

# **Instruction Manual**

# USS-HMA2X Moisture Analyzer



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# Introduction

Thank you for choosing the U.S. Solid USS-HMA2X Moisture Analyzer.

The USS-HMA2X moisture analyzer is precise and reliable. It provides a high level of operating convenience and response sensitivity to facilitate determination of the moisture content of your samples. U.S. Solid's dedicated customer service staff are available to answer any inquiries regarding applications and accessories.

To make full use of the functions and performance of the U.S. Solid USS-HMA2X moisture analyzer, please read the manual completely and follow the usage instructions before installation and operation.

#### 1.1 About Moisture Analyzer

Moisture analyzers work according to the thermogravimetric principle. Moisture is determined by the direct weight lost by the sample due to heating from an intense halogen light.

The U.S. Solid USS-HMA2X Halogen Moisture Analyzer determines the initial weight of the sample. The sample is quickly heated by the internal halogen dryer unit causing the moisture to vaporize. During the drying operation, the instrument continuously determines the weight of the sample and displays the loss of moisture. Upon drying completion, the moisture content or the dry solids content of the sample is displayed.

# **Safety Precautions**

U.S. Solid Moisture Analyzer qualifies as state-of-the-art technology and complies with all recognized safety rules. Improper use or handling, however, can result in damage and/or injury. Follow the precautions below to ensure safe and trouble-free operation of your moisture analyzer.

# Image: Acid / CorrosionImage: Acid / Corrosion

# 2.1 Definition of Warning Symbols

## 2.2 Warnings

• The Analyzer has a 3-pin power socket equipped with a ground terminal. To prevent electric shock and to maintain stability in operation of the analyzer, be sure to ground the analyzer.

Avoid allowing the analyzer to get wet. It is not a water-resistant structure. Any leakage of liquid into the analyzer may cause damage to the analyzer or an electric shock to the user.

Use a power source (voltage, frequency, outlet type) adapted to the specification of the analyzer. If excessive voltage is used, the analyzer may overheat and be damaged or cause a

fire.

Do not measure samples that could cause a dangerous chemical reaction or create an explosion or poisonous gas, when the sample is dried.

Keep flammables away from the analyzer. Parts of the analyzer become very hot. Materials placed near it might catch fire.

Do not touch the heater cover, the halogen lamp, glass-housing, pan handle, sample pan or sample without adequate protection, burns or scalding may result.

Parts of the analyzer are very hot when a measurement finishes. For operation, use the specified grips of the heater cover and pan handle. Use the standard accessory tools.



Toxic gases produced during the drying process of substances containing toxic or corrosive ingredients may

cause irritation (eyes, skin, breathing), illness or death. Such substances may be dried only in a fume cupboard.

• For substances that produce corrosive vapors when heated (e.g. acids), work with small amounts of samples as the vapor may condense on cooler housing parts and cause corrosion.

## 2.3 Cautions

Operate the Analyzer on a stable, rigid and flat table.
Handle the moisture analyzer carefully. It is a precision device, subjecting it to impact may result in a malfunction.

- Ensure sufficient free space around the Analyzer as a safety zone. Allow at least 1 meter of free space above the Analyzer. Do not place anything on top of the heater cover.
- Use appropriate personal safety equipment, such as safety glasses, gloves and protective clothing.
- If an abnormal situation occurs (for example, a burning odor is smelt), remove the power cable immediately.
- When the device will not be used for a long period of time, turn the power off and disconnect the power cable.
- The Analyzer must be operated only by trained individuals who are familiar with the properties of the samples being tested and with the equipment operation.
- Do not disassemble, remodel or repair this product or accessories.

# **Design and Function**

## 3.1 Components



- 1: Heater Cover
- 2: Heater (Halogen Lamp)
- 3: Temperature Sensor
- 4: Sample Pan
- 5: Sample Pan Holder
- 6: Sample Pan Handle

- 7: Draft Shield
- 8: Stainless Steel Bracket
- 9: Control Panel
- 10: Level Bubble
- 11: Leveling Foot



- 12: Fan Outlet
- 13: Switch
- 14: Power Inlet
- 15: RS-232 Connector

# 3.2 Control Panel

1 <u></u> 2 <u></u>		3 4 5	
	2024-05-07 22:12:07.	9	
	WEIGHT 0.000 g	10 11	
6 —— 7 —— 8 ——	MENU E CAL TARE +0+ START	12	
No.	Description		
1	Heating temperature		
2	Measuring time		
3	Ending mode		
4	Drying mode		
5	Test report		
6	Zero/Tare the weighing value		
7	Calibration options		
8	Menu interface		
9	Date and time		
10	Measurement value		
11	Measurement unit		
12	Start/Stop measuring		

