

CALDWELL DRYER



OPERATION MANUAL
P/N 095256
Rev 1 (September 2019)

CHIEF 

Trusted. Tested. True.

Operation Manual

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**
- **WHAT TO DO IF YOU SMELL GAS**
 - **Do not try to light any appliance.**
 - **Extinguish any open flames.**
 - **Do not touch any electrical switch.**
 - **Immediately call your gas supplier. Follow the gas supplier's instructions.**
 - **If you cannot reach your gas supplier, call the fire department.**
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**



WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

FOR YOUR SAFETY

The use and storage of gasoline and other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

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Introduction

Thank you for purchasing the Caldwell continuous mix flow grain drying system. Proper operation will ensure you the best overall experience with your dryer and guarantee smooth operation.

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The technical data contained herein is the most recent available at the time of publication and is subject to modification without notice. Chief Industries, Inc. reserves the right to modify the construction and method of operation of their products at any time without any obligation on their part to modify any equipment previously sold and delivered.

Note: If your dryer has a completely separate control panel for controlling the DryerMaster, this manual does not cover the installation and operation of the DryerMaster DM510 control system. Refer to all DryerMaster manuals and guides before attempting to operate the dryer. DryerMaster is the first line of contact regarding any operation, service or technical issues involving the DM510 automatic moisture controller and its components.

Note: If your dryer has an integrated DryerMaster controlled through the HMI of the dryer, the instructions are included in this manual. Use this manual along with the DryerMaster manuals to operate the dryer.

Model Number Description

The dryer model nomenclature distinguishes the application of the dryer. The information includes a designation of the applicable dryer width and height. The model number is stamped on the serial number plate and the definition of the model number nomenclature is as follows:

Example: CMF 24 - 14

 (a) (b) - (c)

- (a) CMF = Caldwell Continuous Mix Flow
- (b) 24 = Dryer nominal length in feet
- (c) 14 = Dryer tier height



Before You Begin

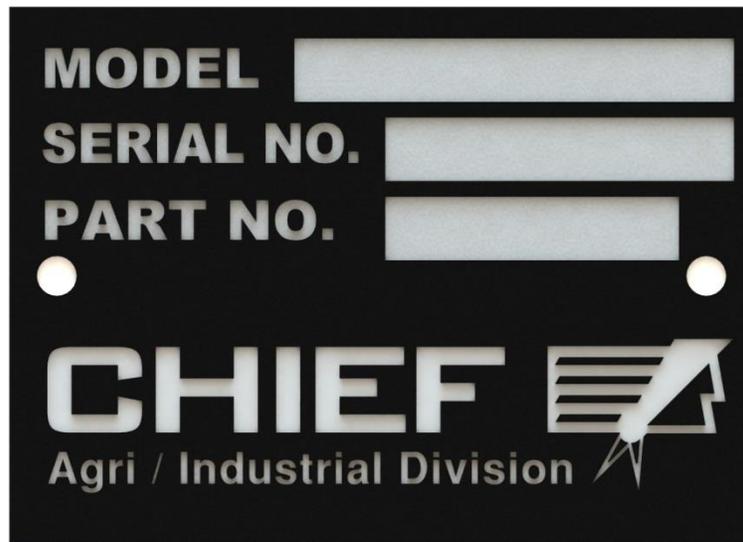
Read this manual thoroughly before operating this dryer. Keep this manual in a location for quick access and reference.

Your Caldwell dryer is designed for safe and reliable operation when properly installed. However the dryer requires electricity, which when improperly installed or when operated improperly, can be potentially dangerous. Anyone who will operate this unit should read the manual before installing or operating this unit. The following table, provided for your convenience, will aid in verifying that these individuals understand the proper operation of the dryer. After completely reading the manual, this table should be filled in.

