INSTRUCTIONS MANUAL FOR INFRARED MOISTURE

BALANCE RSMA-1 & RSMA-2

Infrared Moisture Balance



INTRODUCTION:

Infrared Moisture balance is specifically used for measuring the moisture contents of materials that do not change their chemical structure while losing water under exposure to infrared radiations. This instrument is widely used for testing soils used in construction, agricultural soils, chemicals, raw-materials, foods, pharmaceuticals, plastics and similar materials. Since drying and weighing are simultaneous, the Infrared Moisture Balance is used for determining the moisture contents percentage in substances that quickly reabsorb moisture after drying. The intensity of the infrared lamp can be continuously varied from 0 to 250 watts using the Solide-State control device. As a result greater panetration of heat is posible than in conventional methods.

SPECIFICATIONS:

Capacity:

Balance is available as 5 grams standard Instrument (5 grams torsion wire). However the Instrument is also available in capacities 10,20 and 25 grams upon request against order specifications.

Scale Range: 0-100%

Least Count: 0.2%

Probable Error: ±0.25% in substances containing moisture up to 25% and ± 0.5% on samples containing moisture above 25%

Input voltage: 220 volt (AC), 50 Hz

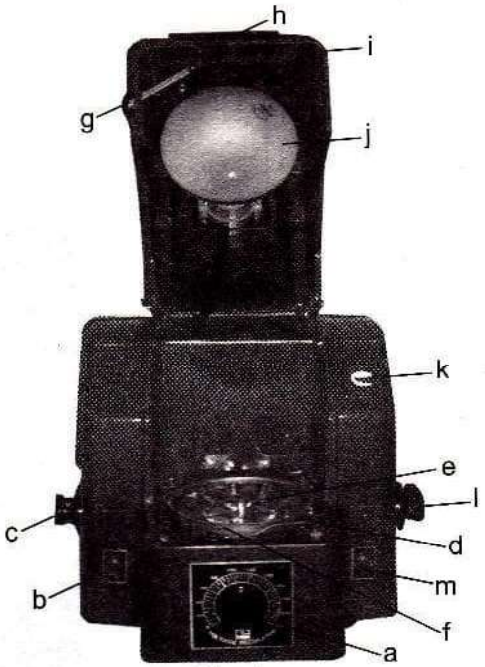


Fig.1

PARTS DESCRIPTION:

(a) Solid-State Control Device:	To Control the intensity of infrared radiation
(b) Left side switch:	Mains ON/OFF switch
(c) Left side Knob:	To position the pointer
(d) Grip assembly with clamp:	Holds the sample pan in place
(e) Sample Pan:	Used as a receptacle for test material
(f) Retainer Pan:	Acts as an arrest for the sample pan
(g) L bend Thermometer:	Indicates the temperature of the drying chamber
(h) Handle:	Lifts the lamp frame
(i) Lamp Frame:	Protects the lamp and provides drying chamber
(j) Infrared Lamp:	Provides necessary heat to conduct experiment
(k) Scale viewer:	Shows the scale
(l) Right side Knob:	Rotates the scale
(m) Right side Switch:	Turns the scale lamp in "on" and "off 'Position
(n) Index:	Reference Line. (Refer to fig. 2)
(o) Pointer:	Indicates the moisture content Percentage of the Sample. (Refer to fig. 2)

Set Up:

Lift the lamp frame by the handle on the front side of the instrument. Release the sample pan clamp by pulling on the grip assembly and place the clamp on the side as shown in fig. I . Sample pan should rotate freely on the tip of the retainer pan. However if the sample pan does not moves freely when spinned, the tip may be slightly adjusted for center positioning which is located beneath the sample pan.

Step by Step instructions for maximum precision

1. Connect the Mains cord to 220V (AC), 50 Hz Supply.
2. Make sure that the Solid -State control device is in "off' position.
3. Turn the Mains switch "on", now using the switch on the right side of the instrument turn "on" the scale lamp.
4. By turning the scale-adjusting knob adjust the scale until the 100% mark coincide with the reference line.
5. Use the pointer-positioning knob and coincide the pointer with the reference line. Do not disturb the pointer-positioning knob from this point forward.
6. By now the reference line, pointer and the 100% mark on the scale should coincide.
7. Rotate the scale until the 0% mark coincides with the reference line.
8. The pointer is now above the reference line.
9. Carefully distribute the test material equally on the disposable sample pan until the pointer coincides with the reference line. The quantity of the sample to be tested should approximately be the same as the capacity of the instrument. For example 5 grams of sample is needed for the standard 5-gram Rico make I.R.
10. Close the lamp frame and turn "on" the infrared lamp by rotating the Solid-State control device in a clock-wise direction.
11. Set the desired temperature settings for conducting the experiment. (Refer to Trial & Error method given below).
12. The sample begins to lose moisture and the pointer rises above the Index, simultaneously rotate the scale slowly so that the pointer is visible on the scale viewer.
13. When the pointer slows rising, give it a few minutes and the pointer will come to a stop. Now rotate the scale to coincide the pointer and the Index and simply record the final moisture contents percentage of the sample.

NOTE:

Temperature settings vary for different materials and must be known for the material being tested. Temperature settings can be determined by following the trial and error method.

Trial & Error Method

Place the material to be tested on the disposable sample pan. Set the Solid-State control device at an arbitrary temperature and turn on the infrared lamp. Observe the results.

