

**COMPUTRAC**  
**Mx-100 MOISTURE ANALYZER**  
**USER'S MANUAL**

June 1997

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Part Number 700-0015  
Revision A1

# **Computrac Mx-100™**

## **User's Manual**

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# Computrac Mx-100™ PACKING and SHIPPING INSTRUCTIONS

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Movement, handling, and packaging of the instrument must be done with **EXTREME CARE** to avoid permanent, expensive internal damage.

## UNPACKING

Unpack the instrument carefully and set it down gently. Select a place where it will be safe from bumping, jarring, and excessive vibration.

For all shipments, boxes and packing materials are available from AZI. Call AZI Customer Service at (800) 528-7411 or (602) 470-1414 for additional shipping information when returning a unit for repair.

Retain all packaging materials for any future shipment of the instrument. If the instrument is returned to Arizona Instrument for any reason, it must be placed in the original packaging materials which have been tested and proven to be effective protection during shipment.

# REPACKING FOR SHIPMENT

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Pack the Computrac Mx-100 in a Computrac Mx-100 shipping container, using the packing figure supplied on the box as a guide.

If proper shipping materials are not available, contact AZI Customer Service at (800) 235-3360 or (602) 470-1414 to have a set sent to you.

AZI WILL NOT BE RESPONSIBLE FOR SHIPPING DAMAGE.

IF YOU RETURN THE INSTRUMENT VIA ANY OTHER SHIPPER THAN FEDERAL EXPRESS, YOU SHOULD INSURE IT FOR FULL VALUE.

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# **Computrac Mx-100 Moisture Analyzer**

## **User's Manual**

### **Introduction**

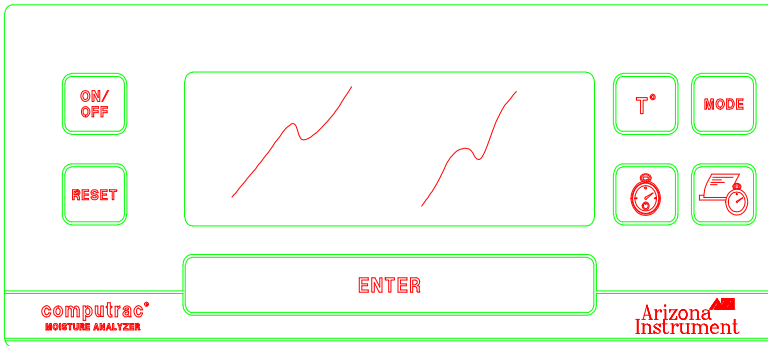
The Mx-100 Moisture Analyzer is an economical, durable moisture analyzer designed for both production floor and quality control applications. The Computrac Mx-100 is equipped with an internal balance with a 30 gram sample capacity, infra-red heater elements electronically controlled between 40° and 160°C, and a front panel interface keypad for user-programming and testing control.

The test chamber's hood is lined with reflective panels and holds the tubular infrared heating elements. These infrared heating elements provide the heat for moisture evaporation during the test cycle. Each heating element generates 180 watts of power when the moisture analyzer is operating.

At the beginning of moisture determination, the chamber is fully heated until the set temperature is reached. The heat intensity is monitored by the built-in resistance temperature sensor and adjusted through feedback to the microprocessor to maintain the chamber at the nominal setting.

As a safety feature, a mechanical interlock within the hood assembly recognizes the hood position to ensure that a routine test cannot begin when the hood is open. This same contact also recognizes when the hood has been raised during a moisture test. Opening the lid during a test interrupts and cancels the measurement routine.

## Mx-100 Front Panel LCD and Keypad



The front panel LCD consists of three separate fields and easy-to-understand symbols. Test information such as the sample's current weight or the computed moisture result, as well as the elapsed test time and the test temperature are displayed. As an added convenience, the display includes a linear range indicator for the precise control of the beginning sample weight.