Date	Operator Signature	Owner Signature

Special Service Note: If you are unable to remedy any service problem after thoroughly studying this manual, contact the dealer from whom you purchased the unit. Your dealer is your first line of service. The following information is required for service:

1. Dryer model number: _____
2. Dryer serial number: _____
3. Dryer model number: _____
4. Dryer serial number: _____
5. Line Voltage Measured: _____
6. Approximate operating pressure: _____
7. Hours the unit has been in operation: _____
8. Type of grain stored: _____
9. Moisture content of the grain: _____
10. Dealer purchased from: _____
11. Dealer address and phone number: _____
12. Date purchased: _____
13. Service contractor:
 - a. Name: _____
 - b. Address: _____
 - c. Phone: _____



Safety and Precautions

Your safety and the safety of others is a primary concern to Chief Industries, Inc. This manual was written to assist in the safe installation and operation of the Caldwell Dryer.

It is your responsibility as the owner, builder, operator, or supervisor to know what specific requirements, precautions and hazards exist and to make these known to all personnel working with equipment or on the jobsite so that they can observe any necessary safety precautions.

All personnel, including the installation crew, must read and understand the information contained in this manual before starting construction. Chief Industries, Inc. is not responsible or liable for the misuse of equipment or operation of personnel or equipment in an unsafe manner.

Chief Industries, Inc. assumes no liability with respect to proper construction and inspection, assembly, or use of its products established under applicable laws, all of which is the sole responsibility of the purchaser and those authorized for the installation.

Follow all local and federal safety laws and regulations. Verify that all equipment and personnel conform to any applicable jurisdiction regulations.

Work Area Safety Statement

To ensure the safety of all individuals in the work area, only authorized and trained persons shall install, maintain and use the Caldwell Dryer.

Under no circumstances should unauthorized individuals be allowed to trespass or be present in the work area.

It shall be the duty of all operators to ensure that the work area is clean, organized and kept free of all debris and tools that might cause an accidental tripping or falling hazard.

Special care should be taken when working from unsafe heights. Common sense dictates that when conditions such as rain or wind prohibit the safe use of equipment, the installation be discontinued.

Chief Industries, Inc. strongly recommends that equipment meeting the current specifications be used, whether the individual operator is required by law to do so or not. Proper climbing equipment and a secured safety harness should be used at all times when performing operations work, installation or maintenance.

Field modifications without the authorization of the manufacturer may present unknown dangers to the operator and must be avoided.

Auxiliary Equipment Safety

You may decide to purchase and install “auxiliary equipment” made by other manufacturers. Chief Industries, Inc. has no control over the design and manufacture of this equipment. In view of this, at a minimum, we suggest you do the following:

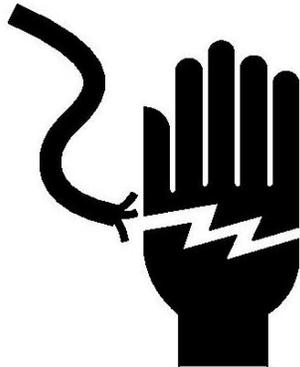
1. Obtain, read and understand the instructions and safety cautions of the auxiliary equipment manufacturer. Be certain that all equipment is installed in agreement with those instructions.
2. Check with Chief Industries, Inc. to verify that your system is designed to support any additional loads supplied by the auxiliary equipment.
3. Obtain any applicable safety decals from the manufacturer and make certain they are displayed in a visible location.
4. Make certain that all electrical equipment is properly installed and grounded by a qualified electrician.
5. Check availability and operation of electrical lock out and emergency stop systems.
6. Be certain that all guards and shields are securely in place.
7. Store all operation / maintenance manuals in a safe place for future use.

Dryer Safety

Before operating the unit, perform the following checks:

1. Disconnect and lock out all power and fuel before adjusting, servicing or accessing the dryer and associated equipment. Never rely on the PLC interface for on/off control.
2. Observe recommended drying temperatures.
3. Keep the dryer clean throughout, and ensure grain entering the dryer is sufficiently clean of foreign material. This will prevent risk of fire.
4. Ensure any hot surfaces have had adequate time to cool before working on or in the equipment.
5. If entry to the dryer is required, ensure the dryer has been purged of any combustion by products and harmful gasses or vapors.
6. Never attach lifting equipment to unauthorized locations, such as ladders or platforms.
7. Use extreme caution when working around high speed fans, gas fired heaters, auxiliary conveyors, which may start without warning when the dryer is operating on automatic control.

