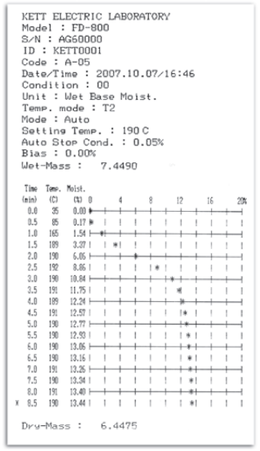
Option

VZ-330
Printer

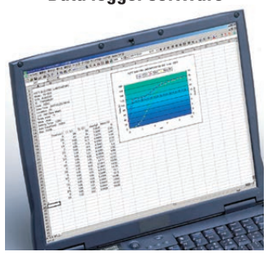
Example of VZ-330 output



FW-100
Windshield with Deodorizer

FW-100 can be installed within the FD-800 to reduce errors caused by the influence of external airpflow on the high precision balance. Further, since a deodorizing filter is provided on its upper portion, it is also possible to reduce odours created during heat drying.

FDL-01
Data logger software



By connecting the FD-800 to a PC in which the "Data logger software FDL-01" and MS Excel® are installed, it is possible to transfer and save the measurement data to the PC in real time. Also, it is possible to display the recorded measurement data graphically, so that the moisture and temperature condition changes can be visually confirmed. The graph can show the moisture, thermistor (T1) temperature, and radiation thermometer (T2) temperature.

GF-200
Radiation thermometer calibration kit
(with a digital thermometer, heating standard sample)

Specifications

Measurement format	Evaporation weight loss method (Heat drying and weight loss method)
Measurement object	Powder, Particle, Liquid, Paste, etc.*1
Sample weight	0.1-120g using selective weight sampling method
Minimum displayable units	Switch between moisture 0.01 % or 0.1 %, mass 0.001g
Measurement range	0-100 % (wet base, solids) 0-500 % (dry base)
Reproducibility (Standard deviation)*2	Sample mass 5 g and above 0.05 % Sample mass 10 g and above 0.02 % (including water content)
Measurement modes	Automatic halting mode, Timed halting mode, High-speed drying mode, Low-speed drying mode, Stepped drying mode, Predictive measuring mode
Temperature range	30-180˚C in 1-degree increments when using a thermistor (T1) 30-250˚C in 1-degree increments when using a radiation thermometer (T2) *3
Display	Backlight LCD display (137 mm x 43 mm)
External output	RS-232C interface
Data memory	100 of data
Temp./humidity operating range	5 -40 ˚C, maximum of 85 % RH (no condensation)
Heat source	Mid-infrared quartz heater (200 W x 2)
Temp. sensor	Thermistor (T1), Radiation thermometer (T2)
Sample dish	Stainless steel (Diameter: 130 mm; Depth 13 mm)
Power supply	AC100-120 V/220-240 V (50/60 Hz)
Power consumption	Maximum 900 W
Weight and dimensions	Net:5.4kg / Gross:9.5kg 220 x 415 x 220 mm (W x D x H)
Items included	2 Sample dishes, 2 Sample dish handlers, Sample dish tray, Wind shield, Power cord, Spoon & Spatula set, 2 Spare fuses (8A), 2 Packages of aluminum foil sheets (10 per package), Glass fiber sheets (10 sheets), Operating manual
Option	Printer (printer VZ-330, interface cable VZC-14), Printer paper (10 rolls), Aluminum foil sheets (500 sheets), Glass fiber sheets (100 sheets), GF-200 radiation thermometer calibration kit, Data logger software FDL-01, Sample crusher TQ-100, Windshield with Deodorizer FW-100

1 Material that will not cause dangerous chemical reactions when heated.
2 As per Kett's in-house stipulated measurement conditions and standard samples.
3 If the T1 temperature exceeds 180 ˚C during a measurement, the set temperature may not be achieved.

⚠ Safety precautions

- ***For safe operation, ensure you read the Operating Manual before use.***
- ***Do not attempt to measure material that will cause dangerous chemical reactions on heating. Further, the tester becomes very hot, so please take precautions against burns and/or fire.***

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Management system enhancement department of the Japanese Standards Association (JSA) registers the Quality Management System of the above organization, with conform to JIS Q 9001, ISO 9001.
The scope of the registration.
Design, development and production management, calibration and repair of Moisture testers, NIR composition analyzers, Grain inspectors and Coating thickness testers.

