A&D Weighing

MOISTURE ANALYZER

Purchasing Essentials

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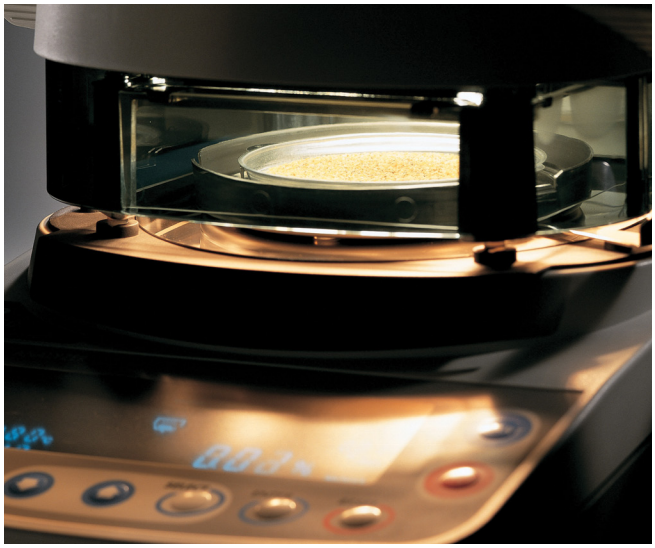


Moisture analysis plays a vital role in the processing and handling phases of production for multiple industries. Strict moisture content standards are enforced upon companies that distribute goods like pharmaceuticals, specialty chemicals, and food to ensure product stability and proper shelf life.

Thanks to moisture analyzers, companies can make sure these moisture content requirements are met each time. However, while it may be tempting to go out and buy the newest, most expensive model equipped with all the bells and whistles, it may not be the most efficient or cost-effective choice. Not all moisture balance analyzers are made equal, and different industries will require their own set of readout, repeatability, temperature range and other specifications for maximum throughput.

As an award-winning manufacturer of industrial and laboratory balances, scales, and weighing systems, A&D Weighing is here to break down the specifications that every buyer should keep in mind when purchasing their next moisture balance equipment.

Choosing The Right Moisture Analyzer Type

Moisture analyzers calculate moisture content through methods like thermogravimetry, spectroscopy or chemical conversion. Thermogravimetric analyzers are the most commonly used type of moisture balances across industries.

Thermogravimetric or loss of weight on drying (LOD) balances like the *A&D MS-70, MX-50, MF-50, or ML-50* work by measuring the amount of moisture removed by evaporation upon the heating of samples. The moisture measured by these balances includes not only water, but oil, alcohol, organic solvents, and other volatile components too.

For more specific applications where water selectivity is required, chemical conversion moisture balances will work best. However, keep in mind that these types of moisture analyzers use hazardous solvents that not only need seasoned technicians to operate, but also require the water in the sample to be accessible to the reagent.

Curating Components

Each standard moisture balance is made up of a mounted heater, precision balance, control panel and display. However, other units may also have additional components and features that you can use for your application such as pan holders, sample pans, fiberglass filters, memory functionalities, and a connectivity interface.

Moisture balances can come mounted with either of the following drying technology types: infrared radiation, halogen radiator, oven drying, and microwave drying. Halogen and infrared heaters are the most commonly used heaters, with Halogen being the fastest of the two.

If your work with samples that are prone to developing film or crust during the heating process, use a fiberglass filter to cover or sandwich samples. This will improve heat absorption, avoid splashing, and will keep your samples protected.

Memory functionalities coupled with an RS-232 serial interface will help researchers build out a library of frequently used analysis programs and integrate their data with computers and printers for more convenient record keeping. Interested in a unit that can do all that? Check out the *MS, MX, MF, or ML series moisture analyzers*.

Fulfilling Your Moisture Range Requirements

Readout, also known as resolution or readability, refers to the smallest unit of measure that can be displayed on the panel. Readings are usually presented in grams and percent moisture. Most moisture analyzers are capable of displaying a minimum percentage scale value of 0.01% and a minimum gram scale display of 0.001g like the *MX-50 balance*.

For industries that handle materials like plastic, which require very low moisture content for molding for example, get an instrument such as the *MS-70 moisture analyzer* with readout capabilities of 0.0001g or 0.001% moisture. When handling and testing food, moisture analyzers with lower resolutions will suffice like the *MF-50 and ML-50*.

Always keep in mind that the equipment you select should accommodate your application requirements.

Balancing Repeatability, Sample Size, and Capacity for Precise Results

Repeatability is what allows balances to display the same results each time the same sample is tested. This functionality is expressed as a standard deviation.

Generally speaking, repeatability data improves as you add to your sample size. However, large sample sizes do not necessarily equate to more accurate readings, except when working with moisture values below 1%. Because low moisture values are difficult to gauge, larger samples are required for precise measurements.

