

Humidification Products



Introduction to Moisture Restoration

Adding moisture can add efficiency and value.

We talk *a lot* about cotton moisture. But just to add variety to the same old fiber moisture explanation, let's take a look at another favorite ag product – chocolate!

When cocoa beans are harvested, their first step in becoming chocolate is to undergo a fermenting process where their moisture content is around 60%. If done incorrectly, the classic chocolate flavor will not develop.

Next the beans must be dried down to a moisture content of about 7%. If it's too low, the beans are too brittle and break. Too high and they will mold in storage. Now the beans are ready to be shipped to the factory, where they will be dried further with roasting. Other processes follow, including milling, pressing, refining, tempering and molding. Each of these processes require a certain moisture range to produce desired results. Sound familiar?



Cotton, like chocolate and virtually every other ag product, requires the control of moisture to maximize its value. In the previous section of this handbook, we discussed the needs and benefits of drying. But the benefits of moisture control do not stop after the drying and pre-cleaning stage of the gin.

There are two critical points in the gin where restoring moisture can yield efficiency gains for the gin and higher bale values for the growers.

In the following pages you'll see the products we offer that are designed to deliver these benefits. If you are interested in obtaining the full advantages of moisture restoration in your gin, give us a call and we will work with you to find the best solutions for your operation.

Moisture restoration requires a Humidaire Unit and an Applicator.

Humidaire Units

Humidaire Units are used to safely and effectively restore moisture to cotton. They create moist or humidified air by heating ambient air; allowing it to absorb large amounts of moisture. Humidaire Units are often generically called moist air generators, humidifiers or simply moisture units. Each system usually requires a single Humidaire, but larger gins are reaching capacities where multiple units would actually be better in certain applications. There are several models of Humidaire Units with different levels of performance and control for your gin's specific needs.

Moist Air Applicators

Once the moist air has been generated by the Humidaire Unit, you need a moist air applicator. Applicators are separated into two groups: those used to restore moisture to seed cotton and those used to restore moisture to lint. The two types of applicators differ by their location in the gin and more importantly their function as it relates to gin production, efficiency and fiber quality. Example applicators are shown below.



A King Mesa Humidaire Unit.



A Conditioning Hopper for seed cotton moisture restoration



A Lint Slide Grid for economical lint moisture restoration



A Steamroller for powerful and efficient lint moisture restoration

Introduction to Moisture Restoration

Benefit from moisture at your gin stand feeders...



A typical Conditioning Hopper System

Seed Cotton Conditioning Systems

Samuel Jackson Seed Cotton Conditioning Systems apply humid air to seed cotton between the conveyor distributor and each gin stand using an applicator called a Conditioning Hopper. Although each system will have a single Hopper above every stand, typically only one Humidaire Unit is required for the entire system. Seed Cotton Conditioning is used to prepare seed cotton for ginning. When the moisture level of seed cotton is raised before ginning, certain aspects of fiber quality are preserved. Seed Cotton Conditioning used alone has little effect on bale moisture content and is not a substitute for Lint Conditioning.

Lint Conditioning Systems

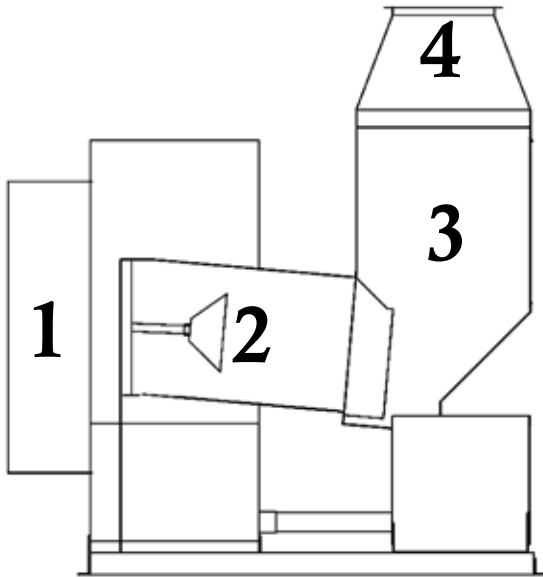
Samuel Jackson Lint Conditioning Systems are found between the battery condenser and the tramper on a press. Generally, gins operating below 30 bales per hour use a Lint Slide Grid System and gins with capacities above 30 bales per hour use a Steamroller System. The purpose of restoring moisture to lint from a gin's perspective is to reduce the hydraulic pressures on the press. Conditioned lint presses easier, can improve press capacity and adds consistency to bale weights. Samuel Jackson Lint Conditioning Systems have no positive or negative effect on fiber quality.

... and at your press



A Steamroller II Lint Conditioning System

Humidaire Operation in 4 Easy Steps



Understanding the principles of operation of a Humidaire Unit is easiest when you break it down into the following four steps:



Step 1: Ambient air is pulled in through the air inlet of the Humidaire Unit. *Note: The air inlet screen has been removed for picture clarity.*

Step 2: The air passes through the burner head which raises the temperature of the air. Heated air will carry much more moisture than cool or ambient air.



Step 3: The heated air enters the spray chamber where it mixes with a torrent of water that is circulated through the unit and sprayed out of nozzles. The air absorbs the moisture to become humidified air.

Step 4: The moist air leaves the Humidaire Unit through a pipe connected to the top of the spray chamber and goes to the application point. The picture shows humidified air being exhausted from our Humidaire Test Stand as an example of the volume of moisture generated. In a gin, the humidified air would go to a seed cotton or lint moist air applicator.



Introduction to Moisture Restoration

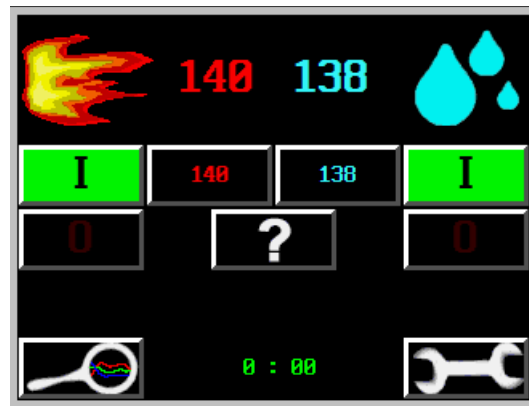
Traditional Humidaire Control

Step 1:

The operator sets the air temperature. This controls the gas valve. Hotter air absorbs more moisture, so a higher air temperature will allow the Humidaire to generate more moisture output.

Step 2:

The operator sets the water temperature. This controls the water valve. The water valve adjusts the amount of water flowing through the nozzles. Adjusting the water temperature closer to the air temperature creates more moist air output.



Step 3:

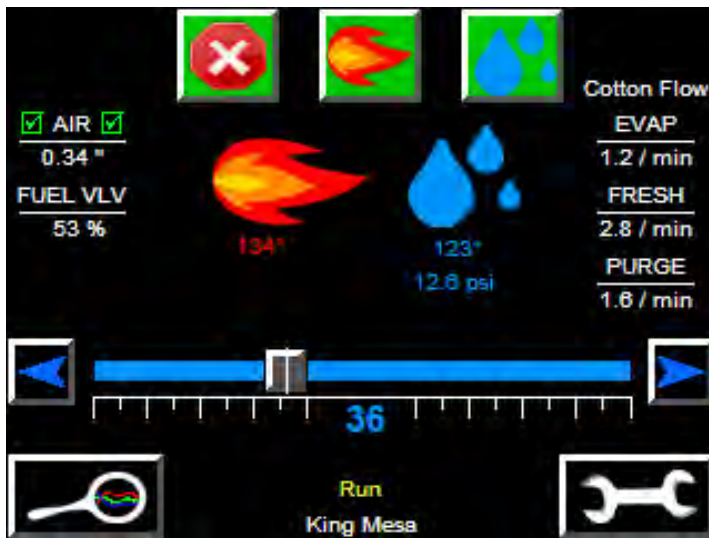
By balancing the air and water temperatures, the operator controls the amount of moisture the Humidaire Unit generates.

Note: This picture shows an example of the volume of moist air generated by a Humidaire Unit. In a gin, the moist air would be carried by pipe to an application point.

HUMIDIFY

New Moisture Direct Control

Makes it Easier Than Ever to Control Humidaire Output



Our Humidaire units have a strong reputation for performance and dependability. But controlling their output has always been a skill that required specialized instructions, experience in a variety of conditions and a knowledgeable touch – until now!

Moisture Direct Control makes getting just the right amount of moisture from your Humidaire Unit easier than ever. Traditional Humidaire units measure temperature in the water tank and adjust moisture output by changing the amount of water being exposed

to the hot air stream. Moisture Direct simplifies the control process by adjusting the water valve directly from the touch screen based on desired moisture output. Bump up the output percentage for more moisture or turn it down for less. It's that easy!

In addition to making moisture control easier to use, Moisture Direct also gives Humidaire Units more precise output, a larger operating range and faster response.

The key to successful Moisture Direct operation is a complex algorithm that is specially calibrated and unique to each Humidaire Unit. Every unit is carefully calibrated on our factory test stand prior to shipping. Should your unit ever need recalibrating, the complete procedure can be performed with the touch of a button and is completely automatic!

We tend to agree with the old saying, "It's easy to make something complicated, what's hard is keeping it simple." Our design team has done the hard work in making Humidaire control easy for all of your operators to get great results.

Moisture Direct is a feature on all units with the 1600 Series Operating System.

Humidaire Features Explained

Introducing the 1600 Series Operating System

After designing and manufacturing moisture equipment for over 50 years, we've seen a number of machines that “look” like genuine Humidaire Units. While proven thermodynamic design is critical, experienced ginners will tell you a very important part of any moisture unit's performance is the operating system or “controls”.

The Humidaire King Mesa closely resembles its popular predecessor, the Southwest Lite. That said, don't be quick to judge this book by its cover. The King Mesa introduces the biggest change in Humidaire controls technology in over 20 years. Moisture output is easier to adjust, faster to respond and more stable than ever! The new 1600 Series Operating System was specifically designed for the Humidaire King Mesa to support a number of new features including:

- Moisture Direct Control
- Moisture Mirror X remote compatibility
- Analog Water Pressure Monitoring
- Analog Gas Pressure Monitoring
- Improved Automatic Purge System
- Water Pump and Flame Settings for Gin Idle
- Output for Moist Air Fan VFD
- Advanced Real-Time Error Logging
- And more!

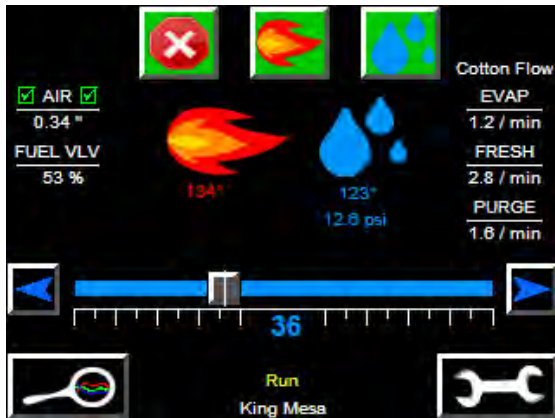
The 1600 Series Operating System organizes all of these features on the Humidaire's local color touch screen so they are easy to find and use. Your operators will enjoy the simple and intuitive controls compared to previous moisture units.

In addition to the Humidaire King Mesa, the larger, extreme-duty Humidaire Southwest also features the 1600 Series Operating System on all new units. Consult the factory for control upgrade options available for Southwest and Southwest Lite Humidaires.

