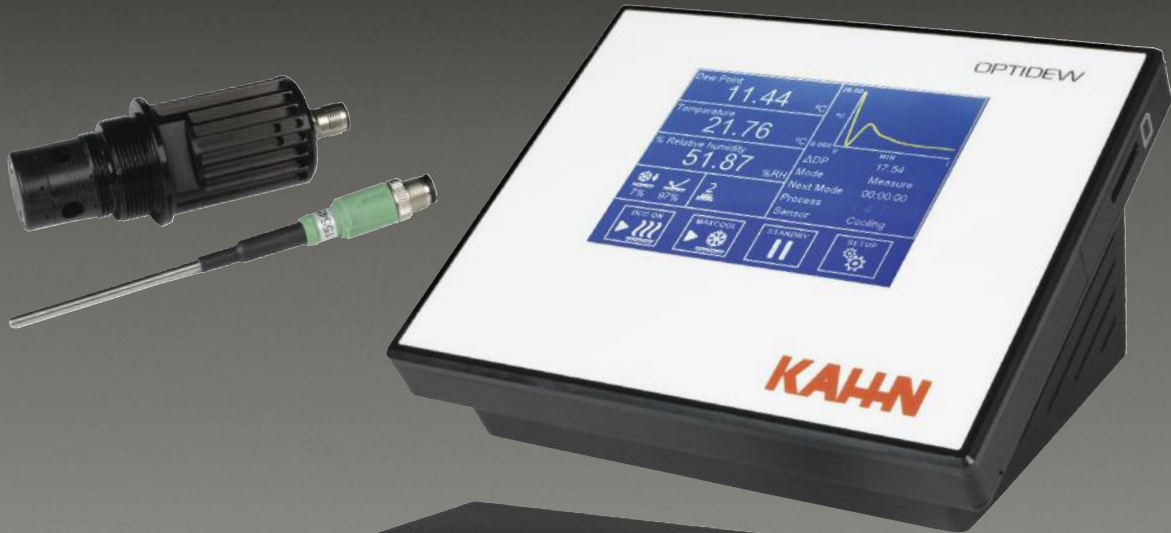


Chilled Mirror Optical Hygrometers

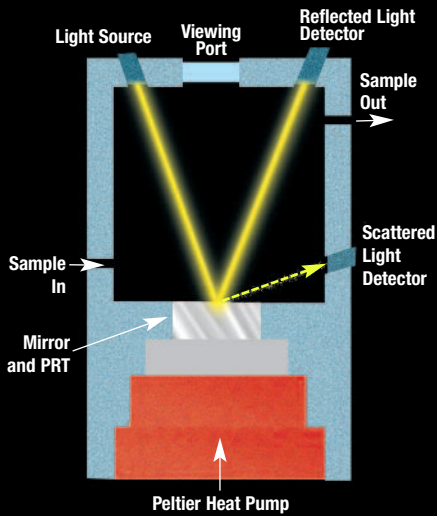
the ultimate standard in
moisture measurement
technology



KAHN

Principle of Operation

Kahn optical hygrometers use a fundamental and therefore highly accurate, reliable and drift-free method of continuously measuring the dewpoint of a gas sample. A mirror is chilled by a Peltier thermoelectric heat pump; a light is focused on the mirror; a photodetector measures the amount of light being reflected or scattered off the mirror; a platinum resistance thermometer (PRT) measures the temperature of the mirror which is dewpoint or frostpoint, by definition.



Mirror and Cooling System

A chemically resistant, polished metal mirror is thermally bonded to a multi-stage Peltier thermoelectric heat pump. Direct current delivered to the heat pump allows the mirror to cool until condensation begins to form.

Electro-Optical Detection System

A single or dual optical detection system consisting of a light source and photodetector(s) measures reflected and/or scattered light off the mirror. Closed-loop temperature control ensures rapid equilibrium between condensation and evaporation at the mirror surface.