If discolouration or smoking of the sample is caused, it is due to excessive heat and it indicates the release of volatile matter other than moisture. Repeat the experiment only this time with reduced temperature settings until the proper drying temperature is determined. It is suggested to keep the temperature at its minimum to obtain accurate results however the experiment will take longer time.

FORMULA :

To determine the percentage reduction of weight at any time during the drying operation, rotate the scale by turning the scale-adjusting knob until the pointer returns to the index. Read the percentage of moisture lost, based upon the intial weight of the sample. To convert this number to the percentage of moisture on by dry basis, use the formula :

$$'p' = \frac{100xP}{100\text{-}P}$$

Where P is the percentage of moisture lost by the sample, and `p' is the percentage of moisture on the dry basis. The formula can be applied as needed to individual cases, or it can be used to make a chart showing "p" for different values of P.

EXAMPLE:

Where P = 20% lost by sample on wet basis.

$$\text{Therefore } 'p' = \frac{100 \times P}{100 - P}$$

$$\frac{100 \times 20 = 2000}{100 - 20 = 80} \qquad = 25\% \text{ on Dry Basis}$$

Maintenance:
With normal care and proper usage, the Infrared Moisture Balance will be reliable over a period of many years.

Fig. 2 Top view of the Moisture Balance with the upper part removed to reveal mechanism.

a.& b) Four Screws connecting the upper and lower part of the Instrument.
c) Damping Magnet
d,e & f) Brass clamps
g) Spring Assembly
h) Three pin socket
i.) Pointer gear wheel
j) Arresting Arm
k) Torsion Wire
l) Scale wheel
m) Scale pan arrester
n & o) Pit
p) Pointer
q) Index

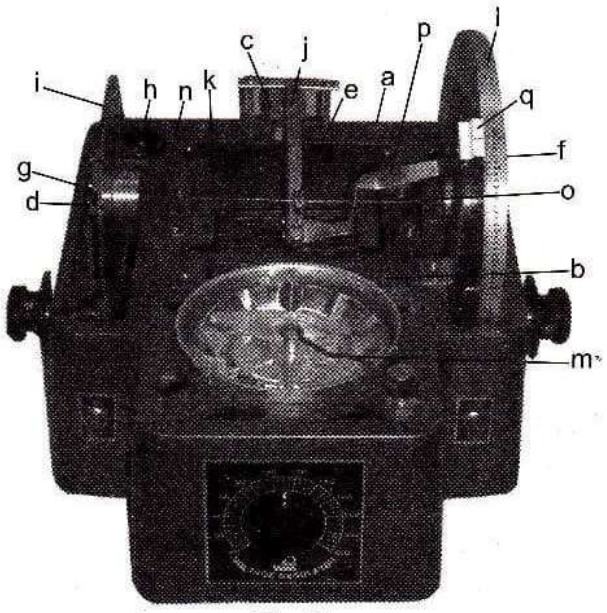


Fig.2

Troubleshooting: -

1.) When it becomes necessary to replace the torsion wire, follow the guidelines given below.

(a) Notice that four screws (a&b) hold the upper and lower part of the Instrument.

(b) Lift the lamp frame and remove the two screws in the sample compartment.

(c) Close the lamp frame and remove the other two screws, located at the rear of the instrument.

(d) The upper and the lower part of the instrument are connected electrically through a three- pin socket (h) at the rear of the instrument. Remove the plug from the socket and carefully lift the upper part.

(e) The torsion wire goes through three brass parts, which act as clamps for torsion wire. On each clamp two screws are compressing the torsion wire. These clamps are located on the scale wheel, pointer gear and the arresting arm.

(f) Both the pointer gear and the scale wheel are to be rotated until the two screws on the clamps are easily assessable from the top.

(g) Loose these screws on both sides.

(h) On the pointer gear, the torsion wire goes through the clamp and a spring assembly which has to be pressed until the torsion wire is relieved of all tensions.

(i) In the center the torsion wire goes through a clamp on the arresting arm. Now loose these two screws and remove the defective torsion wire.

(j) Replace the torsion wire with the additional wire which is supplied with the standard accessories.

(k) Now carefully install the new torsion wire between the clamp on the gear wheel (d) and spring assembly (g). Making sure that the torsion wire is in the centre of the pit (n), tighten the clamp on the gear wheel (d). Place the wire between the clamp on the arresting arm (e), through the centre of the pit (o) and between the clamp on the scale wheel (f).

(l) Leave about 5/8 of an inch of wire from both clamps on the gear wheel and the scale wheel.

(m) Notice that the wire creates a groove in the clamps, so when installing the new wire slightly rub the surface of clamps with ambre paper for smoother surface and thus the wire can be compressed properly.

(n) Pull the wire with a Plier from the other end of the clamp on scale wheel making sure that it is tightened properly and in the center of the pit fasten the screws on the clamp.

(o) Now when both the ends are tied, coincide the 100% mark on the scale with the index.

(p) Make sure that the pan spins freely in the retainer. However if the sample pan does not moves freely when spinned, the tip may be slightly adjusted for center positioning which is located beneath the sample pan.

(q) Also make sure that the rear of the arresting arm is in the center of the damping magnet and tighten the clamp on the arresting arm.

(r) Lift the upper part of the instrument and connect the three-pin plug to the socket. Now carefully place the upper part on the base and fasten the four screws (a) & (b).

If any problem occurs which cannot be rectified immediately contact the nearest Sales/Service department of the company.