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Kett
SCIENCE OF SENSING

Moisture Analyzer

Infrared Moisture Analyzer
Model FD-800

Full spec model mounted with dual temperature sensor

KETT ELECTRIC LABORATORY

Infrared Moisture Analyzer FD-800

FD-800 is an instrument positioned at the top of Kett's infrared moisture analyzer series. It employs a revolutionary dual temperature sensor method to enable high precision moisture measurements. Conventional models measured the temperature within the drying chamber by using a thermistor, and controlled the heat drying temperature. Temperature measurement using thermistors is a procedure that is stable, and known to be reliable through years of experience. However, with a demand for an even more accurate moisture measurement, problems such as the temperature of the sample following the environmental temperature, and the fact that because of the shape of the sample it is difficult to maintain a constant distance between the test piece and the heater or thermistor, these inconsistencies have adversely affected the measuring accuracy. Thus, in addition to a thermistor, the tester is mounted with a radiation thermometer to measure the sample temperature without coming in contact with it. This complements to an extent the disadvantages of the thermistor, enables the user to optimise the heat drying settings to match the characteristics of the sample, and allows a reduction in measuring time and increase in measurement accuracy without burning or deforming the sample. This tester can handle highly advanced moisture control, and is positioned as a moisture sensor for quality control departments or testing divisions requiring a high level of moisture control.

• Dual temperature sensor

In addition to environmental temperature control using a conventional thermistor (T1), a radiation thermometer (T2) was employed to directly measure a new sample temperature, thus allowing high level temperature control that makes the maximum use of the merits of both types.

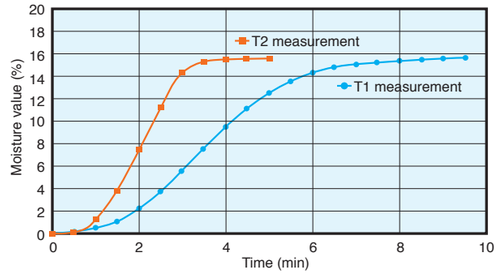
• Measuring time shortened

Comparison of thermistor (T1) measurement and radiation thermometer (T2) measurement.

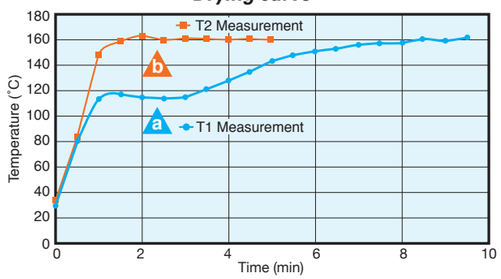
Temperature mode	Thermistor (T1) measurement	Radiation thermometer (T2) measurement
Moisture value	15.68 %	15.66 %
Measurement time	9.5 min.	5 min.

(Measurement example: Sodium Tartrate 2H20)

Measurement result

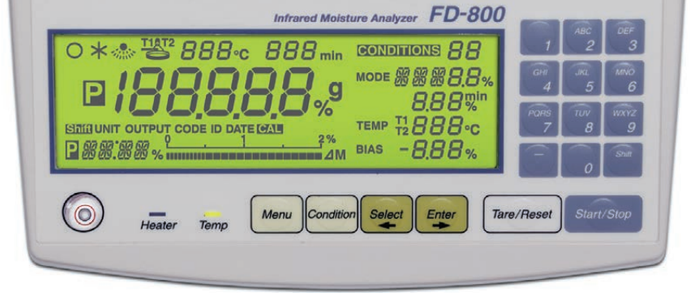


Drying curve



- *Sample surface temperature: Starting with a high temperature, (T2) measurement conducts heat drying efficiently*
- *Sample surface temperature T1 measurement data (a) shows the temperature of the sample surface when dried at T1=105 ˚C.*
- *Not all objects measured will necessarily show the same slope of the drying curve vs drying time as shown above.*