Programming the Mx-100 for a new test procedure is accomplished through the front panel LCD and keypad. The easy-to-understand symbols guide the operator through parameter entry prior to the start of a test. The front panel keypad is protected with a durable overlay to prevent damage to the LCD or the key switches. A light touch on the keypad triggers an audible tone to indicate that the keypad has been pressed.

Depending on the test's parameters, additional information, such as programmed test temperature, elapsed test time, time remaining, selected display mode, current result, and an analog display of the sample weight, appears in the LCD when any of the keys are pressed.



# Installation and Set Up Instructions

## Ambient Conditions

Choose a suitable location for the Mx-100 Moisture Analyzer. The location should be a clean, dry area not exposed to vibrations or strong drafts. The Mx-100 Moisture Analyzer delivers accurate results, even when it is exposed to unfavorable ambient conditions. However, some points must be addressed to assure the continual safe and accurate instrument life.

**Note:** The Mx-100 has not been approved for, and may not be used in, hazardous areas or locations.

During use, the moisture analyzer gives off heat through the mesh on the hood. For this reason, the mesh must remain uncovered when the unit is in the standby mode and during operation.

**Note:** After prolonged use, the components of the moisture analyzer can be very hot to the touch. Therefore, exercise caution when operating the unit to avoid burns.

Do not expose the moisture analyzer to extreme moisture over long periods. If a cold moisture analyzer is brought to a substantially warmer place, moisture in the air will condense on its surfaces. When transferring a moisture analyzer from a cool area to a warmer one, make sure to leave it unplugged for about two hours at room temperature to equilibrate. After equilibration, if you keep the moisture analyzer connected to line power, the continuous positive difference in temperature between the inside of the moisture analyzer and the outside will practically eliminate the effects of moisture condensation.

## **Safety Precautions**

If you attach an extension cord without a protective grounding conductor, it may interfere with the built-in protection provided by the moisture analyzer. If you use an electrical outlet that does not have a protective grounding conductor, make sure to have an equivalent protective conductor installed by a certified electrician as specified in the applicable regulations for installation in your country.

To ensure safety, the data interface is separated from line power by a transformer with a Class 1 design.

## **Leveling the Moisture Analyzer**

You can level the moisture analyzer using the four leveling feet. This is only necessary if you are testing samples of low viscosity which need to be at a uniform level in the disposable sample pan.

# How to Operate the Mx-100 Moisture Analyzer

You can determine moisture content and dry weight with the Mx-100 as soon as it is switched ON.

## Default Parameters

The following parameters are the factory set default settings:

<b>Parameter</b>	<b>Default</b>
Temperature	130°C (266°F)
Auto start	Lower the hood
Drying time	Automatic shutoff
Result (mode)	0-100% (moisture)

The LCD shows special messages for your information throughout the moisture determination routine.

After the moisture analyzer has been plugged into a wall outlet, the standby symbol appears on the LCD when the moisture analyzer is switched OFF. This means the unit is ready to operate without requiring warmup. Press the ON/OFF key to switch the unit ON or OFF.

## **Self-Test**

After the unit is switched ON, all LCD segments will briefly light and the unit automatically runs through a self-test of the electronic circuitry. This self-test ends with a readout of the pre-set parameters for moisture determination.

When TAR appears on the LCD, the unit is ready for operation, and you may begin your moisture determination/dry weight determination routine.

## **How to Change Parameters**

To change parameters in order to adapt the moisture analyzer to meet special testing requirements, or to utilize the full performance capabilities of the unit, select the individual operating parameters either by briefly pressing a function key once, or by holding down a function key while simultaneously turning on the unit.

With the Mode key, you can toggle among the readout modes of the computed results during a moisture determination routine. The result displayed has been calculated according to the equation assigned to the particular mode.

The program parameters for temperature, shutoff/time and print interval can be changed by pressing the Reset key (TAR will be displayed) and the T°, “clock” or “print timer” keys, respectively.

You can then alter the parameters by pressing either the T°, “clock” or “print timer.”

To store the selected parameter(s), press the Enter key. To leave the parameter selection mode without changing parameters, press the Reset key.

