas standard permeation rate can be determined by using liquid standard)	Measuring range 1: 0-20.0 ppbV Measuring range 2: 0-100.0 ppbV This mode also allows measurement in *liquid phase* from 0-30 µg/l and 0-150 µg/l

Detection limit equivalent to:	< 50 ppt gas phase** < 100 ng/l 2 * 10^{-9} M (liquid phase)
Noise	< 2% at full scale
Time constant	90 sec (10-90%), delay time 180 sec
Interference from (e.g. 1:20,000 ppb indicates that a measurement signal of 1 ppb in the presence of a 20,000 ppb concentration of the perterber)	Benzaldehyde < 1 : 20,000 Acetaldehyde < 1 : 10,000 Acrolein < 1 : 10,000 Propanal < 1 : 20,000 Glyoxal < 1 : 123 Methanol < 1 : 50,000 H_2O_2 < 1 : 100 O_3 < 1 : 3,000
No detectable interference from	Acetone, SO_2, NO_2, Isobutane
Zeroing	Internal zero trap
Signal output	Analog: 0-5 Volt FS. Calibration automatically sets output to 4.0 Volt of maximum value of chosen range Digital: via RS 232 interface
Maintenance Interval	1 Month (typ)
Expendables	Distilled Water, Acetyl Acetone, Acetic Acid, Ammonium Acetate, H_2SO_4 and Zero-Trap
Calibration	Internal permeation device using KIN-TEK™ permeation tubes

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