EASIDEW TRANSMITTER
with Current Source Output

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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1. INTRODUCTION

1.1 General

The Easidew Ceramic Dewpoint Transmitter measures dewpoint in the range -148 to +68°F. Current output is standard and factory set at 4-20mA. The Easidew operates as a 4-20mA Transmitter providing a linear analog output to an external control or monitoring device.

1.2 Ceramic Sensing Element

Easidew utilizes the Kahn ceramic moisture sensor manufactured from metalized ceramics using thin and thick film technologies. The Kahn ceramic moisture sensor is virtually chemically inert with inherently fast response, high calibration stability and high resistance to corrosive environments. The Easidew Transmitter measures humidity by monitoring the electrical response exhibited by the sensor to variations in partial pressure of water vapor of the gas composition to which it is exposed.

1.3 Calibration

Calibrations are performed using precision dewpoint generators and transfer standard optical hygrometers which have been calibrated directly at the National Institute of Standards & Technology **(NIST)** Gaithersburg, MD, USA.

1.4 Manufacturing Quality

Your Easidew Transmitter should reach you in perfect working condition. We have rigorous procedures at every stage of production to ensure that the materials of construction, manufacturing, calibration and final test procedures meet the requirements laid down by our quality system.

1.5 Easidew Identification

The Easidew Transmitter can be identified by a serial number label located on the outside of the Easidew Transmitter housing.

2. MECHANICAL INSTALLATION

Just prior to installation of the sensor, remove the protective plastic cover and retain for future use.

The Easidew Transmitter is provided with a 5/8"UNF parallel mounting thread that renders it suitable for housing in its optional flow-through sample block. The body of the Easidew Transmitter is designed to mate with the bonded seal provided.

If the Easidew Transmitter is to be mounted in the optional sample block, appropriate gas couplings should be selected and screwed into the female 1/8"NPT (taper) threads provided. Sample gas flow can be in either direction through the block.

The Easidew Transmitter, when mounted in a sample block, is sufficiently light that no special arrangements need be made to secure it providing it is connected into a stainless steel tubing system of 6mm or 1/4" OD. If smaller diameter stainless steel, or PTFE tubing is used, it may be necessary to secure the sample block against a suitable panel or wall using a spring clip.

With the Easidew Transmitter the bonded seal provided should be placed over the sensing part of the transmitter before it is screwed into the sample block. This arrangement is designed for operation at pressures of up to 5000 PSIG. For direct insertion installations, the pressure rating of the Easidew Transmitter is also 5000 PSIG. If pressure certification is required please consult the Kahn Sales Department or your nearest representative.

Although the operation of the Easidew Transmitter is not sample flow-rate dependant it is important to ensure that the flow velocity through the sample line connecting the gas source to the sampling block is high enough to avoid long time lags in response to changes in humidity at the source. We therefore recommend a flow rate of 2 to 10 Standard Cubic Feet per Hour (SCFH) be set when the Easidew Transmitter is mounted in the standard sample block. In direct insertion applications, a wide range of gas flow velocity passed across the Easidew Transmitter is acceptable. Flow velocities up to 30 feet/second are acceptable with the protection given by the standard sintered guard.

3. OPERATING PRECAUTIONS

Precautions should be taken to protect the Kahn Ceramic Moisture Sensor from damage. Statistical information indicates that the vast majority of failures are caused either by incorrect sampling methods, sampling positions or inadequate protection against dangerous substances.

3.1 Sampling Hints

As mentioned in section 2.0, the Easidew Transmitter can be provided with an optional sample block that will enable a small sample of process gas to be diverted past the ceramic sensing element before returning to the main gas stream or being bled off to atmosphere. Alternatively, the Easidew Transmitter can be mounted directly into a flowing gas stream in a duct or pipe, provided there is not any form of contamination within the duct/pipe that will damage the ceramic sensing element. (See Section 3.3).

Sample system guidelines:

a) Ensure the sample is representative of the gas under test.

The sample point should be as close to the critical measurement point as possible. For example in a glove box application, mount the Easidew Transmitter at the exit of the glove box, not at the gas entry point.

b) Minimize dead space in sample lines.

Try to avoid too many tee pieces or unnecessary tubing. Where possible build up sample tubing specifically for the job and do not use tubing previously installed for another application. Dead space in sample lines increases response time by holding water molecules that are released to the passing gas sample.

c) Remove any particulate matter or oil from the gas sample.

The ceramic sensing element of the Easidew Transmitter is protected against particulate contamination by the standard 80µ sintered guard. This protects against physical damage caused by large particles at high velocity such as rust in a compressed air line. However, fine particles will not be prevented from contact with the ceramic sensing element. If high concentrations of fine particles are present in the sample flow they may "blind" the ceramic sensing element and reduce its response speed. If the Easidew Transmitter is installed in a sample block and particulates such as desiccant fines or pipe rust are present, use a particulate in-line filter. Kahn Technical Sales staff will be pleased to give advice in this area.

d) Use high quality sample tubing and fittings.