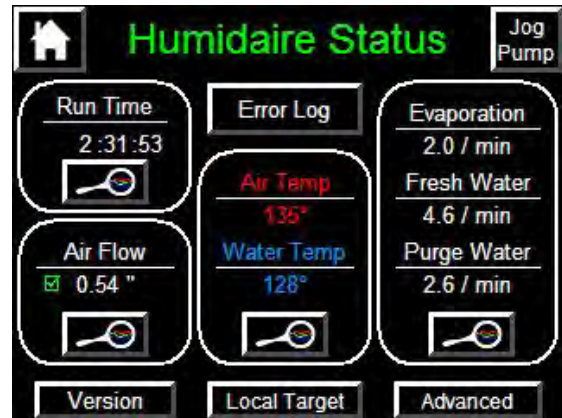


1600 Series Features You Don't Want to Miss

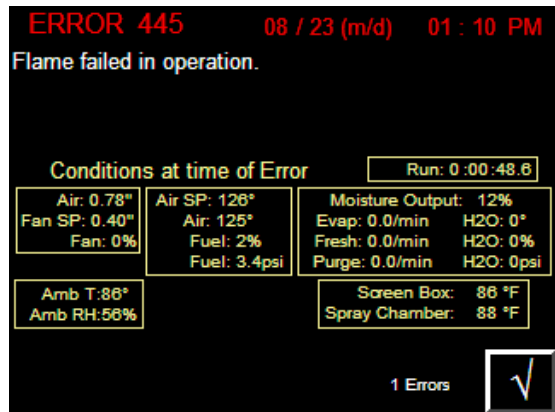
The 1600 Series operating system is loaded with new features. We can't cover them all here, but we wanted to highlight a few of them that you won't want to miss.



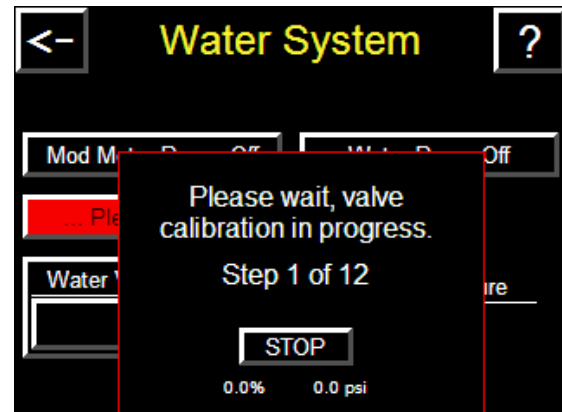
Moisture Direct Control



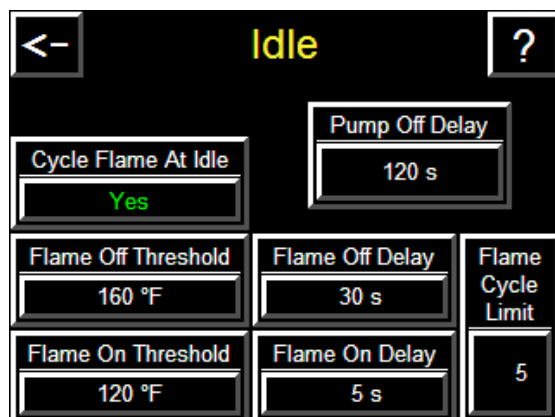
More analog inputs for advanced control and performance



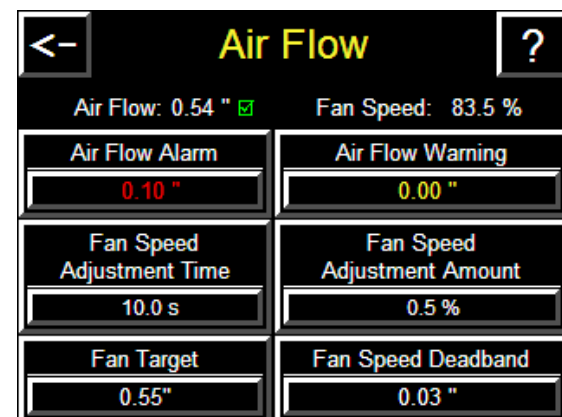
Detailed error reports and log



Auto calibration procedure



Flame idling



More complete air monitoring

Humidaire Features Explained

Moisture Tunnel Technology

Thermodynamically Speaking...It Sizzles!



You can see the Moisture Tunnel in action as the fire and water interact inside the spray chamber.

We've all had our share of hamburgers. Cooked in a pan or a griddle they can be satisfying, but when you're really craving a good, make-your-mouth-water burger, there is no substitute for flame-grilled. Letting that flame come in direct contact with the patty as it cooks does something special.

Now you may be wondering what that has to do with Humidaires (other than this being written at lunch time). Well the 'classic' Humidaire configuration uses 'griddle' thermodynamics. The flame and the water are separated by a physical barrier and the water is heated indirectly.

Humidaire models equipped with Moisture Tunnel Technology use 'flame-grilled' thermodynamics, forcing the water into direct contact with the flame from a fuel-efficient, premium burner head. The results sizzle in more ways than one. As an example, the Humidaire Southwest is equipped with Moisture Tunnel Technology and can evaporate 100% more moist air using 10% less fuel than traditional moisture units.



Moisture Tunnel Technology is available on the Humidaire Southwest, Humidaire King Mesa, Humidaire Sahara and Sahara Lite models. The Zephyr can be upgraded to the Sahara Lite.

Hydrocyclone Cleaning Option

Clean Water Makes For Happy Humidaires and Humidaire Owners



If you or one of your employees get stress relief from cleaning the mud and muck out of your Humidaire tank and pipes, then the hydro-cyclone may not interest you.

But if you'd like a device that helps do that work for you, read on!

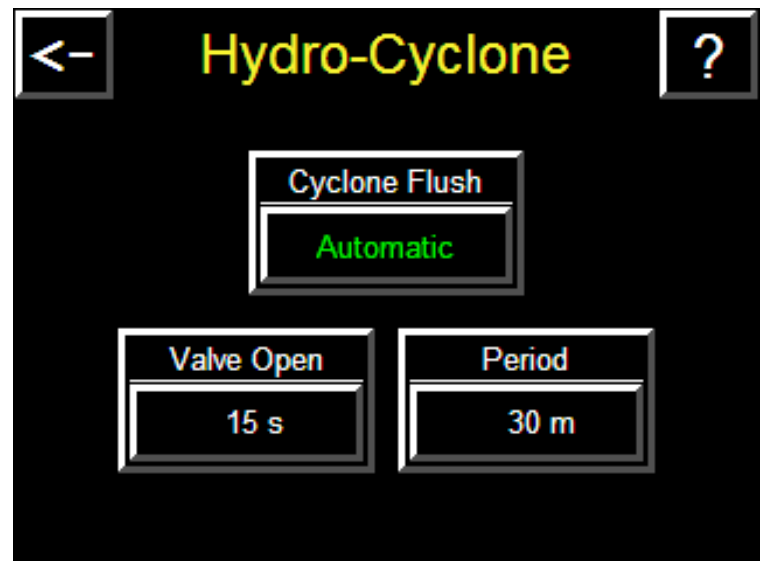
Keeping the water circulating in your Humidaire clean helps it perform better, extends time between cleanings, makes cleaning the unit easier and adds life to your unit. The optional hydro-cyclone makes achieving cleaner water and its benefits possible.

Similar in principle to the cyclones in your air systems, dirty water is swirled through the hydrocyclone. The dirt, sediment, lint and

other junk entrained in the water gets separated out and exits the bottom of the cone. The cleaned water exits the top and is recirculated back into the bottom of the tank, where it sweeps the bottom of the tank clean, too.

The Hydrocyclone Cleaning Option is available as a factory option or field retrofit on all HU-80 models. Compatible models come equipped with software controls that make it easy to setup and customize cleaning parameters.

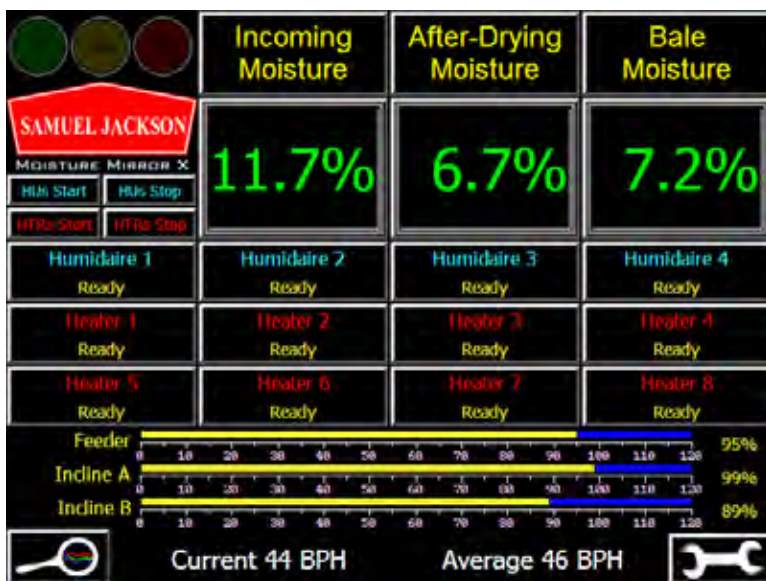
Ask your Sam Jackson rep for more information on how this option will work for you and improve your system.



Humidaire Features Explained

Moisture Mirror Remote Control

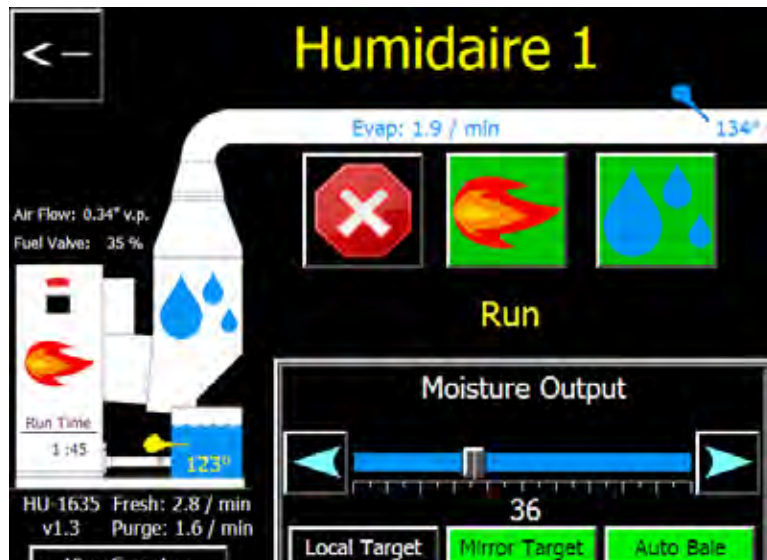
The Moisture Mirror 2X, 3X and 4X offer remote control of 1400, 1500 and 1600 Series Humidaires from your console.



How would you like to take back a little real estate on your console? The Moisture Mirror 2X, 3X and 4X can remotely control up to four Humidaires and up to eight Heaters from a single touch screen. The Mirror allows you to start and stop the unit, change temperatures and even view performance statistics such as gallons evaporated per minute. If there is a problem at the unit, the Moisture Mirror will notify you at the console and offer possible solutions. You're not going to miss your old digital controllers!