Temperature Measurement System

The temperature of the mirror surface is measured directly with a highly accurate PRT embedded within the mirror, and is displayed in selectable units on the instrument's front panel.

Contamination Compensation

Contamination can compromise the measurement accuracy of an optical hygrometer. All Kahn optical hygrometer products feature Dynamic Contamination Correction (DCC), which ensures continuous optimal operation of the sensor in contaminated environments. The contamination compensation system periodically heats the mirror to vaporize the accumulated dew or frost. The instrument then readjusts itself to allow for altered reflectivity due to contaminants and returns to normal measuring. Although the DCC system is fully automatic, it can be user configured for individual applications.

NOTE: The information included herein was correct at the time of publication and supersedes all previous data. It is our policy to continually improve our products to insure even better performance. Consequently current Kahn products may incorporate modifications not shown on these pages.

KAHN: The Ultimate Standard in Moisture Measurement Technology

Product Scope

Kahn offers several optical (chilled mirror) hygrometer products, *Optidew*, *Optisure* and *S4000TRS*, to meet the requirements of a broad range of dewpoint measurement applications. Each product is available in a variety of models to suit the user's specific needs. Kahn's 40 years of experience in chilled mirror technology has produced extremely sensitive (parts per billion), accurate and drift-free instrumentation for measurement of gas dewpoint. All Kahn hygrometers offer measurement traceability to national and international standards.

OPTIDEW

Compact, Economical & Rugged

The Optidew Dewpoint and RH Hygrometer is a compact, sturdy and economical instrument that provides continuous dewpoint measurement, display and output. Key features include:



Models

Optidew-Wall Mount

- Wall mount transmitter with display
- Transmitter with remote sensors and 1 foot cable

Optidew-Bench Top

- Bench top hygrometer with integral display, remote sensor and sensor cable

Optidew

- -40 to +120°C dewpoint measurement range
- Dewpoint accuracy of $\pm 0.15^\circ\text{C}$
- 1-Stage or 2-Stage Peltier cooling
- Automatic contamination compensation
- Data logging SD card
- Built-in data hold function
- Analog and digital outputs
- Transmitter or display models
- High temperature sensor available

OPTISURE and S4000TRS

Ultimate in Dewpoint Monitoring



The Optisure and S4000TRS family feature the most accurate and versatile optical hygrometers available in the marketplace today. Key features include:

Models

Optisure Integrale

- Lightweight with measurement range to -60°C
- Triple display: 10 parameters (dewpoint, RH, temperature, pressure, etc.) available in each window

Optisure Remote

- Remote sensor in a compact housing
- Climactic version: dewpoints to $+120^\circ\text{C}$

Optisure RS

- Temperature-controlled sensor body for dewpoint measurements to -90°C (92 ppb)

S4000TRS*

- Temperature-controlled sensor body for dewpoint measurements to -100°C (13 ppb)

Product Highlights

- Dewpoint measurements from -90°C to $+120^\circ\text{C}$
- Dewpoint accuracy and resolution $\pm 0.1^\circ\text{C}$
- Dewpoint, temperature and %RH display and output
- 3-stage thermoelectric heat pump
- Automatic contamination compensation
- Current, voltage and RS232 digital outputs, USB, ethernet, and SD card
- Dual optics detection system
- Precision platinum resistance thermometer
- Microscope to monitor condensation on mirror
- Optional pressure compensation
- Built-in data hold function

*The S4000TRS also features our unique "speed pipe" technology that improves the response speed at trace moisture levels. The "speed pipe" concentrates the formation of ice crystals on the mirror surface and can reduce response time at trace moisture levels by a factor of four times.

KAHN: The Ultimate Standard in Moisture Measurement Technology

Applications



Motor Vehicle Emissions Testing

Measurement of motor vehicle emissions such as nitrous oxide, carbon monoxide, lead and residual hydrocarbons is affected by humidity. By precisely measuring dewpoint, Kahn optical hygrometers help ensure an accurate determination of emissions concentrations.