Heed the following warnings and others:

	 DANGER
	HIGH VOLTAGE WILL CAUSE SEVERE INJURY OR DEATH LOCK OUT POWER SUPPLY BEFORE OPENING ENCLOSURE AND SERVICING
	LE CONTACT DU COURANT ÉLECTRIQUE PEUT CAUSER DE GRAVES BLESSURES OU LA MORT VERROUILLER L'ALIMENTATION HORS TENSION AVANT D'OUVRIR L'ENCEINTE ET D'INTERVENIR

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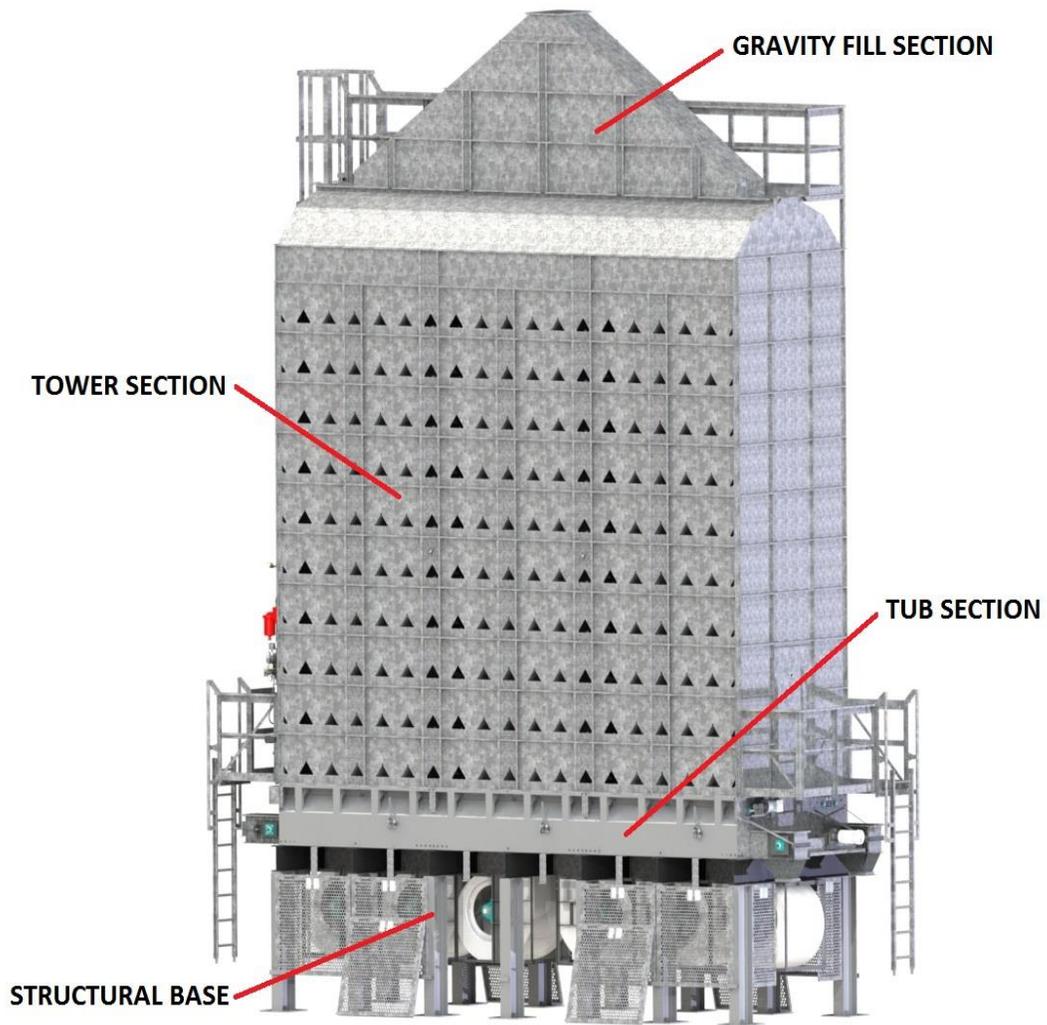
 WARNING

ROTATING BLADE OR WHEEL CAN CAUSE SEVERE INJURY Keep guards in place. Stay clear of fan blade at all times LOCK OUT POWER BEFORE REMOVING GUARD.