Mirror X Home Screens (2X shown) show the status of all connected Humidaires

Connecting 1400, 1500 and 1600 Series products to the Moisture Mirror is easy. It only requires a single Ethernet cable from the Mirror to each product. If there's a communication problem, there is only one cable to check making troubleshooting a snap!



Each Humidaire has its own screen complete with start and stop buttons and operation statistics.

Moisture Mirror Remote Compatibility is not available for the Static Zapper or Zephyr Humidaire Unit models.

Water Watch

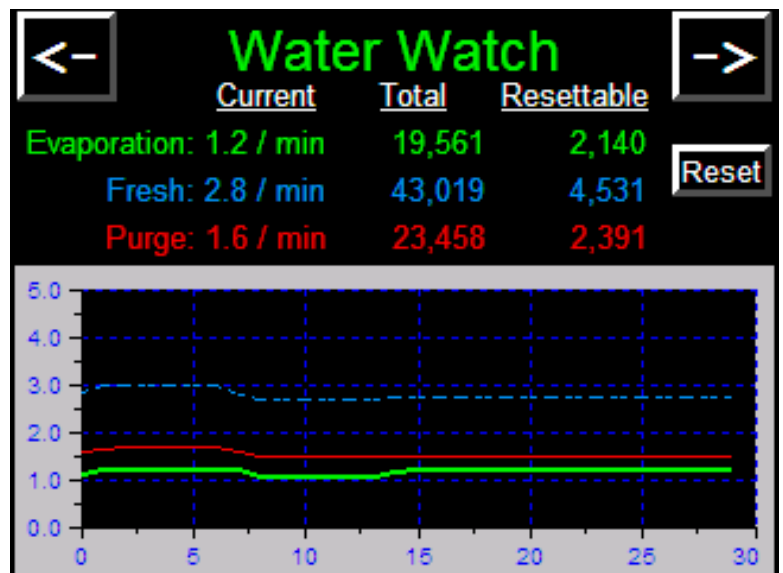
Don't guess about Humidaire performance, watch for yourself.



Water Watch meters are housed in the lower cabinet and help measure the ROI of moisture restoration at your gin.

The relationship between temperature settings and Humidaire output can sometimes be difficult to understand. Water Watch makes it easier by displaying Humidaire performance as Fresh, Purge and Evaporated water in gallons per minute. By comparing the fresh water entering the unit with the purge water being removed, the amount of water evaporated is calculated as a running 30-minute average. Fresh and Purge totals are kept over the lifetime of the unit and resettable totals can be zeroed at the start of each gin season.

Water Watch information is graphed over a 24-hour period. The graphing window displays a 30-minute time frame and defaults to the latest 30-minute interval. Graphing history is viewed by pressing the on-screen forward and back arrows. The Water Graph is especially helpful in identifying trends. Trends can be used to compare moisture system performance over time and highlight problems with Humidaire performance early. A malfunctioning water valve or float valve is easy to see when you look at the color-keyed graph.



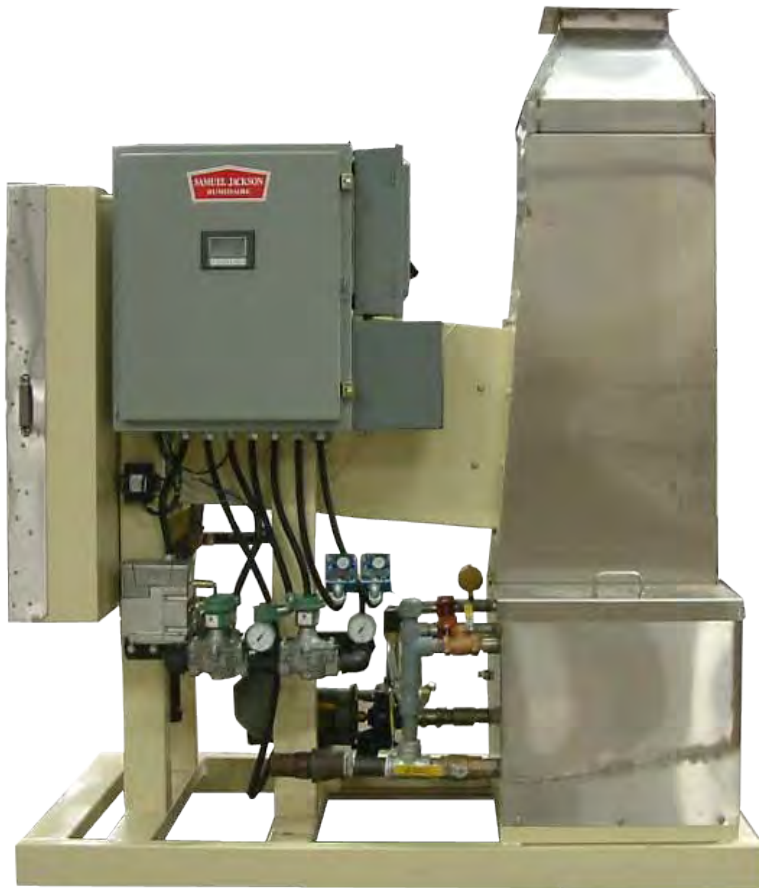
The Water Graph clearly defines a problem such as the malfunctioning purge valve in the example above.

Water Watch comes standard on 1400, 1500 and 1600 Series Humidaire Units.

The Static Zapper

A Special Purpose Moisture Unit

Many don't realize that the Humidaire was originally invented for the purpose of killing static. Success at that led to its use in other applications, giving benefits to press efficiency, ginning speed and protecting quality at the gin stand.





With that history and the known power of moisture restoration, it's not surprising that interest in new applications for moist air continues to grow. Not all of those applications are suited for our traditional sized Humidaires.

The Static Zapper offers an economical, easy-to-use moist air generator that is ideally sized for lower volume applications. Simple and straightforward to install, this unit is suited for special applications such as small capacity gins, spot conditioning, prototype testing and research trials.

- Available in gas or oil-fired configurations (gas-fired shown)
- 2 HP Water Pump
- 500 - 1,000 CFM
- 1-million Btu/hr rating
- Stainless steel water tank and spray chamber
- PLC controls
- Water flow controlled by VFD
- Output for fan speed control for constant air volume
- Evaporation rates of 60 gallons per hour
- Fast warm-up time
- Output is adjustable in 1% increments
- Easy installation
- Great alternative to boiler systems

Gas-Fired Humidaire Comparison

Which model fits your needs?

	King Mesa	Southwest
Model #	HU-80-1635	HU-SOUTHWEST-1680
Max. Evaporation	3.5 gallons/minute	4.2 gallons/minute
Heating Efficiency	1,530 Btu per pound of water evaporated	1,530 Btu per pound of water evaporated
Maximum Air Volume	4,000 CFM	5,000 CFM
Water Pump Motor	5 HP	7.5 HP
Stainless Steel Pump	No	Yes
Burner	Samuel Jackson	Samuel Jackson
Moisture Tunnel Technology	Yes	Yes
Two side water tank access	No	Yes
Access doors to tunnel	1	3
1600 Series Operating System	Yes	Yes
Combustion Controls	PLC	PLC
Air Temperature Control	User Set-Point PID Controlled by PLC	User Set-Point PID Controlled by PLC
Water Temperature Control	NEW! Moisture Direct	NEW! Moisture Direct
Operator Interface	Touch Screen	Touch Screen
Ethernet Communications	Yes	Yes
Moisture Mirror Remote Control	Mirror 2X and higher	Mirror 2X and higher
Mirror Compatible for Target Bale Moisture	Yes; Ethernet	Yes; Ethernet
Error/Alarm Interface	Touch Screen	Touch Screen
Water Watch Diagnostics	Yes	Yes
Purge System	Automatic	Automatic
Hydrocyclone Filter	Optional	Yes
Suggested Use	Conditioning Hoppers, Moisture Condensers and Steamrollers	Conditioning Hoppers, Moisture Condensers and Steamrollers
Value Category	 Fusion	 Pinnacle

Gas-Fired: The Humidaire King Mesa

The Humidaire King Mesa has powerful moisture output, fuel efficient operation and user-friendly controls in one impressive package.

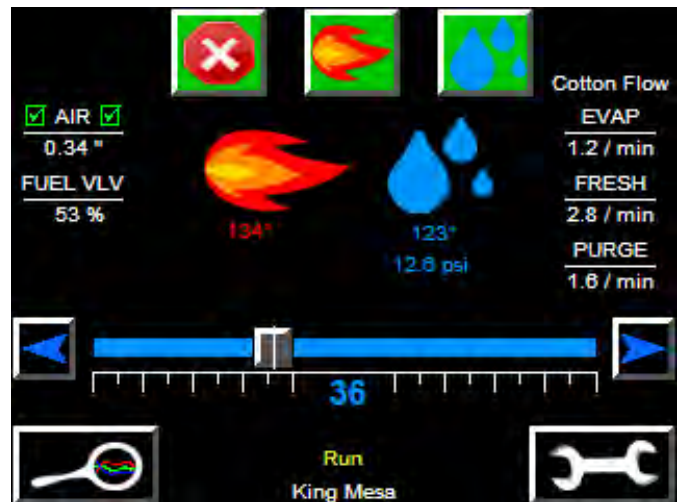


The Humidaire King Mesa.

The Humidaire King Mesa comes standard with several impressive features such as:

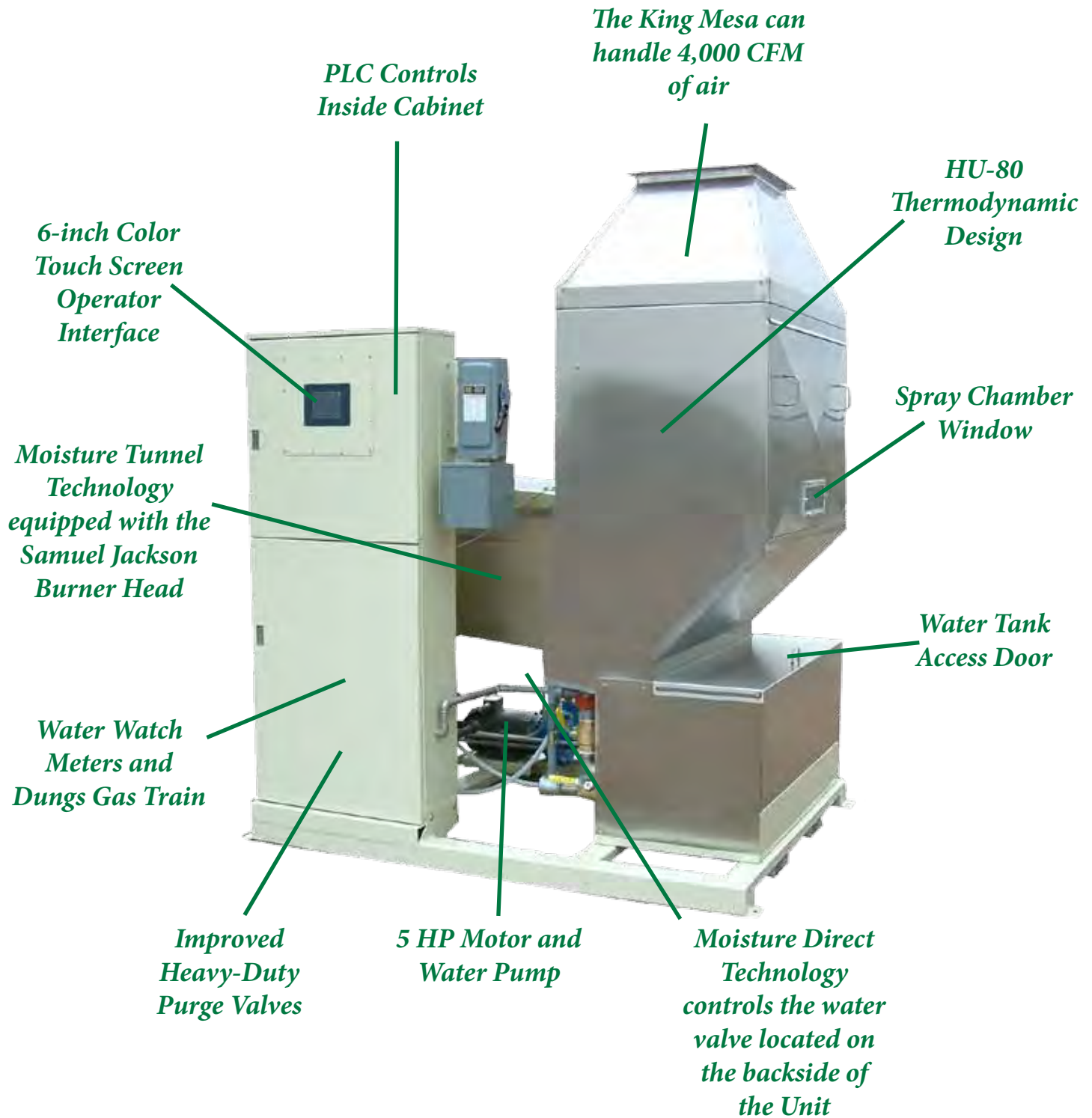
- A local color touchscreen for simple control and advanced diagnostics
- Improved! Automatic purge system to reduce cleaning needs
- Target Bale Moisture Control with any Mirror and a Tex-Max
- Remote control from any Mirror 2, 3 or 4 with Mirror X software
- Remote monitoring with an iPhone or iPad using the Mobile Mirror App
- Easy access to the water tank during operation

