Instruction Manual For Rotronic GT-Series of Portable Indicators

(This series was discontinued in 1991)

Introduction

The GT Series of portable instruments provide accurate and precise measurements of humidity and temperature. Advancements in sensor and integrated circuit technology has made it possible to achieve outstanding performance from a hand-held instrument. Through the use of the GT-series instruments and by proper application of basic procedures when obtaining humidity measurements the data will be reliable and dependable.

The series consists of:

- GT-L indicator of ambient conditions.
- GT-S uses to measure the %Equilibrium Relative Humidity in stacks of paper.
- GT-P Used to measure in granulated and power products.

Technical Description

The new C80 humidity sensor developed by Rotronic is a solid state device which changes its electrical characteristic at extremely small changes in humidity. These changes are detected, amplified and displayed by unique electronic circuitry specifically designed for maximum performance. The temperature sensing system also uses integrated circuit technology in combination with an accurate temperature element (Pt100) to produce high quality data.

Operation

The instrument may be operated from a standard 9-volt battery or a rechargeable battery. The use of alkaline batteries is recommended for longest operation between battery replacement,.

Functions	Controls
On - Off	Black push button on the right side
RH-Temp Selector	White push button on the right side
Display	3 digit, LCD type. A small segment on the left side of the display indicates the parameter being displayed.
Battery Test	Push button on the front side. Depress with the instrument on to display battery charge. Zero or negative reading indicates battery change is required.
Calibration	Potentiometer on the front side, covered by a cap.

Measurement practices

Before taking a measurement the operator is requested to read the following paragraphs which descripe some of the fundamental good practices when performing humidity measurements. These are common to the measurement of (and understanding) of humidity testing.

These indicators are ready to use 10 seconds after turning on. Accuracy and reliability of a measurement depend upon the sensing elements of the GT-series being in equilibrium with the environment to be measured.

Important: Before a correct reading can be done, the probe and the medium to be measured must be at the same temperature and in equilibrium with the humidity. At 50% RH a temperature difference of ±1°C results in an error of ±3%RH.

The time required for the sensing elements to get in equilibrium with the product to be measured can vary from 1 to 30 minutes depending on:

- difference in humidity and temperature between product and probe at the beginning
- stability of the parameters during the measurement time
- the speed at which water vapor can be interchanged between sensing element and the ambient.

The humidity display will give the operator an excellent indication of the status of measurement. By using the 3rd digit of the display small fluctuation can be observed and the trend toward equilibrium will become defined. Equilibrium is reached when this digit oscillates around an average value. For accurate measurements following practices should be followed:

- Keep the product and the probe in an area where there is no air drafts or heating/air condition cycling.
- Avoid have the product or probe in sunlight. This produces temperature variation, thereby influencing the humidity measurement.
- Avoid making any measurements where there are water sprays, steam sprays, dripping water etc.
- Do not use probes in dusty/dirty environments unless equipped with proper dust filters.
- Never clean out the dust filter using pressurized air.
- Never place your hand directly over the sensing element to see response time and then place the probe in the product, expecting quick equilibrium. This practice produces a new condition for the probe and equilibrium can take longer.

A displayed value above 100% is usually an indication of condensation in the sensing element and/or in the assembly. Condensation does not damage the probe and does not change the calibration. The probe can be restored by drying it in a light air flow like 1 m/ sec. This drying period of 2-4 hours can be reduced by slightly heating the airflow up to 40 or 50°C.

<u>Measurement In Gases</u>

The instrument GT-L is designed for measurement in gases. Because the heat transfer between gases and solids is very slow the probe was designed with very little mass to speed up the time constant. The GT-L probe can be used in still or moving air. Adaptation to the environment is 4 times faster in air with a movement of 1 m/sec. as opposed to a measurement in still air. The sensor can operate satisfactorily in air movements up to 3 m/sec.

As mentioned, never place your hand over the sensor. The sensors are fast responding units and the best manner to observe response is by placement into the product.

To make the measurement:

1. Turn power on.
2. Wait approximately 10 seconds
3. Hold the instrument in your hand and with a slight waving motion, move the unit back and forth to create air movement near the sensor to speed up equilibrium
4. Press the white button to select the parameter to be measured
5. Depress power switch to off and repeat 1 thru 4.