# **Installation and Adjustment**

## 4.1 Scope of Delivery

Unpack and check the completeness of the delivery. The following accessories are parts of the standard equipment for your new U.S. Solid USS-HMA2X Moisture Analyzer:

- · 1 Moisture Analyzer Main Body
- · 20 Aluminum Sample Pans
- · 1 Sample Pan Holder
- · 1 Sample Pan Handle
- · 1 Draft Shield
- · 1 Power Adapter
- · 1 100g Calibration Weight
- · 1 Instruction Manual
- · 1 Quality Certification

Unpacking and checking the instrument for transport damage.

Immediately inform U.S. Solid customer service if you have any complaints or parts are missing.

Keep all all of the packaging. This packaging guarantees the best possible protection for the transport of your instrument when transporting.

## 4.2 Selecting the Location

Measurement performance of your moisture analyzer depends largely on the surrounding environments.

Follow these guidelines to make sure the proper environmental conditions are met:

- Operate the instrument only indoors.
- Make sure that all parts of the instrument reach room temperature
   (5°C-30°C) before switching it on. Make sure that the relative humidity is
   between 20% and 80% and that non-condensing conditions are met.
- The power plug must be easily accessible.
- Select a firm, horizontal location that is free from vibrations as possible.
- Avoid direct sunlight.
- No excessive temperature fluctuations.
- Surroundings should be as free from dust as possible.
- Sufficient clearance around the instrument to allow warm air to dissipate.
- Sufficient distance from heat-sensitive materials in the vicinity of the instrument.

## 4.3 Installing Parts

Procedure:

1. Lift the cover straight up



2. Install the draft shield

Place the draft shield into the sample chamber. Align it with the hole.

3. Install the sample pan holder

Place the pan holder on the axis of the moisture analyzer main unit. Align the pan holder with the draft shield, and insert them onto the bottom.

4. Place the sample pan handle

#### 5. Place a sample pan

Place a sample pan on the pan holder so that the brim of the holder can secure the sample pan.

#### 4.4 Leveling the Moisture Analyzer

Accurate horizontal positioning is a necessary condition for repeatable measurements and exact results. To compensate for small irregularities or tilts at this location, the instrument needs to be leveled. Adjust the leveling feet of the Moisture Analyzer until the air bubble in the indicator is centered. The level indicator is located under the cover

towards the rear of the Moisture Analyzer.



Position of air bubble	Adjustment method		
up	Turn both feet clockwise		
down	Turn both feet counterclockwise		
Left	Turn left foot counterclockwise, right foot		
	clockwise		
Right	Turn left foot clockwise, right foot		
	counterclockwise		

## 4.5 Connect to Power

Warning:

• To prevent electric shock, be sure to use the 3-pin power cord with equipment grounding connector.

• Check to make sure the voltage indicated on the moisture analyzer data label matches the local line voltage. If it is does not match, do not connect the moisture analyzer to the power source.

Connect a power cable:

a. Insert the female end of the power cord into the power inlet located at the rear of the main unit.

b. Plug the male end of the power cord into the outlet.

## Note:

To obtain accurate results, the moisture analyzer must be warmed up for at least 30 minutes each time it is connected to an AC power source or after a power outage of more than 30 minutes.

Only after this length of time will the analyzer reach the required operating temperature.

# Calibration

Weight calibration is the correction of the difference between the measured value displayed and the true weight (mass) of a sample, or the reduction of the difference to a level within specified permissible error limits.

#### 5.1 Single-Point Calibration

Utilize the included 100g weight with the machine.

#### Procedure:

1. Tap "CAL" located on the left, or alternatively, tap "MENU" in the upper right corner, followed by "CAL".

2. To start the single-point calibration, tap "Sing-point Calibration".

3. When the prompt "Please put on the weight" appears, position the calibration weight on the sample pan. The message "Please wait" will be displayed.

4. Once the screen shows "Please take away the weight", remove the calibration weight.

5. Upon completion of these steps, the machine will automatically finish the calibration process and return to the home screen.

#### 5.2 Multi-Point Calibration

For the multi-point calibration, a set of weights comprising of 100 g, 50 g, and 20 g is needed.