Introduced in 2010, the Humidaire King Mesa can evaporate 75% more moisture using 10% less fuel compared to traditional moist air units. The improved performance and efficiency are by-products of Moisture Tunnel Technology. The King Mesa is also the first Humidaire model to include Moisture Direct Control. Moisture Direct is the most stable and user-friendly Humidaire control system to date. More information on both Moisture Direct and the Moisture Tunnel can be found earlier in this section.



The King Mesa utilizes the Premium Touch Screen Interface that gives the operator in-depth performance statistics directly on the home screen.





The Humidaire King Mesa is equipped with the NEW 1600 Series Operating System!

Gas-Fired: The Humidaire Southwest

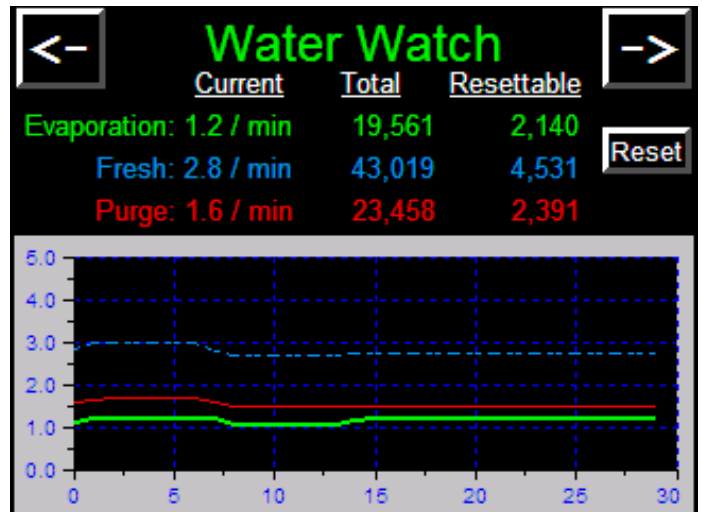
*An extreme-duty machine for top performance
in the most demanding conditions.*



The Humidaire Southwest.

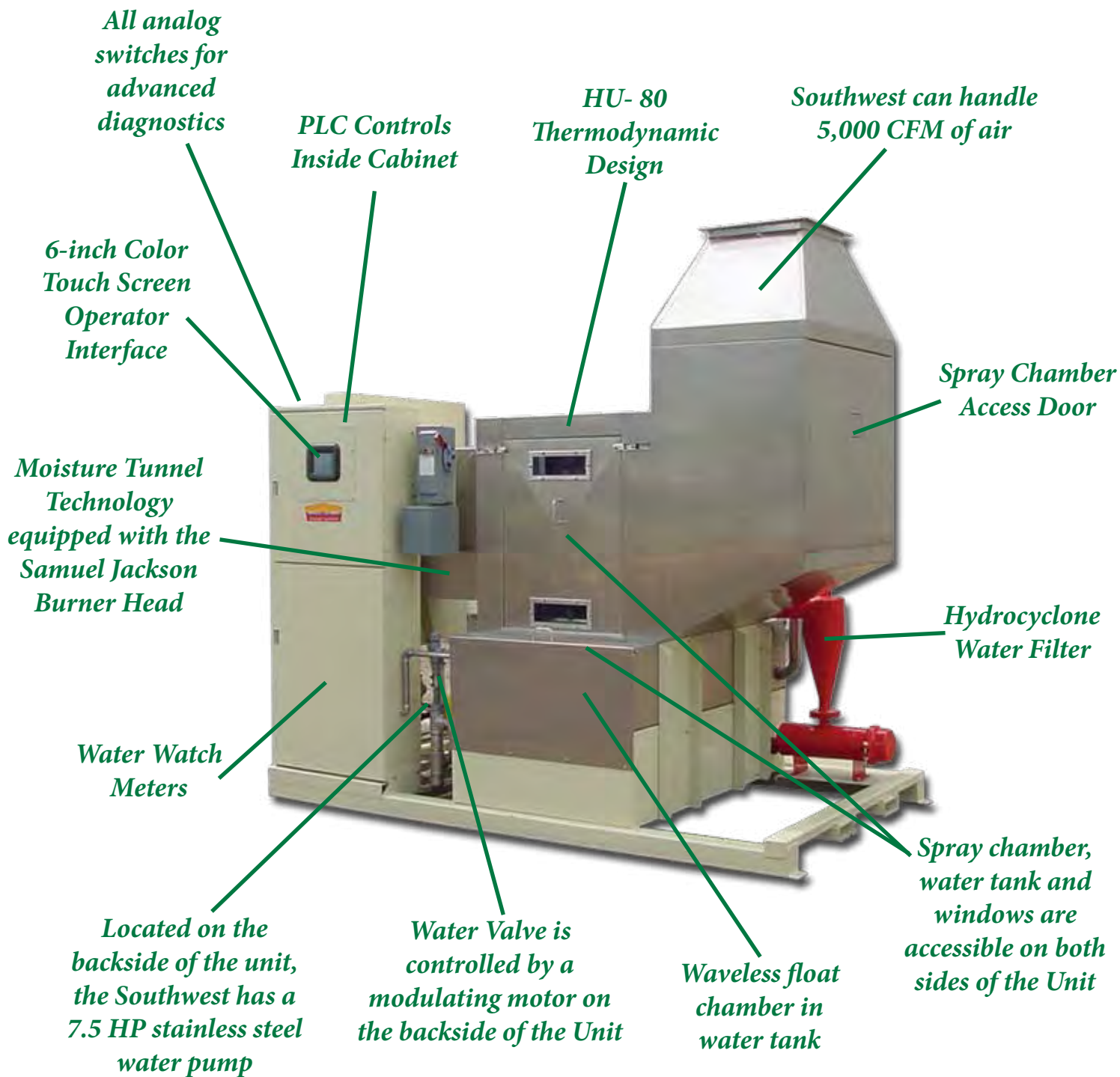
The Southwest comes standard with a 7.5 HP motor and a stainless steel water pump. These components generate robust water pressure with some of the most challenging water sources in the world. The unusual looking device on the right side of the unit is a hydrocyclone water filter. If you've got tough water, it can handle it. These features coupled with an almost entirely stainless steel body and touch screen controls make this one amazing Humidaire. If you need references, ask us about the gin that conditioned almost half-a-million bales at 60 bales per hour in the last four years with their Southwest.

Samuel Jackson engineers set out to design a Humidaire that's powerful, rugged, fuel-efficient, easy to clean and operator-friendly. You will find all of these attributes and more in the Humidaire Southwest. Introduced in 2004, the Southwest is especially popular in Australia and the Western U.S. where extremely dry conditions demand it. The Southwest disputes all claims against the ability to restore moisture with humid air with its maximum evaporation capacity at over 4 gallons per minute. The impressive output of this unit can be attributed in part to Moisture Tunnel Technology which also improves its fuel-efficiency by 10% versus traditional Humidaire's.



The Southwest utilizes the Premium Touch Screen Interface. It gives the operator a 30-minute graphing feature to view Humidaire performance.





HUMIDIFY

The Humidaire Southwest is equipped with the NEW 1600 Series Operating System!

Glance at Humidaire History




More than 55 years of Humidaire Progress

The gas-fired models on the previous pages and the following oil-fired models represent the efforts of more than five decades of Humidaire research and development, bringing you the absolute in moist air technology for cotton gins. We always enjoy a look back at our roots and thought you might like to see a little Humidaire history, too.



HUMIDIFY

Oil-Fired Humidaira Comparison

	Zephyr	Sahara Lite	Sahara
Model #	HU-80-ZEPHYR	HU-80-1535	HU-SAHARA-1590
Max. Evaporation	1.5 US gpm	3.5 US gpm	4.8 US gpm
Heating Efficiency	1,230 Btu/lb of water evaporated	1,170 Btu/lb of water evaporated	1,160 Btu/lb of water evaporated
Maximum Air Volume	2,500 CFM	4,000 CFM	5,000 CFM
Water Pump Motor	5 HP	5 HP	7.5 HP
Stainless Steel Pump	No	No	Yes
Burner	Beckett 2-Stage Burner	Maxon	Maxon
Moisture Tunnel Technology	No	Yes	Yes
1600 Controls	No	Yes	Yes
Combustion Controls	Honeywell/ Relay-Based	PLC	PLC
Air Temperature Control	2 - Stage Burner High and Low	User Set-Point PID controlled by PLC	User Set-Point PID controlled by PLC
Water Temperature Control	User Set-Point	User Set-Point	User Set-Point
Operator Interface	Selector Switches	Touch Screen	Touch Screen
Ethernet Communications	No	Yes	Yes
Moisture Mirror Remote Control	No	Mirror 2X and higher	Mirror 2X and higher
Mirror Compatible for Target Bale Moisture	Yes; Analog	Yes; Ethernet	Yes; Ethernet
Alarm/Error Interface	None	Touch Screen	Touch Screen
Water Watch Diagnostics	No	Yes	Yes
Purge System	Manual	Automatic	Automatic
Hydrocyclone Filter	No	Optional	Yes
Upgradable	Yes; to a Sahara Lite	No	No
Suggested Use	Conditioning Hoppers and Lint Slide Grid	Conditioning Hoppers, Moisture Condenser and Steamrollers	Conditioning Hoppers, Moisture Condenser and Steamrollers
Value Category	 Gateway	 Fusion	 Pinnacle

Oil-Fired: The Zephyr Humidaire

A balance of power and simplicity.