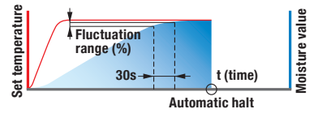
When heat drying samples, in the initial drying stage, the moisture is high, and increase in sample surface temperature is slow. With T1 measurement using a conventional thermistor (a), it was not possible to measure the temperature of the sample surface, and thus it was not possible to conduct this measurement. On the other hand, with T2 measurement (b) using the radiation thermometer, because the temperature of the sample surface is measured directly, it is possible to swiftly increase the sample surface temperature from initial drying to the target temperature, and shorten the drying time. During inititial drying, because the sample surface has a high moisture content, even if there is an addition of a large amount of thermal energy, it will not burn. In the second half of the drying stage, moisture is reduced and the sample becomes easier to burn. However, with T2 measurement, the surface temperature of the sample is under constant observation and control, and thus there is no risk of burning. As such, with T2 measurement, time can be shortened without the sample burning, and it is possible to obtain ideal heat drying.



• Various moisture measurements are possible with the multiple drying mode

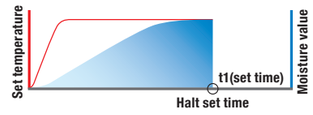
Automatic halting mode

The sensor will automatically halt if the 30s interval moisture change (fluctuation range%) goes below the set value.



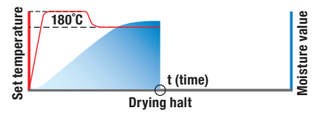
Timed halting mode

Sensor will halt at the pre-set time (t1).



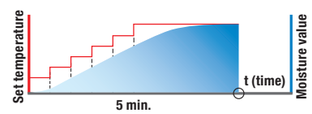
High-speed drying mode

Shortens the measuring time by the high-speed drying during the initial drying stage, after which when the moisture is reduced, the set temperature is returned to normal.



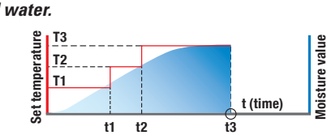
Low-speed drying mode

Slowly dries samples in which surface membrane forms or samples that may break down at high temperatures.



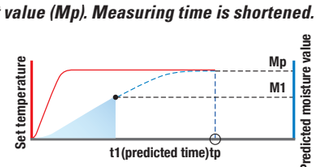
Stepped drying mode

Measures drying conditions in steps, and measures samples that contain a large amount of water, such as surface water or crystallized water.



Predictive (comparative) measuring mode

Predicts future changes from the drying process and determines a measurement value (Mp). Measuring time is shortened.



• Advanced temperature control.

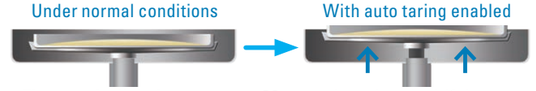
In addition to temperature control using a conventional thermistor (T1), a radiation thermometer (T2) is newly employed to directly measure sample temperatures, allowing advanced temperature control that makes the maximum use of the merits of both types.

• High precision measurement.

Since the sample temperature can be measured, it is possible to set optimal drying conditions that match the characteristics of the sample, avoid burning or quality changes, and enable a more accurate moisture measurement.

• A new type of auto tare mechanism.

Since the measurement is performed automatically while taking the zero-point calibration of the balance, scale drift is compensated even over long measurement times, allowing high precision measurements.



The sample dish rises once per 30 seconds and scale drift is reset.

• The FD-800 displays 30s interval moisture change volume (ΔM) numerically and on a scale.

Moisture changes (ΔM) are shown on the display area. This is effective for measuring when drying is complete, and to determine the final measuring conditions.

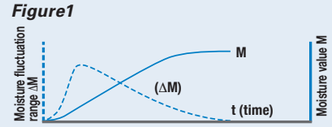
Moisture vaporization rate display

In drying by infrared heater, a large amount of moisture vaporizes in early stage and vaporization slowstowards the end of measurement.

The M curve in ***Figure1*** shows a typical vaporization of moisture. M indicates the rate of vaporization. Monitoring M makes it possible to gauge how close the measurement is to completion.

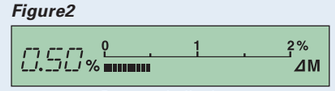
The bar graph display makes it visible. (***Figure2***)

Figure1



Vaporized moisture and vaporization rate

Figure2



Bar graph display

• Can measure a variety of sample forms and materials

Able to measure most materials if only the water content of the material evaporates through heating and the material does not cause dangerous chemical reactions.