We recommend the use of stainless steel tubing and fittings. This is particularly important at low dewpoints since other metals have unacceptable characteristics and absorb moisture through the pipe walls, slowing down response and in extreme circumstances giving false readings. For temporary applications, or where stainless steel tubing is not feasible, use high quality, thick-walled PTFE tubing as this exhibits similar characteristics to stainless steel.

Always use the shortest run of tubing possible between two points. Use the smallest internal diameter tubing possible to reduce response time, but take care not to induce pressure differentials by aiming for too high a flow rate through small diameter tubing. A sample flow up to 2-10 SCFH (or equivalent at pressure) will be satisfactory for the Easidew Transmitter to operate correctly.

3.2 Response Characteristics

Many factors will affect the speed at which the Easidew Transmitter will give a satisfactory result. However, speed of response will increase if, **l**ike the vast majority of applications, your Easidew Transmitter is being used to detect an increase in moisture content of your sample gas. That is because it is much easier for the Easidew Transmitter to detect an increase in moisture content than to respond to a decrease. This is similar in principle to the way it is easy to make a sponge wet, but more difficult to dry it out afterwards. Most materials that are not hygrophobic have similar characteristics and it is these which prevent the Easidew Transmitter from responding in a real-life application as quickly as under test conditions.

However, since response characteristics from dry to wet are orders of magnitude faster than from wet to dry, the effective response speed of the system to leaks, ingress of moisture, etc. is very fast. In an application such as dryer monitoring or glove box monitoring, the Easidew Transmitter will respond in a few seconds to an increase in moisture content.

In practice, the time taken to dry down the Easidew Transmitter from ambient conditions to the operational dewpoint level of the process will normally be shorter than the time taken to dry down the process itself. Therefore when the Easidew Transmitter is installed into the system prior to system start-up, there is normally no time lag before representative test results are obtained.

When a new Easidew Transmitter is installed into an operational system, then typically 15-30 minutes should be allowed for the tubing, filter and the Easidew Transmitter to reach equilibrium with the sample gas.

3.3 Which Gases to Measure

The Easidew Transmitter by nature of its design, is suitable for measurement of the moisture content of a wide variety of gases. In general, if the gas in conjunction with water vapor is not

corrosive to ceramics or base metals then it will be suitable for measurement by the Easidew Transmitter.
However gases containing entrained solids or hydrocarbon mists should be filtered before exposing to the Easidew Transmitter.

High purity gases will not be contaminated by the Easidew Transmitter. It has no components that are likely to outgas (epoxy, plastics, etc.) and therefore is safe for use in critical semiconductor and fiberoptic applications.

High pressure samples may be measured up to a maximum of 5000 PSIG. Make sure that the correct tubing fittings are used and that the bonded seal provided is used to seal the radial face of the Easidew Transmitter sensor block seal.

Similarly the Easidew Transmitter is suitable for measuring samples below atmospheric pressure. Care should be taken at joints and tube fittings that no leak exists which could allow ambient air to contaminate the sample gas. If there is doubt, a standard leak test procedure should be employed (helium or vacuum seal).

4. MAINTAINING THE EASIDEW TRANSMITTER

Routine maintenance of the Easidew Transmitter is confined to regular re-calibrations. This work can only be done by exposure of the Moisture Sensor to sample gases of known moisture content. Calibration services traceable to NIST are provided by Kahn Instruments. Contact Kahn Instruments or your local representative for further details.

The frequency of re-calibrations required in order to maintain the performance of the Easidew Transmitter is primarily dependant on the composition of the gas to which the moisture sensor is exposed, i.e. content of liquid and particulate contaminates, corrosive elements, etc. In most applications annual re-calibration ensures that the stated accuracy of the dewpoint transmitter is maintained.

5. TECHNICAL SPECIFICATION

Sensor type	Kahn Ceramic Moisture Sensor
Gas wetted components	316 Stainless steel
Sensor thread	5/8”UNF
Ingress protection	IP65 standard IP67; NEMA 4 optional
Electrical connection	DIN-type 4-way connector
Power	12V to 28V regulated or unregulated DC supply. Reverse polarity protected
Output	4-20mA current source over the entire dewpoint range
Range	-148 to +68°F dewpoint
Accuracy	±3.6°F
Operating temperature	-40 to +140°F
Temperature compensation	Temperature compensated from -4°F to +104°F
Storage temperature	-40 to +158°F
Operating pressure	5000 PSIG
Flow rate	2 to 10 SCFH
Gas Velocity	Max 30 feet per second (80µ sintered guard)
Weight	0.33 lbs

Fault conditions

Condition	Output
Sensor fault	0ma
Over-range dewpoint	23ma

Sensor cable

A pair of 22 AWG stranded, copper conductors, insulated with polypropylene, twisted together with a common copper drain wire, wrapped in aluminized polyester tape and enclosed together with a second similar pair in a PVC outer sheath. Max length 3000 feet.