A Zephyr Humidaire Unit.

Key Features of the Zephyr:

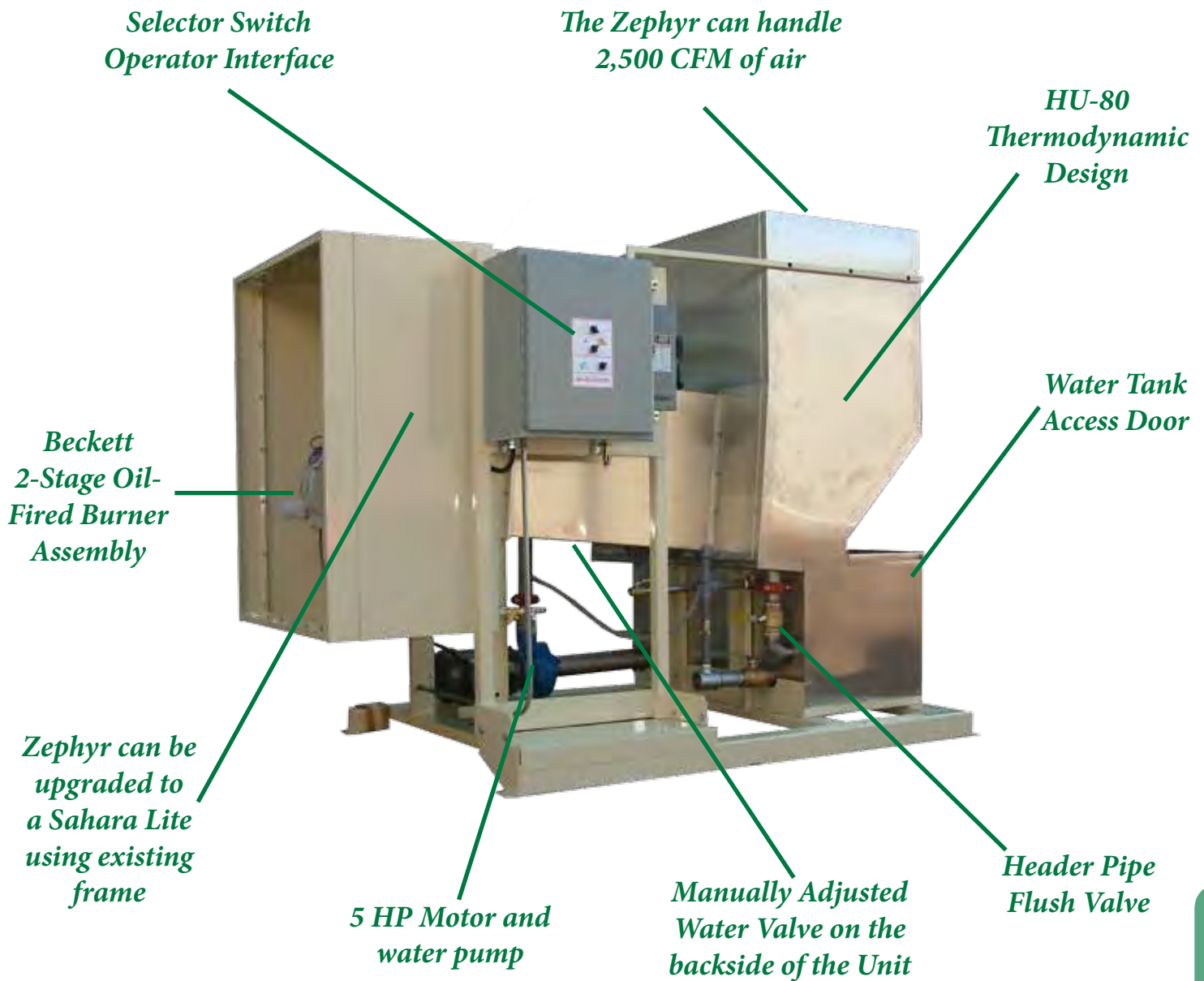
- The Zephyr uses an oil-fired commercial grade burner that burns either kerosene or diesel.
- The burner can change from high fire to low fire with the flip of a switch.
- Moist air output is adjusted with the water valve that's located on the back side of the unit.
- With the selector switch interface, operators will have little trouble learning how to make changes based on climate and condition of the cotton.

The Zephyr is a Humidaire hybrid with selector switch controls similar to the Static Zapper and the HU-80 frame of the more powerful Sahara Lite. This feature-mix creates a unit that's powerful and user-friendly for the novice operator. The HU-80 frame allows the unit to be upgraded to a Sahara Lite as the gin's needs for powerful moist air output and sophisticated controls grow.



The Zephyr's Selector Switch Controls





Oil-Fired: The Humidaire Sahara Lite

Our most popular oil-fired model.

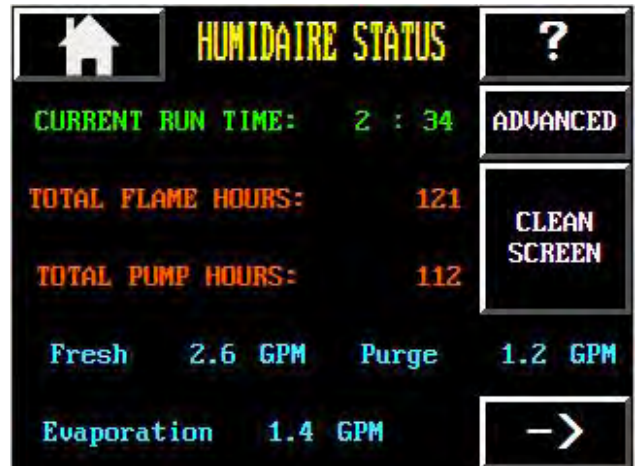


A Sahara Lite Humidaire Unit.

The Sahara Lite comes standard with several user-friendly features:

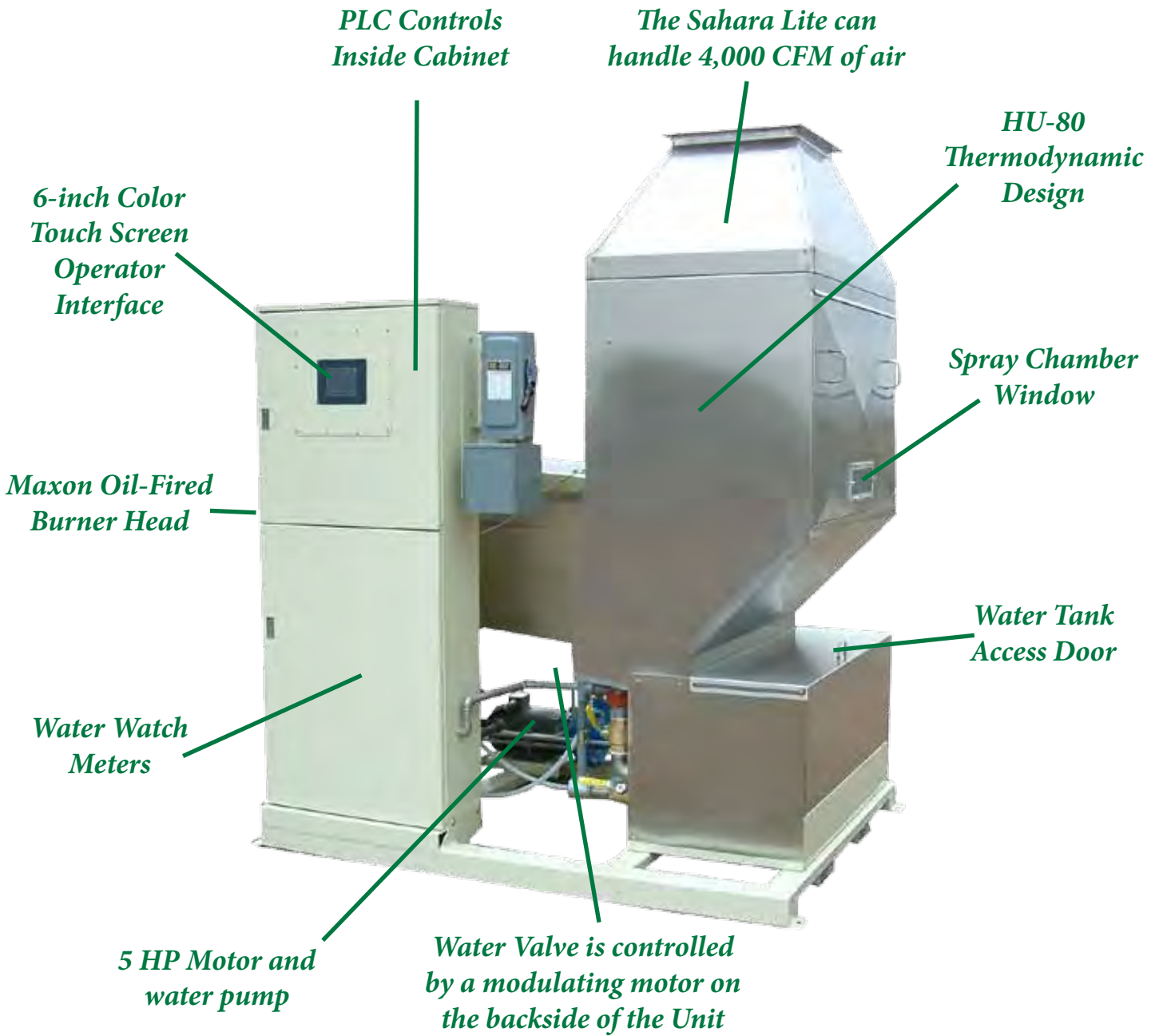
- A color touchscreen for onboard diagnostics and troubleshooting
- Moisture Mirror 2X, 3X and 4X remote control capability
- Target Bale Moisture Auto Control with any Mirror and a Tex-Max
- Auto purge system to reduce cleaning
- Water tank access during operation

Do you need a powerful source of moist air for a moisture condenser or a Steamroller? How about Conditioning Hoppers? Or in smaller gins, one unit for both applications? The Sahara Lite will handle any of those applications with ease. It's also priced at over 40% less than the Sahara and has 100% more moist air output than the Zephyr. Combine price and performance with an elegant color touchscreen operator interface and tons of additional features and you've got one impressive Humidaire.



The Sahara Lite utilizes the Premium Touch Screen Interface that gives the operator instant access to run times and real-time water statistics.





Oil-Fired: The Humidaire Sahara

The most powerful Humidaire in the world.



The Humidaire Sahara.