If you would like to store these parameters permanently in the non-volatile memory of the moisture analyzer, hold down the Enter key. At this point, the unit will automatically switch itself OFF. When the unit is switched ON, it will operate according to the previously selected and stored parameters.

### **Setting the Temperature**

1. Select this mode with the T° key.
2. Temperatures can be programmed between 40 and 160°C. Arrows on the LCD denote the keys which increase or decrease parameters.

Adjust the temperature setting in increments of five degrees using the T° key to increase the temperature or the “clock” key to decrease it.

### **Setting the Time**

1. Select this timer mode with the “clock” key.
2. The drying time can be set between 0.0 and 99 min.
  - a. To increase the time, use the T° key; to decrease the time, use the “clock” key.
  - b. To increase the time by single digits, press the key briefly for each increment.
  - c. Holding down the key increases the time in increments of ten.

The moisture determination routine ends when the set time has elapsed (for settings starting with 0.1 min.). A “Time” setting of 0.0 minutes sets the unit to end automatically.

### **Start Parameter**

To select this parameter, switch the moisture analyzer ON while simultaneously pressing the MODE key. To change the setting, use the T° and “clock” keys.

T°: Start with ENTER (manual start).

“Clock”: Start by lowering the hood (automatic start).

### **Convenience Feature for Weighing Samples**

1. Turn on the moisture analyzer while simultaneously pressing the ENTER key.
2. The target weight can be set between 0 and 25g.
  - a. To increase the target weight, press the T° key.
  - b. To decrease the target weight, press the “clock” key.
  - c. The target weight increases or decreases in single-digit increments.
3. As a convenience, the LCD shows a bar graph to serve as a guide for target weights greater than 1 gram.
  - a. If the initial sample weight is between 85.8% and 114.4% of the preset value, the display prompts to start the moisture determination routine by closing the hood.
  - b. This convenience feature is not activated for "O g," the factory setting.

## **Types of Testing Routines**

### **Time**

The time mode measures moisture loss over a programmed, finite period of time. This test is similar to that used in a standard air oven or vacuum oven. The Mx-100, however, calculates the weight loss automatically and displays that result on the front panel LCD.

### **Automatic**

In the Automatic mode the Mx-100 monitors weight loss throughout the test. As drying proceeds, the moisture loss per unit of time continuously decreases. When the sample no longer contains moisture the loss per unit of time reaches zero. The fully automatic shutoff function recognizes when a considerable weight change is no longer expected. The test ends automatically.

The fully automatic mode is used when the weight loss during drying yields a curve that can be easily evaluated. If the weight loss is extremely slow, or if the loss is very small, (as is the case with plastic granules), the automatic mode cannot recognize this very low moisture and will not end the test. In applications where moisture loss is very slow, or where only a small net weight loss is anticipated, select the Time mode to end the test at a preset time.

## How to Determine the Moisture Content or Dry Weight

### Moisture Testing

Before the initial moisture determination routine, allow the Mx-100 to warm up as follows:

1. Raise the hood.
2. Tare the Mx-100 without a sample dish on the pan support.
3. Place a sample dish on the pan support.
4. Lower the hood.
5. Press the <ENTER> key. During the warmup phase, prepare your sample.
6. After approximately 5 minutes, stop the warmup phase by raising the hood.

**Note:** If TAR does not appear in the upper left hand corner of the LCD, press the reset key.

The Mx-100 is now ready to perform a moisture determination routine.

**Note:** If you plan to analyze samples sequentially following the first moisture test, you do not need to warm up the Mx-100 prior to each of these analyses.



## Running a Test

1. Place the disposable sample pan on the pan support.
2. Press the Enter key. TAR will now go out on the LCD, and the weight readout 00.000 g appears.
3. If a different readout appears, the unit must be tared:
  - a. Press the Reset key (TAR appears).
  - b. Press the Enter key.
4. Now place the sample on the sample pan, spreading evenly across the surface. The moisture test can only begin after the moisture analyzer has been tared and a sample weight greater than 96 mg has been placed on the unit.
5. Lower the hood.