6. EASIDEW TRANSMITTER ELECTRICAL CONNECTION

All connections to the Easidew are made via a 4-way DIN-style connector. The connector has its terminals labeled 1, 2, 3 and G.

Below is a diagram (Fig 1) describing the Easidew electrical connections:

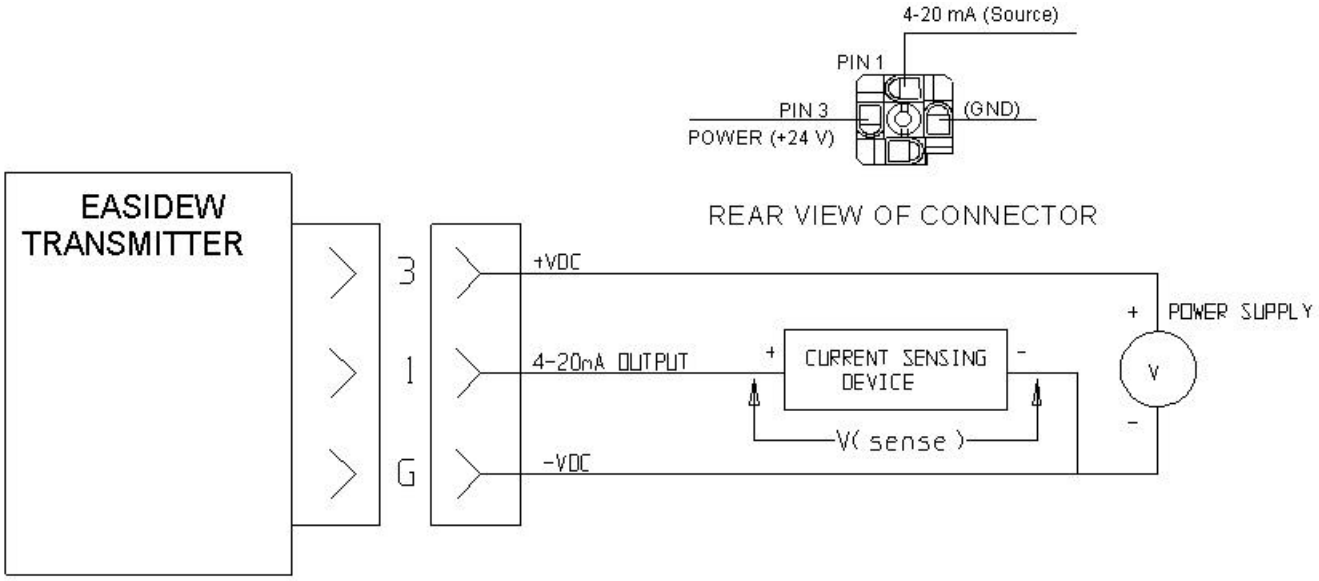

Figure 1 Electrical connections.

To measure the current, a current sensing device must be inserted in series with the current output (source) line as shown above in Fig. 1. The sensing device can be a current shunt resistor that converts the current into a voltage. To calculate the shunt resistor value, the following formula must be used:

Rmax(shunt)=740-[38.1 x (24-Vsupply-3.2)]

Formula above can be rewritten to calculate the minimal power voltage required for a given shunt resistance:

Vmin(supply)=(Rshunt +174)/38.1

Example 1. If a voltage span of 2 to 10V is required the shunt resistor =10V / 20mA = 500 Ohms.

Vmin(supply)=(500+174)/38.1=17.7 VDC

Example 2. For a sense voltage range of 1V to 5V a 250 Ohm shunt resistor can be used.

Vmin(supply)=(250+174)/38.1=11.1 VDC

For accurate current to voltage conversion, a precision resistor should be used (i.e. 0.1% tolerance). Shunt resistor power rating: $P=I^2 \times R$

The 3-wire connection to the Easidew Transmitter for current measurement can be made with a recommended cable supplied by Kahn Instruments. The cable is a pair of 22 AWG stranded, copper conductors, insulated with polypropylene, twisted together with a common copper drain wire, wrapped in aluminized polyester tape and enclosed together with a second similar pair in a PVC outer sheath. The maximum cable length must not exceed 3000 feet. Other cable can be used but must at least equal the specification described above.

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