The Sahara comes standard with all the features you would expect from the best Samuel Jackson has to offer:

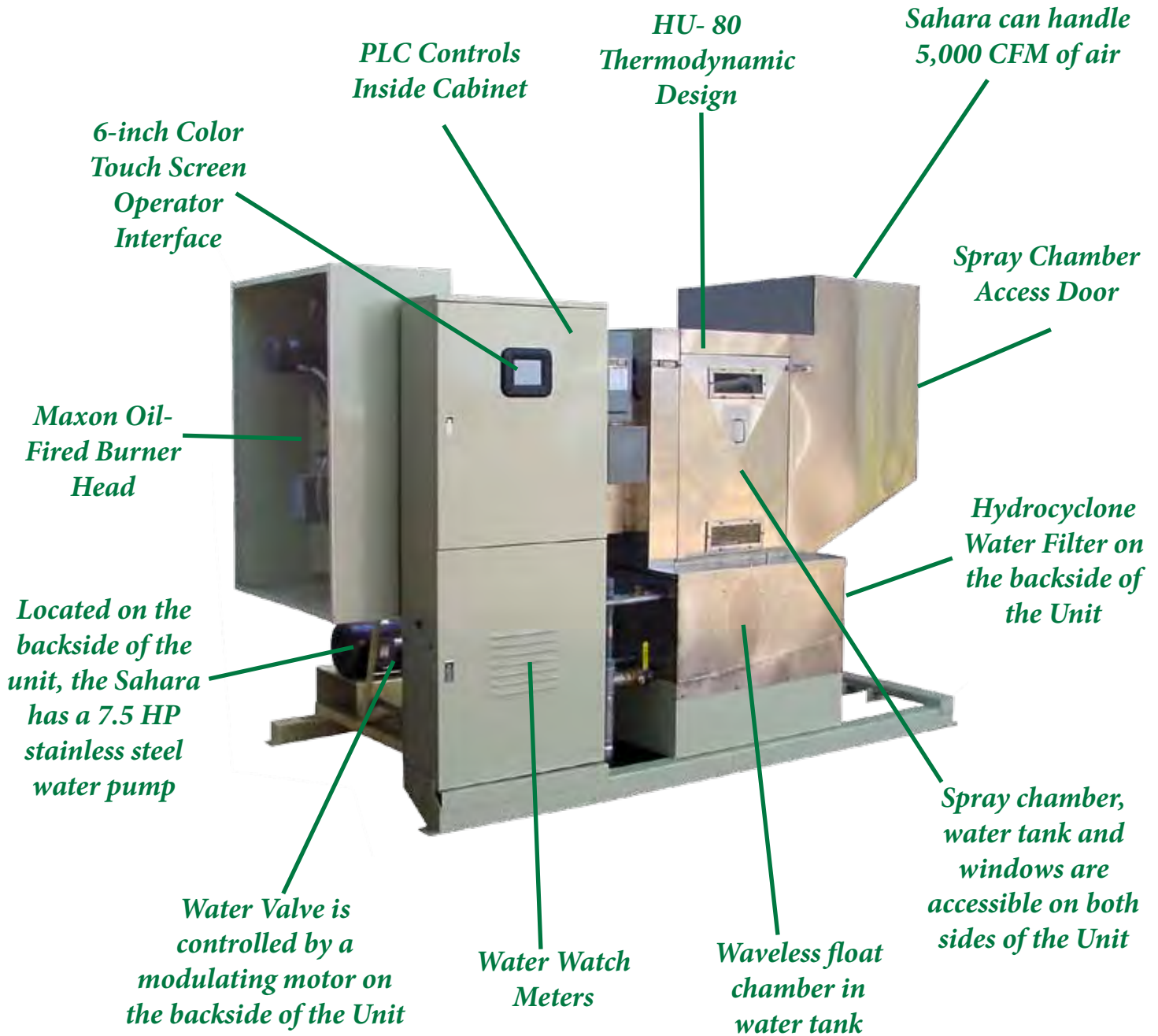
- An onboard color touchscreen for diagnostics and troubleshooting
- Moisture Mirror 2X, 3X and 4X remote control capability
- Target Bale Moisture Auto Control with any Mirror and a Tex-Max
- Auto purge system to reduce cleaning
- Stainless steel water train and pump (except Hydrocyclone)
- A Hydrocyclone filter to handle the harshest water conditions
- Water tank access during operation
- Dual access to the spray chamber and an additional door to the mist eliminator for easy maintenance
- Wave-less float chamber to ensure optimum water level

Seeking to design an oil-fired Humidaire model with the same performance, durability and user-friendly features of the Humidaire Southwest, Samuel Jackson engineers created the Humidaire Sahara. Instead of getting a comparable unit, surprisingly, the Sahara is more powerful and efficient than its gas-fired counterpart. Sahara users will find no job too tough for this extreme duty unit.



The Sahara utilizes the Premium Touch Screen Interface that informs the operator of performance problems and suggests multiple solutions.





Conditioning Hoppers

Everyone agrees gin stand moisture is important. Conditioning Hoppers provide the best solution to maintain optimum ginning moisture.



Conditioning Hoppers in operation at a gin running at over 60 bales per hour.

Over 50 years ago, Mr. Sam Jackson invented the first Humidaire Unit. At that time, the unit was used to reduce static electricity problems in dry seed cotton through an applicator similar to modern Conditioning Hoppers. Through later research, it was discovered that in addition to eliminating static electricity, restoring moisture to seed cotton before ginning also preserves fiber quality during fiber-seed separation. Within practical limits, increasing the moisture in seed cotton before ginning has a positive correlation to fiber quality characteristics such as length, strength, uniformity and lower short fiber content. Today, Hoppers are used in gins all over the world to combat problems with static electricity and fiber damage due to dry ginning conditions.



Researchers have studied the role of moisture in preserving fiber quality at the gin for many years. Below, you'll find excerpts from that research that are very impressive. You'll see that raising the moisture level of seed cotton before ginning can significantly impact fiber quality. If you're not using seed cotton conditioning in your gin, you are missing out on some great benefits.

- Cotton with a 3% moisture content going through two lint cleaners will have 40% more short fiber content than cotton at 5% moisture content.¹
- Raising moisture content from 4% to 6% before ginning resulted in a 1/32nd increase in staple and a 2% decrease in SFC.²
- Results from a USDA - ARS study showed consistent increases in uniformity and strength as moisture increased from 4.1% to 8.4%.³
- Fiber length increases almost one full staple length with each 1% increase in moisture content.⁴
- Moisture contents below 5% are especially damaging to cotton fiber.⁵
- Fiber length is reduced from a 37 staple to a 35 staple when moisture was reduced from 7.4% to 3.4%.⁵
- Short Fiber Content increased from 4.6% to 8.7% when moisture decreased from 8.4% to 4.1%.⁵

¹ Mangialardi and Griffin (1966)

² Impact Of Ginning On Fiber Quality: The Best Ginning Practices, International Cotton Advisory Committee's Expert Panel on Ginning Methods

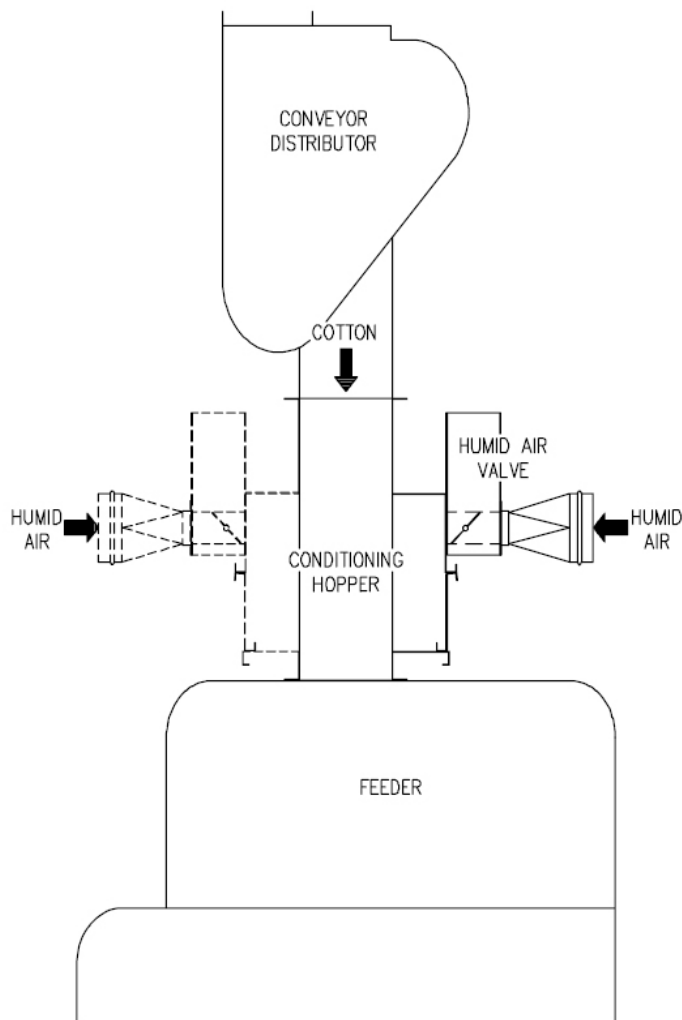
³ USDA-ARS Cotton Ginning Research Unit website

⁴ Rick K. Byler. *Moisture Restoration for Seed Cotton, Two Approaches.*

⁵ W. Stanley Anthony. *Moisture Management Practices at Gins.*

Conditioning Hoppers

Conditioning Hoppers moisturize dry, brittle fiber making it stronger and more valuable.



A diagram of a Classic Entry Hopper.

Conditioning Hoppers are available in two styles: Classic-Entry and End-Entry. Alternative styles offer installation flexibility, but neither has been shown to differ in performance.

On both styles, the moist air enters through two stainless steel valves that stop the flow of humid air when the feeder stops. These valves can also open and close automatically based on incoming moisture when used with a Moisture Mirror. This allows the humid air to be quickly diverted if incoming seed cotton moisture gets too high.

The humid air fills an internal chamber before passing through the galvanized injection plates and entering the seed cotton. This feature creates uniform moisture distribution along the entire width of the Hopper. The moisturized seed cotton is strengthened, giving it more protection from damage as it enters the gin stand for the rigorous fiber-seed separation process.



An End-Entry Conditioning Hopper.

An economical and effective moisture restoration solution for capacities up to 30 bales per hour.



This picture shows a typical Lint Slide Grid installation. It is taken from inside the lint slide looking up at the battery condenser.