The test procedure starts automatically. If you have selected the code for manual start, you must press the ENTER key to start the procedure.

6. The start of the routine is indicated by an acoustic signal and the drying symbol (*fff*) on the LCD. During operation, the time and results corresponding to the mode you have selected will be continuously updated in the LCD.
7. The results in the different readout modes can be cycled in the display by pressing the Mode key.

In the fully automatic drying mode (timer setting = 0.0 min, default setting) the moisture determination procedure ends automatically when a significant weight loss is no longer detected.

**Note:** You can interrupt the moisture or dry weight determination routine at any time by raising the hood or by pressing the Reset key.

8. The result will remain in the LCD until the Reset key is pressed. In addition, "END" will be displayed.
9. Once the Reset key has been pressed, the moisture analyzer is ready for the next moisture determination routine.

## **Appendix A**

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### **Data Output Specifications**

The Computrac Mx-100 Moisture Analyzer features an RS 232C (SN.24) interface for outputting data on the moisture content or the dry weight of a sample. At the interface port, you can connect either a standard serial printer for recording operating parameters and results, or a computer for evaluation.

At the start of a moisture analysis routine, data for the drying program are automatically output to the interface. At the end of a moisture analysis routine, the final result is output. If the routine is interrupted (by raising the hood, for example), a "B" appears in the last line of the printout.

Intermediate results are output during a test either automatically at set intervals or whenever the "print timer" key is pressed.

## General Specifications:

<b>Description</b>	<b>Specification</b>
Type of interface	Serial point-to-point connection
Operation	Asynchronous, simplex
Standard	RS 232 C-S, V24-V28
Handshake lines	Clear to Send (CTS) Data Terminal Ready (DTR)
Interface initialization	External (print key), or Automatic print command
Character coding	7-bit ASCII
Transmission rate	1,200 baud
Parity	Odd
Synchronization	1 start bit, 1 stop bit
Data output format	22 Characters: (21 <sup>st</sup> and 22 <sup>nd</sup> Characters: CR and LF)

## **Interfacing Devices with the Moisture Analyzer (RS Interface)**

Make sure that the interface port is electrically connected to the protective grounding conductor of the moisture analyzer housing. The cabling supplied as accessory components is shielded and electrically connected on both ends to the cases of the connectors. This electrical connection may result in interference caused by cables scraping the floor or by transient currents if you have grounded the housing or connected the protective grounding conductor for line power. If necessary, connect an equipotential bonding conductor to the moisture analyzer.

## **Connecting Electronic Devices (Peripherals)**

Unplug the moisture analyzer before you connect or disconnect devices to, or from the interface port.

## **Startup**

1. Raise the hood on the moisture analyzer and position the protective disk plate and the dish retainer on the unit. The moisture analyzer, rated to Class 1, must be plugged into a properly installed wall outlet which has a protective grounding conductor (PE).

## **Appendix B**

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### **Mx-100 LOSS-ON-DRYING MOISTURE ANALYZER SPECIFICATIONS**

Test method	Heating by infrared rays; determination of weight loss
Sample weight	30 g maximum, 5 - 10 g typical
Readability	0.01%
Measuring accuracy	0.05% (at approximately 5 - 10 g) (Depending on sample)
Measuring range (Moisture)	0 - 100%
Temperature range	40° - 160°C
Temperature increments	5°C
Ambient temperature range	+10° to +40°C
Sample dish	90 mm diameter, disposable, aluminum

Housing (W x D x H)	217 x 283 x 165 mm 8.5 x 11.1 x 6.5 in
Net weight	approximately 5.5 kg 12.1 lbs
Power requirements	115 V or 230 V (selectable)
Frequency	50 - 60 Hz
Allowable voltage fluctuation	-20% to +15%
Power consumption	400 VA maximum
Interface	RS 232 C-S/V24 - V28 7-bit ASCII, 1,200 baud, odd parity