Calibration Reference Testing

Instrument manufacturers, calibration laboratories and other end users utilize Kahn optical hygrometers as reference standards when verifying the calibration or performance of relative humidity probes or dewpoint sensors



Electronic Component Manufacturing

Moisture is an unwanted contaminant in the manufacture of semi-conductors, integrated circuits and other electronic components. Kahn optical hygrometers are used to monitor dewpoint levels in gases used in production processes and to control humidity in fabrication and assembly areas.



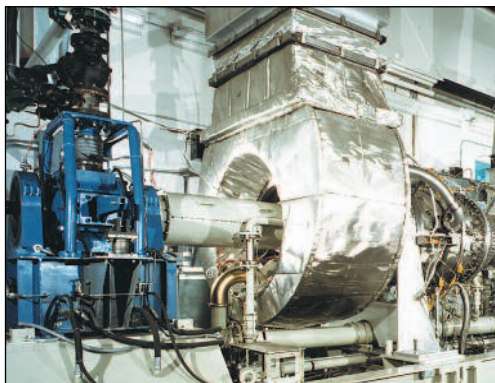
Utility Switchgear Performance Monitoring

Sulfur hexafluoride (SF₆) is used by electric utilities as an insulating gas in high voltage switchgear. Because humidity compromises the ability of SF₆ to insulate, Kahn optical hygrometers are used to monitor its dewpoint and preserve the integrity of vital utility company equipment.



Heat Treating

Annealing, carburizing and other heat treat processes require precise monitoring and control of moisture content. Kahn optical hygrometers allow manufacturers and independent heat treaters to control the quality of their processes, minimize scrap and ensure compliance with quality standards including ISO 9000.



Gas Turbine Inlet Air Monitoring

The moisture content of air drawn into industrial gas turbines must be monitored to optimize combustion and minimize harmful emissions. Durability and accuracy of moisture measurement instrumentation are essential. These benefits are provided by Kahn optical hygrometers to turbine manufacturers and users worldwide.

Count on Kahn Experience

Kahn, a leader in pneumatic, hydraulic and electronic technology for over 70 years, provides innovative solutions to practical measurement problems. Since Kahn's first moisture measurement designs were introduced 60 years ago, we have manufactured high quality, durable hygrometers for many specialized applications, often under demanding conditions. Our long-standing success in customer satisfaction and our expanding product line ensure that Kahn can provide you with hygrometers to suit all your needs.

Kahn provides technical support and maintenance for all of its equipment, from the earliest models to the latest innovations. Our hygrometers are also backed by the finest warranty in the industry: One full year on calibration and workmanship for both the instrument and sensor.

Some Satisfied Customers

Air Products
Cargill
Dow DuPont
Duke Energy
ExxonMobil
Ford
General Electric
General Motors
Harvard University
Hewlett Packard
Honeywell
IBM
Intel
Lockheed Martin
Merck
NASA
National Weather Service
Pratt & Whitney Aircraft
Qualcomm
Spectra Energy
Tennessee Valley Authority
Texas Instruments
U.S. Navy
United Technologies

The calibrations of Kahn hygrometers are traceable to the National Institute of Standards and Technology. Sensors are calibrated through a master optical hygrometer which has been calibrated at the NIST and is periodically re-calibrated. A certificate of traceability is provided with any of these instruments.