Measurement of paper stacks

The blade of the GT-S was designed to come to temperature equilibrium as quickly as possible to shorten the overall response time. As this response time depends not only on the surface of contact but also on the mass of the metallic parts, this probe could not be designed to be strong enough to be introduced by force in a stack of paper or to raise a stack. Therefore any attempt to use this probe as a sword or as a lever will result in a bent blade.

The probe should be introduced in the stack by raising by hand the paper above the measuring point. Avoid any friction of the blade against the paper as this would generate unnecessary heat and increase the measuring time. The same precautions should be taken when removing the probe from the stack to measure further stacks. It is recommended after roughly 30 sec. to move the probe a few mm in order to let its opening come in contact with fresh paper, a procedure which accelerates the measurement. Avoid touching the blade with the hand because of the influence of temperature.

Provided that the temperature of paper and probe are not too far apart, a measurement requires only a few minutes. In case of doubt, monitor the probe temperature which must be stabilized before the reading can be done. This probe has no dust filter and must not be used for measuring powders, granulates, pastes etc.

Measurement of powders, granulates, grains, bales etc.

The instrument GT-P is used to measure % ERH or Aw in batches of powder, granulates, grains etc. without taking a sample. To make the measuremnent, the probe is inserted well into the product. The sensor is located in a small chamber at the tip of the probe and is protected by a dust filter. The tube of the probe is made entirely of metal so that the probe may rapidly adapt to the product temperature.

Sticky products that could clog the dust filter cannot be measured. The dust filter can easily be removed to be cleaned by unscrewing the tip to the probe. This filter must be cleaned from time to time as a dirty filter slows down the response time and this may lead to erroneous readings. By often calibrating the probe at the beginning it is possible to determine how often the filter should be cleaned.

Calibration

The GT-Series along with all Rotronic units are carefully calibrated prior to shipment. We recommend checking calibration at least once a year.

Temperature Calibration

Temperature calibration is done at our factory before the instruments are shipped. Due to the type of temperature sensing element and the nature of the electronic circuit, temperature measurements are extremely stable and practically require no calibration. If the temperature needs calibration It is recommended that the unit be returned for service.

Humidity Calibration

The Rotronic instruments present the advantage that they can be calibrated by the user. Calibration devices adapted to each model seals the sensing element in a small chamber that is air-tight enough for the normal duration of a calibration. A humidity calibration solution is introduced into the calibration device that generates a

known % RH. When equilibrium is reached, the display of the instrument indicates the value of the humidity solution being used

Humidity Standards
Rotronic humidity standards are Non-saturated solutions of Lithium-Chloride. These solutions are available in sets of 5 sealed ampoules which may be stored indefinitely. The Lithium-Chloride solutions do not present any danger as they neither produce any harmful fumes nor is their contact dangerous. They are toxic only if swallowed in large quantities. It is recommended that metallic parts that have come in contact with the solution be cleaned. Each calibration set (5 ampoules of the same % RH) is delivered in a box including 5 fiber disks.

Calibration Procedure
The procedure indicated in this manual must be followed step by step in order to get the expected accuracy of calibration.

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The procedure indicated in this manual must be followed step by step in order to get the expected accuracy of calibration. These procedures allow for one-point calibration. Normally this is done with a 50% RH calibration solution. If your digital reading disagrees by more than 10%, it is suggested that the unit be opened and a full calibration be done or the unit returned to the factory. Full calibration is accomplished at 35 and 80% RH.

Important:
During a calibration it is necessary to calibrate in a room at constant temperature and avoid any thermal effect that may interfere with the calibration: air draughts, sun rays, heater, fan etc.

Procedure

1. Unscrew cover.
   GT-S Remove insertion ring.
2. Insert the probe in the calibration device:
   GT-S Push the probe in the calibration device, the openings of the probe facing the opening of the calibration device.
   GT-L and GT-P Push the probe well inside the calibration device and tighten the sealing ring.
3. Place a cloth disk in the cover of the calibration device and empty content of one ampoule on it. Before breaking the ampoule, shake it to make sure that all the solution will be used.
   GT-S Put insertion ring back in place, metallic part against the cloth disk. Hold the probe and calibration device, opening looking downwards and screw cover back into position.
   GT-L and GT-P Hold the probe and calibration device, opening looking downwards and screw cover back into position.
   Make sure that the solution does not come in contact with the probe during and after this operation.
4. Allow enough time before checking the reading (30 to 40 minutes).
5. Remove cap on the front side and adjust potentiometer with a screwdriver. Put cap back in place.
6. After a calibration throw away the fiber disk. Wash and dry carefully the calibration device.