#### Procedure:

1. Tap "CAL" located on the left, or alternatively, tap "MENU" in the upper right corner, followed by "CALIBRATION";

Initiate the multi-point calibration by tapping "Multi-point Calibration".

3. When the prompt "Please put on the weight 100 g" appears, place the 100g calibration weight on the sample pan. The message "Please wait" will be displayed.

 Once the screen shows "Please take away the weight", remove the 100g calibration weight.

5. Upon seeing the prompt "Please put on the weight 50g", place the 50 g weight on the pan, after which "Please wait" will be displayed again.

6. When the message "Please take away the weight" appears again, take off the 50g weight.

7. Following the same pattern, when "Please put on the weight 20g" is displayed, place the 20g weight on the pan. The "Please wait" message will be shown.

8. Remove the 20g weight when prompted with "Please take away the weight".

9. After all these steps, the machine will automatically finalize the

multi-point calibration procedure and return to the home screen.

# Measurement

#### 6.1 Preheating

\*Before taking measurements, it is recommended to preheat the machine to minimize measurement errors.

Procedure:

1. Power on the moisture analyzer by flipping the switch located on the machine's rear side.

2. Tap "TARE" on the screen to reset the moisture analyzer to zero.

\* The preheating setting should be in Standard drying mode with

automatic ending mode at  $120^{\circ}$ C, which is the default configuration.

3. Tap "MENU" on the home screen and then tap "SETTING".

4. Tap "DRYING MODE" and select "STANDARD", then press "CONFIRM".

5. Tap "ENDING MODE" to select "AUTOMATIC", then press "CONFIRM".

6. Tap "TEMPERATURE" to switch the heating temperature to  $120^{\circ}$ C and tap "CONFIRM".

7. Tap "HOME" twice to return to the home screen.

8. Press "START" to initiate the preheating process, which will automatically complete after 3 minutes.

## 6.2 Measurement

1. Tap "TARE" on the screen to reset the moisture analyzer to zero.

2. Lift the heater cover and place the sample to be measured on the sample pan. Close the cover.

3. Tap "MENU" on the home screen and select "SETTING".

4. Choose "DRYING MODE" and select from "STANDARD", "FAST", or "SOFT", then press "CONFIRM" (refer to section 6.2 for additional details).

: 🚦 °C	STANDANRD AUTOMATIC
STANDARD	
FAST	
SOFT	
CONFIRM BACK	

5. Select "ENDING MODE" and choose from "AUTOMATIC", "TIMING", or

"MANUAL", then press "CONFIRM" (refer to section 6.3 for further information).

:	temperature	STANDANRD AUTOMATIC
	AUTOMATIC	
	TIMING	
	MANUAL	
(	CONFIRM	

6. Tap "TEMPERATURE" to adjust heating temperature and press



"CONFIRM".

7. If the ending mode is set to "TIMING", tap on "TIME SETTING" to

adjust the duration for the measurement to conclude.



8. Initiate the measurement process by tapping "START".

9. The display will show the moisture percentage and remaining sample weight. To access the dynamic curve, tap on "CURVE" on the screen. To view the percentage of weight loss and the percentage of dried contents, simply tap on ".



#### 6.3 Drying Mode

#### Standard Drying Mode

The default setting is the Standard Drying Mode, appropriate for a majority of samples. You can set the heating temperature in this mode. During the test, the sample is heated to the set temperature and maintained at that level until the test automatically concludes.

#### Fast Drying Mode

The Fast Drying Mode is ideal for samples with high moisture content. In this mode, you can set a heating temperature. The initial temperature will surpass the set value, then decrease to the set temperature and remain there until the test automatically ends.

#### Soft Drying Mode

The Soft Drying Mode is designed for samples with low moisture content. The heater's rise to the set temperature takes a longer duration, providing a steady and slow temperature increase. You can manually set the duration for the temperature rise phase.

### 6.4 Ending Mode

#### Automatic ending mode

In the Automatic Ending Mode, the test will cease automatically once a certain condition is met - specifically, when the change in moisture content is less than 2 mg within a 45-second period. This mode activates after 15 seconds of heating.

#### Manual ending mode

During the test phase, tapping "START/STOP" will manually terminate the test.

#### Timing ending mode

This mode requires a preset analysis time. Once the predetermined time duration has passed, the heating process will automatically stop.

# Setting

# 7.1 System Setting

TIMER/DATE	TOUCH.CAL	FACTORY RESET
		ВАСК

Tap "MENU" followed by "System" to access the following settings:

TIME/DATE: Modify the current time and date.