CHILLED MIRROR HYGROMETER SPECIFICATIONS

	Optidew Wall Mount	Optidew Bench Top	Optisure Integrale	Optisure Remote	Optisure RS	S4000TRS
GENERAL						
System Accuracy	±0.15°C	±0.15°C	±0.1°C	±0.1°C	±0.1°C	±0.1°C
Repeatability	±0.05°C	±0.05°C	±0.05°C	±0.05°C	±0.05°C	±0.05°C
Digital Display	Color LED Touch Screen	Color LED Touch Screen	Color LED Touch Screen	Color LCD Touch Screen	Color LCD Touch Screen	Dual Meters
Units	°C, °F, %RH g/m3, g/kg, ppm Twb, Psi, kPa, Bar	°C, °F, %RH g/m3, g/kg, ppm Twb, Psi, kPa, Bar	°C, °F, %RH g/m3, g/kg, ppm Psi, kPa, Bar	°C, °F, %RH g/m3, g/kg, ppm Psi, kPa, Bar	°C, °F, %RH g/m3, g/kg, ppm Psi, kPa, Bar	°C, °F, %RH g/m3, g/kg, ppm Psi, kPa, Bar
Outputs	4-20 mA 0-20 mA RS485 Alarm relay SD Card Ethernet (optional)	4-20 mA 0-20 mA USB RS485 Alarm relays SD Card Ethernet (optional)	4-20 mA 0-20 mA 0-1V USB Alarm relays RS232 (optional) RS485 (optional) Ethernet (optional)	4-20 mA 0-20 mA 0-1V USB SD Card Alarm relays RS232 (optional) RS485 (optional) Ethernet (optional)	4-20 mA 0-20 mA 0-1V USB SD Card Alarm relays RS232 (optional) RS485 (optional) Ethernet (optional)	4-20 mA mV/°C RS232
Sensor Location	Remote	Remote	Integral	Remote	Integral	Integral
Configuration	Wall Mount	Bench Top	Bench Top or 19" rack	Bench Top	Bench Top	Bench Top or 19" rack
Pressure Measurement	Optional	Optional	Optional	Optional	Optional	
Power Requirements	100-240 VAC 50-60 Hz	85-264 VAC 47-63 Hz	85-264 VAC 47-63 Hz	85-264 VAC 47-63 Hz	90-265 VAC 50-60 Hz	
Dimensions						
Monitor Dimensions HxWxD	7.1" x 10.2" x 2.7"	6.8" x 8.7" x 4.7"	7.5" x 10.0" x 8.4"	7.5" x 10.0" x 8.4"	7.5" x 17.5" x 21.6"	34" x 22" x 24"
Sensor Dimensions L x Dia.	5" x 1.8"	5"L x 1.8"	Includes sensor	5"L x 1.8"	Includes sensor	Includes sensor
Weight						
Monitor	3.3 lb.	3.3 lb.	25.1 lb.	9.3 lb.	49.4 lb.	187 lb.
Sensor	7 oz.	7 oz.		0.7 lb.		
Dewpoint Sensor						
Measurement Range	-25°C to +90°C (Single Stage) -40°C to +90°C (Dual Stage)	-25°C to +90°C (Single Stage) -40°C to +90°C (Dual Stage)	-60°C to +40°C	-40°C to +90°C -40°C to +120°C (Optional)	-80°C to +20°C (RS80) or -90°C to +20°C (RS90)	-100°C to +20°C
Dewpoint	-40°C to +120°C (Harsh Environment)	-40°C to +120°C (Harsh Environment)				
Operating Pressure	360 Psig Max.	360 Psig Max.	Vacuum to 290 Psig	Vacuum to 3625 Psig	Vacuum to 145 Psig	Atmosphere
Operating Temperature						
Standard Sensor	-40°C to +90°C	-40°C to +90°C	-20°C to +40°C	-40°C to +90°C*	+5°C to +30°C	0°C to +40°C
Electronics	20°C to +50°C Harsh Environment Sensor: to +120°C	-20°C to +50°C Harsh Environment Sensor: to +120°C	-20°C to +50°C	-40°C to +120°C (optional)	-20°C to +30°C	0°C to +40°C
Sample Flow Rate	0.1 to 2 L/min.	0.1 to 2 L/min.	0.1 to 1 L/min.	0.1 to 2 L/min.	0.5 to 1 L/min.	0.1 to 0.7 L/min.