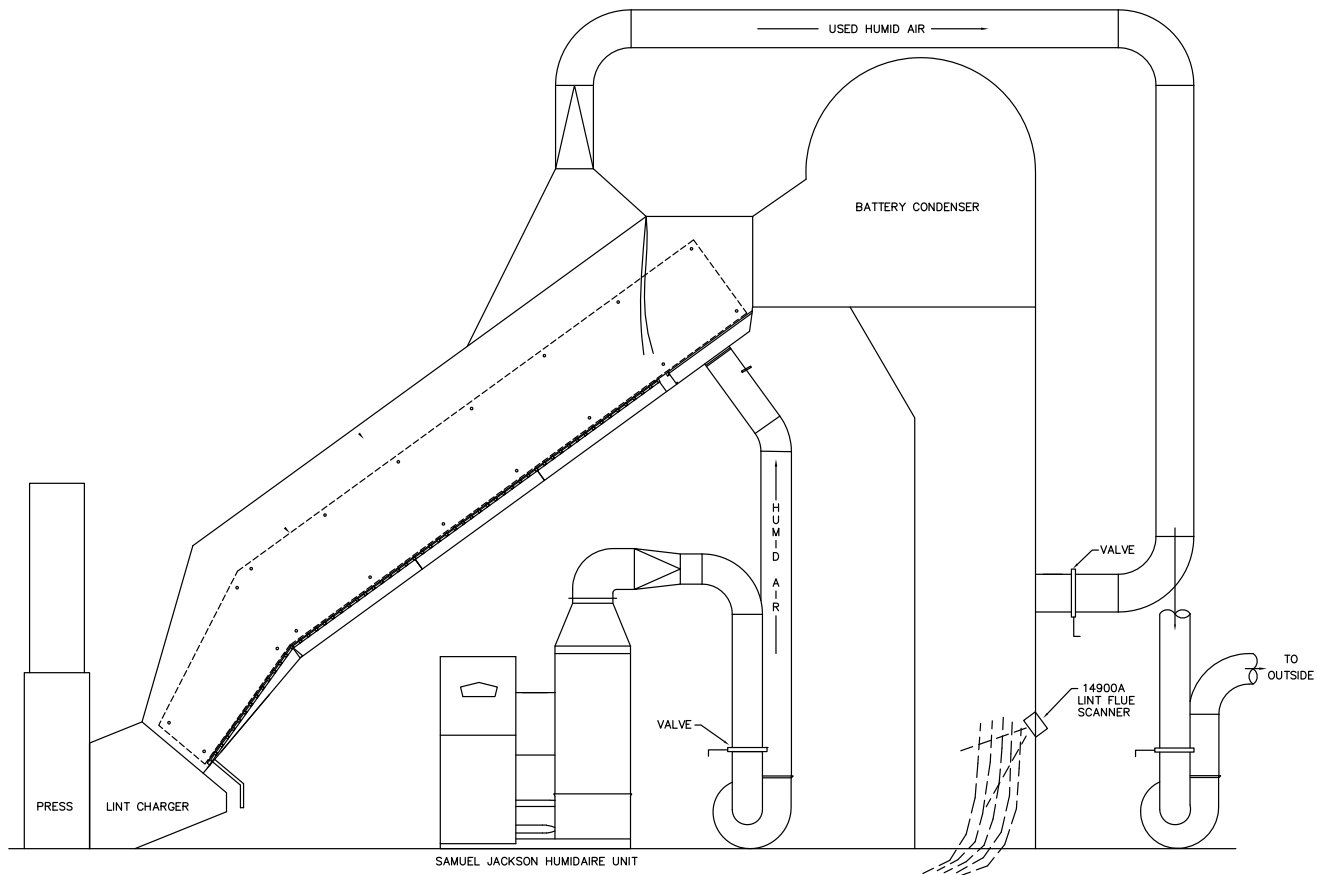
Invented in the 1970s, gins around the world continue to use the Lint Slide Grid as a simple and effective tool for lint moisture restoration. A Grid consists of overlapping stainless-steel slats mounted in the bottom of the lint slide to create a 4-inch false bottom. Moist air travels in the false bottom and evenly escapes through each slat, penetrating the batt as it passes down the lint slide.

The Lint Slide Grid is a great moist air applicator for many gins as it can be effective up to 30 bales per hour. It is also the most economical moist air applicator on the market today.



Lint Slide Grid

Easy to install, operate and maintain.



The drawing above shows a typical Lint Slide Grid installation. Each system must have a Humidaire Unit, a fan for supplying moist air to the Grid and the Grid itself. Insulation along with a dedicated exhaust fan are highly recommended. Grids are available in different models designed for several different types of lint slides.

A Grid begins to moisturize the batt as it leaves the battery condenser. A batt with fewer breaks and a longer lint slide will improve absorption of the moist air by the fiber. While there are many factors to consider, properly set up Grids can restore an average of 1.5% moisture per bale. Be aware that bale moisture is affected by several variables and can fluctuate. Any unused moist air can be piped back into the lint flue or exhausted outside. There are other options and enhancements for Lint Slide Grids that are available by viewing the manual.

Overview of Steamroller Technology



Condensation. If you had to pick one word that inspired the development of the Steamroller, condensation might be the *second* best choice. Everyone sees condensation so often that most folks don't give it much thought. But then most folks aren't cotton ginners.

On a cold glass of iced tea, water condenses from the air around it and forms water droplets. The more humid the air, the more droplets.

In a gin, restoring moisture requires very humid air and when the weather is cold, condensation can become a big problem. Lint sticks to water droplets that form on parts of a lint slide grid system or in a moisture condenser and once that starts happening, you are well on your way toward a choke.

Auxiliary heaters and insulation can help, but with both grid systems and moisture condensers the humid air is interacting with a much larger volume of cold air and eventually the cold air wins out. Frustrated by haired over condenser screens and being forced to run Humidaires at lower outputs, ginners were searching for a better way. These frustrations grew bigger as gins grew in speed and the demands on their presses grew greater.

From this frustration, the Steamroller was born. The resulting design isolated the humid air from directly interacting with large volumes of cold air and protected key points from condensation with auxiliary heat to keep those surfaces warm. But if you think the Steamroller's advantages are just in the cold weather, you'd be wrong.

The Steamroller I & II's design makes them capable of restoring more moisture than any other applicator, making it easier for you to achieve the desired moisture in all conditions. This top performance is achieved using a lower humid air volume than other methods, meaning you'll save fuel costs. Easier to maintain target moisture, lower operating costs, faster press performance and less wear and tear on your press all add up to the best one word description behind the Steamroller. Efficiency.



Steamrollers

Comparison of Steamroller I and II

Sam Jackson manufactures and supports both the Steamroller I and II. Both models share core technologies and offer the same level of efficiency and capability in the amount of moisture they can restore. However, there are some key differences in the two, which have led us to the decision to continue offering both models. This allows users to pick the model that offers them the advantages most important to them. The purpose of this page is to highlight those differences.



The Steamroller I was introduced fifteen years ago and since then has conditioned over 70 million bales and improved the performance and life of 90 presses. Advantages of the Steamroller I include:

- Lower initial cost
- Better for short lint slides
- Suitable for wide range of ginning speeds
- Can be bypassed
- Eligible for upgrade program
- Factory refurbished units may be available

The Steamroller II was introduced in 2008 equipped with features compiled from the wish lists of users of the original Steamroller. The result is a more forgiving, easier to maintain design.

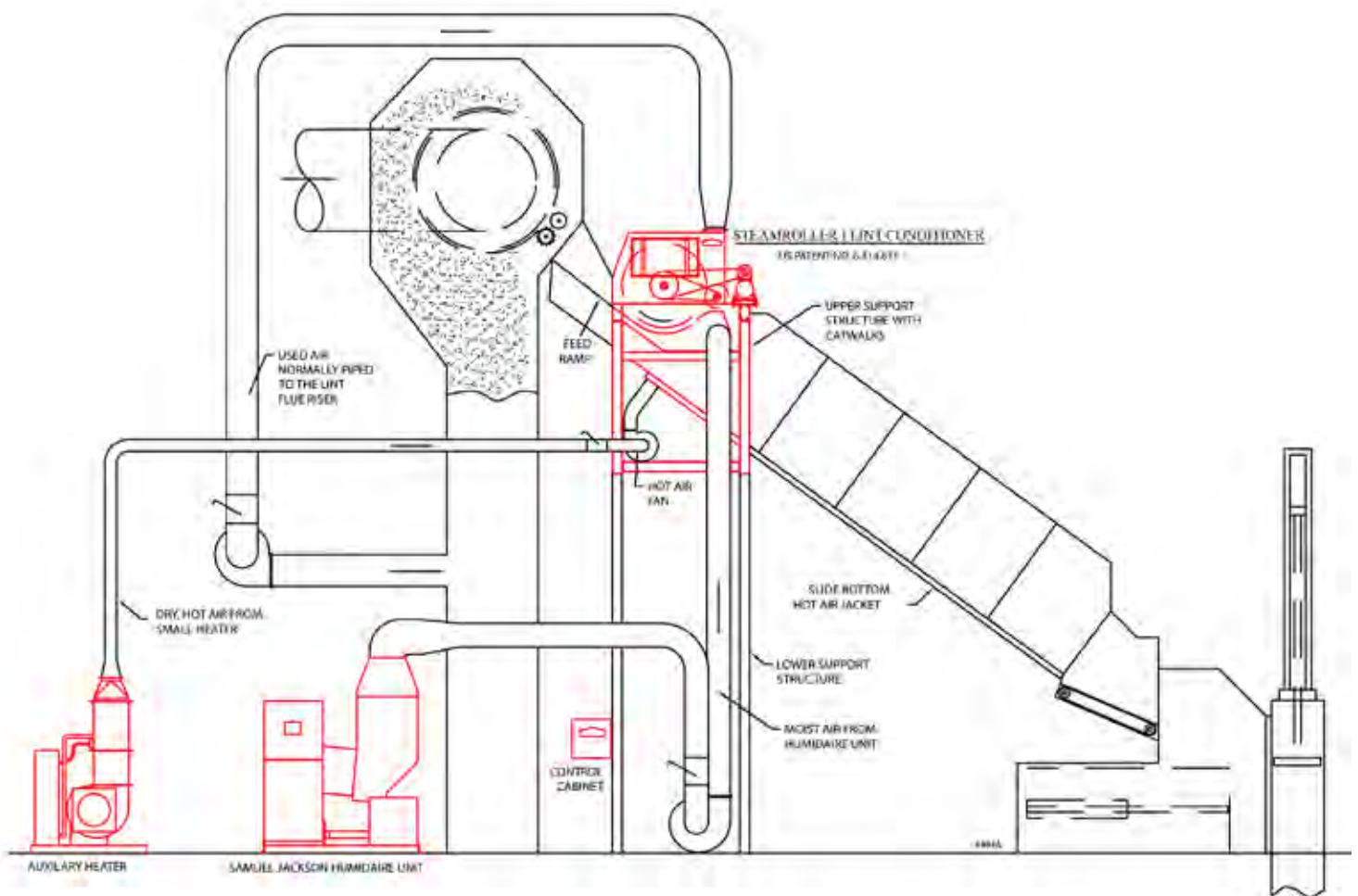
- Reduced cleaning demands
- No plenum to accumulate pin trash
- More aggressive feeding reduces choke potential from large wads
- Easier to install
- Better suited for higher capacity gins
- Overshot drum provides more surface area for applying moisture
- The lint batt compressed only at exit
- Simple and easy to replace flashings
- Drum wiper brush cleans the drum
- Handles uneven batts better
- Better choice for gins handling rough, trashier cotton



HUMIDIFY

How the Steamroller I works.

The lint conditioning process starts as the batt feeds into the Steamroller from the battery condenser. Unlike moisture-type condensers, the Steamroller is a separate piece of equipment from the battery condenser. This means that the moist air used by the Steamroller isn't diluted by outside air which reduces efficiency and causes condensation and hairing problems. The batt passes under a rotating drum where moist air enters from underneath. The Steamroller is under slightly negative pressure pulling the moist air completely through the batt for uniform moisture application through the fiber. Excess air is exhausted by a dedicated fan piped into the lint flue. The conditioned batt is compressed by the feed-out roller as it exits the Steamroller and continues down the lint slide into the tramper.



Typical Steamroller Lint Conditioning System layout.