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Assembly Overview

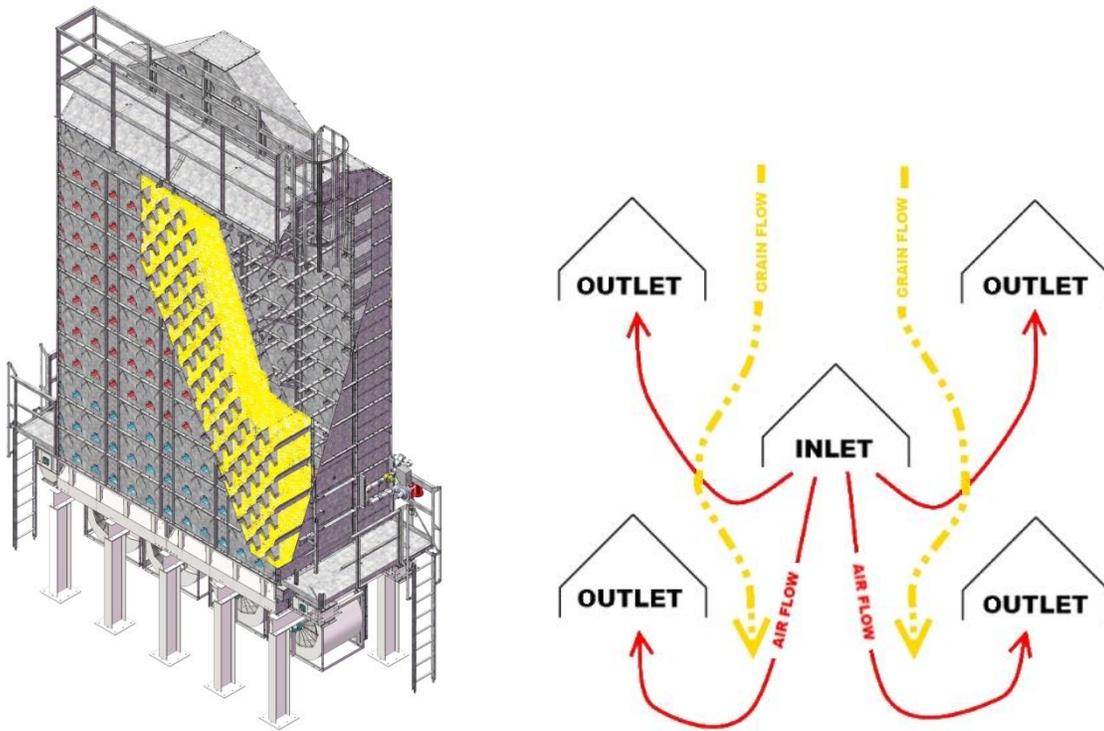


Dryer Features

There are many approaches to grain dryers in the market today. Each dryer will dry grain, however each dryer type has unique characteristics. Kernel quality and efficiency distinguish Caldwell’s Continuous Mixed-Flow Grain Dryer.

When air velocity is moving more slowly through a grain mass, this will result in a better transfer of moisture to the air, which in turn results in higher kernel quality and gentle movement of the grain.

The CFM of air that is delivered to every bushel has a large effect on drying efficiency and fuel consumption. The higher the airflow rate is the higher the fuel cost. While other dryers offer a much higher airflow rate, the Caldwell mixed-flow dryer offers an efficient CFM/Bushel.



There are several components and features to this dryer that are important to point out and understand prior to using the product.