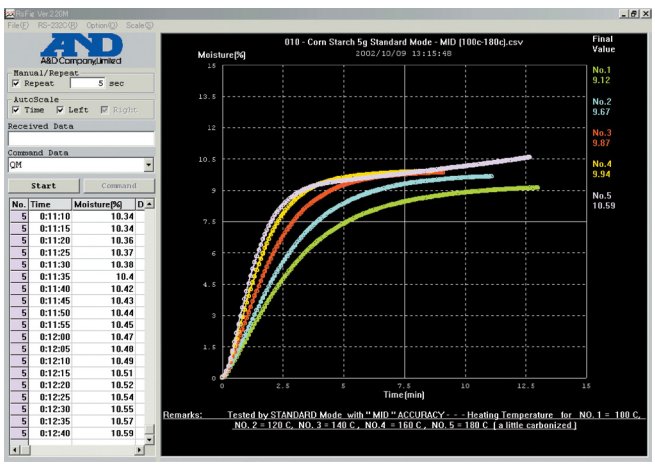
To make things clearer, say you're measuring a sample with 1% moisture content. In this case, a sample weight of 2 grams or more would be adequate. However, for a sample with an estimated 0.1% moisture content, you will need to measure 20 grams or more to get an accurate reading. If you find yourself often working with the latter kind of samples, opt for a more sensitive moisture analyzer with higher readout capabilities like the *MS-70 balance*, with its ability to resolve down to 10 ppm.

Another thing to remember is that determining optimal sample weight involves trial and error on your sample, just make sure to stay within the moisture balance's capacity limits. This will be indicated inside any operating manual. Typical maximum sample weights range from 50 to 70g but some units have higher capacities. A few moisture analyzer operating manuals will also include suggestions for specific products, too. As a general rule, your samples should be enough to thinly cover the surface of the sample tray and be free of lumps or peaks.

Selecting Temperature Ranges

Typical moisture balances provide temperature ranges from 50º to 160 º C although there are models that are capable of broader ranges like 30 º to 200 º C. Temperatures are then set in increments of 1 º C and maintained within 1 º C of the selected setting.

Oftentimes, analyses will involve maxing temperatures out to 160 ºC or less. There are special cases however, where higher temperatures may be required to completely dry samples.



Drying Modes

Substances react differently to a moisture analyzer. To accommodate various samples, some models will offer programmable heating profiles. Four of the most common types are Standard, Fast, Step, and Ramp.

The Standard drying profile is suited for most substances, and thus is the most commonly used mode. On the other hand, if you are working with samples that have a moisture content value between 5% to 15%, a Fast drying cycle is recommended.

The Fast heating profile raises the halogen heater temperature to approximately 40% above the set temperature, known as preheat. This drives off the bulk of the moisture more quickly. The shift is then followed by a decline in temperature until it returns to the original settings.

The Step drying mode works the same way Fast heating does, but is meant for samples with a moisture content greater than 15%. The step process allows for tighter control of the drying temperature, breaking down the drying process in two stages. The first stage is meant to measure surface water and is followed by higher temperatures to allow for the measurement of bound water in the next stage.

The Ramp drying mode, also known as the soft or gentle drying mode, is best used for heat sensitive samples. By gently ramping the temperature, samples are protected from the full power of the halogen heater. This prevents samples from decomposing or forming a protective layer. During this process, samples are heated evenly from the outside to the inside by heat convection.

Automating the Switch-Off Process

While determining when to switch-off the moisture analyzer models, users must consider the sample being analyzed and take into account the accuracy required. Remember that a stable dry weight can be established when weight loss per unit of time falls below a specified value.

While switching off the unit can be done manually, there are units with built-in switch-off options already available. Get one that provides three methods for setting switch-off: automatic, timed, and manual. This will give you more time to focus on other lab tasks while ensuring accurate and reproducible results.

Calibrating Moisture Analyzers

Moisture analyzers would be useless if they failed to provide users with accurate results. To set and maintain a moisture analyzer balance's accuracy, users must perform both initial calibration and periodic recalibration. Operators must also complete two calibrations, one for weighing accuracy and another for temperature accuracy. Maintenance schedules for each unit can be found within the operation manuals that come included with each purchase.

To calibrate for weighing accuracy, most moisture analyzers require "external calibration". Externally calibrated units like *A&D Weighing's MS, MX, MF, or ML moisture balances* make use of a separate adjustment weight (such as 20g) that is equal to the moisture balance's capacity or typical sample size. Other units will also offer internal calibration features that perform the process automatically.

Temperature calibration is responsible for checking heater accuracy. This calibration process requires the use of a separate temperature calibration kit and is conducted at two points. Take note that this calibration process can take longer than weight calibration.

Checking for Warranties

Warranty services differ among providers on the market so be sure to get a unit with a fair warranty period should you run into any problems with your moisture balance down the line. A&D Weighing provides customers with a five-year warranty for their available moisture analyzers so you can be assured of excellent product performance and quality.

A&D Weighing has been providing industry-leading precision weighing and measurement equipment to laboratories across the world for over 40 years. At A&D Weighing, you can rest easy knowing that each piece of equipment passes through the highest of quality standards at ISO 9001 certified facilities.

To view A&D Weighing's *a complete line of Moisture Analyzer Balances and accessories* visit our website today and we'll provide you with worry-free and convenient warranty services for guaranteed product performance and quality satisfaction.

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