TOUCH.CAL: Calibrate the touch functionality.

FACTORY RESET: Restore the device to original factory settings.

## 7.2 Printer

Tap "MENU" followed by "Printer" to access the printer settings. This will allow you to configure the system to match your printer's specifications, enabling you to print the measurement results.



## 7.3 History Report

To view individual test reports, simply tap "MENU", followed by "HISTORY" (Or directly tap "REPORT" on the upper-right corner of the home screen). This will display the detailed results of each test conducted.

		: 120	°C	STANDANRD AUTOMATIC	
		ORT 2024	- 0 8 -	2 1 1 7 : 5 2 : 2 7	
1	Heating Temp:	Standard 120 ℃	Ending Time el	apsed 0 3 : 0 0	
	Wet Weight	0.000	g Dry W	eight 0.000	1
	Moisture	0.00%M			
			C	DNFIRM BACK	

# Maintenance

- Turn off the power switch and remove power cord during maintenance.
- Cool down all parts of the analyzer before maintenance.

#### 8.1 Cleaning

Make sure that no dust or liquid enters the moisture analyzer housing. Do not use any aggressive cleaning agents (solvents, abrasive cleaning agents, etc.) or organic solvents to clean the analyzer.

*Clean the moisture analyzer using a piece of lint-free cloth which has been wet with a mild detergent (soap) only.* 



Remove sample pan, sample handle, sample holder and draft shield for cleaning. Ensure that no liquid seeps into the device. Dry with a dry soft cloth after cleaning.

Cleaning the sample chamber:

## Cleaning the heating unit:



Disconnect the power by unplugging power cord from the outlet.

 Carefully remove any residue from the temperature sensor.

 Use a damp, lint-free cloth to clean the tubular heating element.

Cleaning the display panel:



Wipe the panel with a damp cloth. Do not use a chemical dust cloth, as it may damage the paint surface and display panel.

## 8.2 Disposal

Disposal of equipment and packaging must be carried out by the operator in accordance with relevant laws of the country or region in which the equipment is to be used.

# Troubleshooting

**Problem:** Display remains off after switching on.

#### Possible causes:

- Power cord is not connected
- Power line fuse blown
- Power supply interrupted
- Instrument faulty

**Problem:** Display does not change when loading samples.

**Possible causes:** The sample pan/pan holder is not installed correctly.

**Problem:** Weight display is constantly changing or unstable.

#### Possible causes:

- The sample pan is in contact with the draft shield or heating chamber
- Air movement
- Test bench vibration
- Electromagnetic field interference

#### Problem: Drying does not start

#### **Possible causes:**

• Heating chamber open

- Power cord is not connected
- Power line fuse blown

Problem: Measurement takes too long.

Possible causes: Incorrect ending mode selected

Problem: Measurements are not repeatable.

#### **Possible causes:**

- The samples are not homogeneous.
- Drying time is too short.
- The temp selected is too high and the sample has been oxidized.
- The temperature sensor is contaminated or defective.
- The sample is not completely dry.

#### Fault code:

- ERR1 The load is less than 1 gram.
- ERR2 The temperature setting is less than 104  $^\circ\mathrm{F}$
- ERR3 The drying-time setting is less than 30 seconds
- ERR4 Heater circuit board fault.
- ERR5 The setting time is less than the specified time when in the soft

drying mode.

ERR6 Temperature sensor fault.

# **Technical Data**

Model	USS- USS-		USS-	
	HMA21	HMA22	HMA23	
Capacity	110g			
Weight Readability	0.01 g 0.005 g 0.001 g			
Moisture Readability	0.1 % 0.05% 0.01 %		0.01 %	
Control Panel	5-inch Touch Screen			
Heating Element	250W Halogen Lamp			
Operating Temp.	<b>40</b> °C - 160 °C (104 °F - 320 °F )			
Ambient Temp.	<b>41</b> °F - <b>95</b> °F ( <b>5</b> °C - <b>35</b> °C )			
Time setting range	1 - 99 min			
Test mode	Standard, Fast, Soft			
Ending mode	Automatic, Timing, Manual			
Displays of results	[%m] moisture content, [%] dry content,			
	[g] residual weight in grams			
stabilization time	≤ 3 s			
Pan size	$\Phi$ 100 mm			
Interface	RS-232			
Power	110V 60Hz AC			
Dimensions	13.23*8.43*6.54 inches (336*214*166 mm)			
Net Weight	7.73 lbs (3.5 kg)			

#### Contact

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