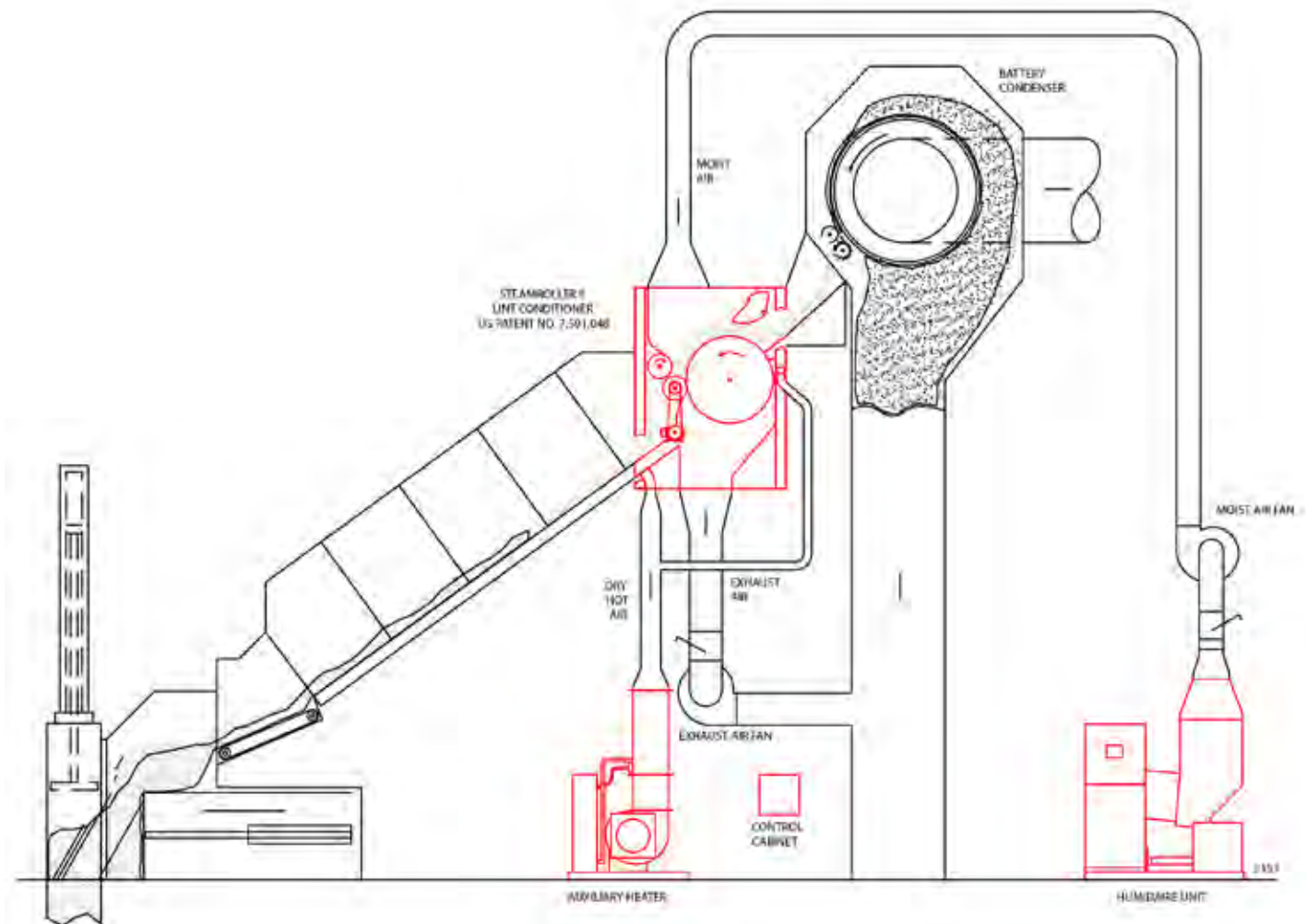
Steamrollers

How the Steamroller II works.

Like the original design, the Steamroller II isn't diluted by outside air, which reduces efficiency and causes condensation and hairing problems. But unlike the original, the batt passes on top of a rotating drum in an overshoot fashion. The moist air enters from above, where it is pulled down through the lint. Because there is no plenum, there is no place for pin trash to accumulate and most of it is carried away in the exhaust air. Users report cleaning takes less than half the time of the original.

The updated design also features aggressive doffing and compression rollers that do a superb job of handling wads, avoiding chokes and keeping the cotton flowing.

Loaded with other design touches, the Steamroller II delivers the highest levels of performance with easier than ever maintenance.



Typical Steamroller II Lint Conditioning System layout.

1501 Gas-Fired Auxiliary Heater

A One-Million BTU/hr Heater in One Compact and Well-Designed Package

Perfect for providing just enough heat to tame or avoid condensation issues on moist air applications, the HG-1-1501 Gas-Fired Heater can be the difference between achieving great results or battling chronic chokes.

Without a dependable source of hot dry air at a consistent temperature, your moisture restoration system will either be crippled by the need to run at lower than ideal outputs or you will be at risk of condensation problems and the resulting chokes.

The HG-1-1501 has an integrated fan, burner body, gas train and control panel mounted on a skid. Installation can be as simple as connecting pipe, three-phase power, a thermocouple and gas supply.



Looking for something more sophisticated and able to provide more convenient operation? The control panel can connect to compatible Moisture Mirrors, providing remote functions such as start and stop commands, temperature set point control and error/ alarm monitoring. You can even set up the HG-1-1501 to automatically start and stop when your Humidaire does, ensuring it's ready when you need it.

Whether you do a basic install or take advantage of the more advanced features, your HG-1-1501 will help your moisture restoration system perform at its best. So take the advice of one of our favorite ginning friends who counsels, "You either need a good auxiliary heater or you need some stout ginners with big pipe wrenches. The problem with the last one is those aren't the kind of guys you want to make mad by having them clearing chokes a few times everyday."



1142 Gas-Fired Auxiliary Heater

Gas-fired auxiliary heater for special applications.



The HG-1-1142 heater.



The 1142 Features:

- *Burner body that can handle 4,000 CFM of air*
 - *Operator-friendly digital control*
- *Packaged burner lights quickly and reliably*
 - *Low air flow and flame protection*
- *Suitable for a variety of drying applications*

The HG-1-1142 is an economical gas-fired heater with a maximum output of 1 million Btu per hour. Costs are kept low by using a packaged burner assembly and simple controls. Burner operation is fast and reliable as it automatically turns on and off to maintain a desired temperature set by the operator. The operator simply enters a set point on the single temperature controller mounted in the control cabinet door. When needed, a knob on the gas train permits fine tuning adjustments to the gas flow to influence the cycle period for heat output. The heater package includes the fan, motor and controls already mounted making installation fast and easy. Simple setup, an economical price and easy-to-use controls make the 1142 well-suited for a variety of applications.



1143 Oil-Fired Auxiliary Heater

Dependable oil-fired auxiliary heat.



The HO-1-1143 heater.



The 1143 Features:

- *Burner body that can handle 4,000 CFM of air*
 - *Operator-friendly digital control*
- *Packaged burner lights quickly and reliably*
 - *Low air flow and flame protection*
- *Suitable for a variety of drying applications*

The HO-1-1143 is an economical oil-fired heater with a maximum output of 700,000 Btu per hour. Costs are kept low by using a packaged burner assembly and simple controls. Burner operation is fast and reliable as it automatically turns on and off to maintain a desired temperature set by the operator. The operator simply enters a set point on the single temperature controller mounted in the control cabinet door. When needed, the oil fuel delivery system permits fine tuning adjustments to influence the cycle period for heat output. The heater package includes the fan, motor and controls already mounted making installation fast and easy. Simple setup, an economical price and easy-to-use controls make the 1143 well-suited for a variety of applications.



Moist Air Applicator Chart



	Typical Moist Air Volume (CFM)	Typical Maximum Moisture Restoration Capability (pounds of moisture per bale)	Typical Energy Consumed in a 40 BPH Gin (Btu per pound of moisture)
Lint Slide Grid <i>Low cost applicator</i> <i>No batt compression</i>	2,000	8	3,125 (4 cents/pound)
Moisture Condenser* <i>Dual-purpose applicator / condenser</i> <i>Good batt compression</i>	3,500	10	5,000 (6.4 cents/pound)**
Steamroller I & II* <i>Most efficient applicator</i> <i>Best batt compression</i>	2,400	20	1,625 (2 cents/pound)**

*Moisture Condensers and Steamrollers are often used with an auxiliary heater which will consume additional fuel, particularly in cold conditions.

**Using natural gas at a cost of \$1.29/therm. 1 therm = 100,000 Btu

Tex-Max Microwave Bale Moisture Sensor

*Missing the mark on moisture could cost you a lot.
The Tex-Max allows you to monitor every bale.*



A Tex-Max Bale Moisture Sensor.



The Tex-Max is an online microwave moisture sensor built by Samuel Jackson using Vomax Microwave Technology. It scans each bale leaving your gin thousands of times and provides a single reading reflecting the average of those scans. The Tex-Max is highly repeatable as found in numerous studies including a 2008 Beltwide Cotton Conference paper on Vomax Technology.

All current models of Moisture Mirrors and most Samuel Jackson Humidair Units allow you to enter a Target Bale Moisture for Automatic Control.



A Tex-Max cannot protect you against problems from bales that have been subjected to water spray systems. Because water spray systems apply moisture unevenly, extreme wet spots can and do exist within a bale that has an average moisture of less than 7.5%. Problems from these wet spots can arise before the moisture can equilibrate throughout the bale. Samuel Jackson reserves the right to refuse sale of a Tex-Max to any gin using a water spray device.

A Common Sense Guide to Moisture Restoration

*It's not a matter of moisture or no moisture...
it's a matter of balanced moisture.*



Restoring moisture to lint cotton is probably the most debated and most misunderstood ginning practice. Recent abuses have made the industry even more fractured on this matter and spawned even more misinformation.

The following facts are educational and practical as good ginning guidelines to follow in your own operation. We hope you find them helpful...

- During storage, a bale will move toward and attain an equilibrium moisture content (EMC) in the warehouse in which it's stored.
- Without any moisture restoration at the gin, the typical moisture content of the lint is well below the EMC a bale will reach in storage. Simply put, the fiber after lint cleaning is very dry.
- There are significant benefits to a gin if they can raise the moisture in the lint prior to the press. In fact, for efficiently operating at modern ginning capacities, the ability to restore moisture is a necessity, not a luxury.
- Bale moisture sensors are intended to offer a useful display of lint moisture for a ginner skilled in evaluation and handling of cotton bales. It is recommended that an operator pay close attention to bale moisture conditions at all times and validate readings against oven moisture tests if they appear questionable. Always gin your cotton with wisdom and prudence.



- Lint moisture restoration systems do not improve fiber quality. When considering this point, it's important not to confuse lint moisture restoration with seed cotton moisture restoration (seed cotton conditioning), which can positively impact fiber quality.
- Done properly, lint moisture restoration does not harm fiber quality. This requires the moisture to be applied uniformly and in moderation.
- Water spray systems do not apply moisture evenly throughout the bale.
- A mill buying a bale based on the receiving dock weight is paying for the moisture in that bale whether it was gained by the lint at the gin or in the warehouse.
- A mill can derive benefits from bales that were properly moisturized by the gin, including: bales opening to a uniform and more manageable height, fewer broken bale ties making handling easier, reduced tie forces making opening the bales safer, faster conditioning times in the mill's opening room (because proper fiber moisture is important for mill operating efficiency, too).



Taking the above points into consideration, it's clear that there is some common ground on this issue. If a gin restores moisture to lint using a safe method and reasonable level, it can be mutually beneficial for both gins and mills. Growers benefit by having some of the weight lost during harvesting or gin drying restored to the bale.

What is the best target bale moisture?

This is not only a good question, it's also one of the most common asked. To answer it we first have to know the answer to two questions that are specific to your gin:

- 1. What bale moisture provides the best performance for your press (and strapper)?*
- 2. How much weight would the bale regain in storage if it were ginned without the benefits of moisture conditioning?*

Those factors are used to determine the ideal target bale moisture for your gin. This target will help you gin faster and more efficiently, and it will help your growers get paid for the weight gain that would otherwise go to a middleman.

Give us a call. We'd love to help you determine and achieve your ideal bale moisture.