## Appendix C

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### Error Messages and Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
No Segments Appear in the Display	<ul style="list-style-type: none"><li>- No power available</li><li>- The power cord is not plugged in</li></ul>	<ul style="list-style-type: none"><li>- Check the power supply</li><li>- Plug in the power cord</li></ul>
“L:l” appears in the LCD	<ul style="list-style-type: none"><li>- The dish retainer (2) is not in place</li></ul>	<ul style="list-style-type: none"><li>- Insert the dish retainer</li></ul>
"H" appears in the LCD	<ul style="list-style-type: none"><li>- Sample exceeds the capacity of the moisture analyzer</li></ul>	<ul style="list-style-type: none"><li>- Reduce the initial sample weight</li></ul>
The weight result changes constantly or the LCD does not light up	<ul style="list-style-type: none"><li>- Unstable ambient conditions</li><li>- The sample dish or the dish retainer is touching the protective disk plate (3)</li></ul>	<ul style="list-style-type: none"><li>- Set up the moisture analyzer in another area</li><li>- Position the sample dish or dish retainer correctly, making sure that they do not touch the protective disk plate (3)</li></ul>



## Appendix D

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### Cleaning, Maintenance and Calibration

#### Cleaning

Do not use any aggressive cleaning agents (solvents or similar agents) on the outer case or the front panel keypad. Instead, use a piece of cloth with a mild detergent to clean the moisture analyzer.

**Make sure that no liquid enters the moisture analyzer housing.** After cleaning, wipe down the moisture analyzer with a soft, dry, lint-free cloth.

#### Safety Inspection

If there is any indication that safe operation of the Computrac Mx-100 moisture analyzer is no longer possible, turn off the power and unplug the unit from the wall outlet **immediately**. Lock the moisture analyzer away to ensure that it cannot be used inadvertently.

Safe operation of the moisture analyzer is no longer ensured when:

- S** there is visible damage to the moisture analyzer.
- S** the moisture analyzer no longer functions properly.
- S** the moisture analyzer has been stored for relatively long periods under unfavorable conditions.
- S** the moisture analyzer has been exposed to rough handling during shipment.

## **Calibration**

The calibration routine adjusts sets the sensitivity of the built-in weighing system to an accurate weight.

### **Materials Required:**

30 gram calibration weight

### **Procedure**

1. Switch the unit OFF.
2. Press the T° key down while switching the unit ON.
3. While all segments of the LCD display are lit, simultaneously press both the “clock” and “printer clock” keys until a number and "C" are displayed.
4. If the disposable sample pan is on the pan support, remove it.
5. Press T° key once more.
6. As soon as “30.000” and "CAL” appear in the display, place the 30 g calibration weight on the dish retainer.
7. Once the calibration weight is stored, the unit will shut off automatically. This indicates the end of the calibration procedure.

Arizona Instrument recommends that the Computrac Mx-100 be calibrated on an annual basis by qualified factory service technicians. Under some circumstances, a qualified technician may perform more frequent calibrations.

If you have any questions about the Mx-100, this calibration procedure or application development, call Arizona Instrument Customer Service at (800) 235-3360 or (602) 470-1414.

## **Appendix E**

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### **Application Information**

For moisture determination, the moisture lost is displayed as a percentage (%) of the sample's beginning weight. Solids calculations compare the residual sample weight to the sample's beginning weight to calculate the percentage. Since moisture is analyzed most often, only moisture determination is discussed in the succeeding sections.

Exact and reproducible moisture testing requires optimum test parameters, careful sample handling and preparation, and an accurate, reliable moisture analyzer. The Computrac Mx-100 provides a high degree of flexibility in parameter selection for repeatable and dependable moisture measurements.

The two critical parameter settings in the Mx-100 are the "time" and the "temperature" settings. You can ensure reproducible results if you maintain the determined, optimal values for the sample amount, time (automatic mode), and temperature during a moisture analysis routine.

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**Arizona Instrument LLC**  
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**Part Number: 700-0015**  
**Revision A1**  
**Document Number 6C21-0018**

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