Standard Features:

- No screens: Caldwell's continuous mixed-flow grain dryer is designed without screens. There are no screens to plug and decrease drying efficiency during normal operation, thus requiring cleaning. This feature offers a huge savings in time, labor, and fuel costs during the drying season.
- Low CFM/Bushel: The CFM (cubic feet per minute) that is delivered to every bushel has a large effect on drying efficiency and fuel consumption. The higher the airflow rate is, the higher the fuel costs. Caldwell's mixed-flow dryer offers 45-50 CFM/Bushel.
- Longer Retention Time: Caldwell's mixed-flow dryer carries a longer grain retention time in the dryer. The grain stays in the dryer for a longer period of time compared to traditional dryers. The grain is being dried more gently and therefore can remain in the dryer for a longer period of time without stress-cracking or degrading.
- HMI Touch Screen Panel: The main operating and control screen for the Caldwell mixed-flow dryer is a high resolution touch screen panel. All setting and adjustments are made from this screen. All dryer processes and functions will be observed from this screen. **Note:** Remote HMI Panel is optional if panel is desired in control room.
- RTD Grain Temperature Sensors: These sensors will provide the operator a general feel for the grain temperature at various locations within the dryer. NOTE: these sensors do not provide an exact kernel temperature. Rather, they illustrate a combination of both the grain temperature and the temperature of the drying air surrounding the grain. These sensors are to be used as a general guide only and can be helpful in detecting hotspots within the dryer as well as the moisture of the grain.
- Slide Gate Doors: These manually actuated doors are used as a tool for service. The door can be closed, cutting off the flow of grain to the metering roll, in the event that service or repair needs to be performed on the metering rolls or any unloading equipment. **Note:** All slide doors have 3 pre-set positions: fully open, half-open, and closed. All slide doors should be fully open for normal operation.
- Conveyance Unload: The Caldwell mixed-flow dryer is unloaded by a dual set of drag chain conveyors. Conveyors are driven by a single low horsepower direct drive.
- Aluminum Metering Rolls: The dryer discharge rate is controlled by a series of aluminum metering rolls. These rolls are driven by a VFD and the speed is set by the operator based on drying conditions.
- Chain Failure Sensor: This sensor will shut the dryer down in the event of a chain break.
- Dryer Fill Switch: Located in the dryer's reserve/warming section. The switch controls the auxiliary loading equipment and ensures that the dryer always remains full.
- Thermocouples: Two located at top of dryer in the hot plenum. One is used for reading plenum temperature and the other is used as a high limit.
- Main Junction Box: Located next to the fuel train. All dryer electrical components with the exception of motors are wired through this box.
- Control Panel: Contains all electrical components to control dryer. HMI comes mounted standard in the control panel.
- Liquid Shut Off Valve: Located on the liquid line. This valve allows fuel to pass once activated from the control panel.
- Liquid Line: Only present with Liquid Propane models. Liquid Propane passes through the liquid line entering into the vaporizer.

- Vaporizer: Only present with Liquid Propane models. Liquid Propane enters the vaporizer located above the burner and vaporized before it enters the rest of the fuel train. The vaporizer can be moved up or down to achieve desired heat requirements in order to be turned into vapor without overheating.
- Fuel Regulator: Supplied by Chief on Liquid Propane models only. Gas company will need to supply regulator on Natural Gas line. Fuel pressure should be approximately 5 psi through the regulator for both LP and NG fuel systems.
- Line Strainer: The line strainer is located on the liquid line and should be cleaned out periodically. Refer to maintenance section.
- Siemens Dual Valve: Regulates the gas flow from the main regulator to the modulating valve.
- Pressure Gauge: One located on the liquid line, (when applicable) one located before the Siemens valve and one located after the Siemens valve.
- Modulating Valve: Controls the fuel to the burner.
- Rubber Mat: Covers the burner and fans when filling the dryer and for off season storage.
- Flame Sensor: Located on the fuel train end of dryer on end of burner. Proves the flame is lit. Dryer will not start unless flame has been proven.
- Spark Ignitor: Two supplied, one on each end of the burner.
- Spark Ignitor Transformer: Two supplied. One on each end of the dryer below the burner with spark ignitor wire attached to it and spark ignitor.
- Air Prove Switch: Located in the main junction box. Set for negative pressure so the copper line is located on the inlet side of fan one. If air switch does not indicate fan running within two seconds after being started, the fans will shut down.
- Clean Out Doors: Located on outside of tub sections. (Two doors per 8 foot section) In the event the dryer needs to be emptied immediately without passing through metering rolls, these doors can be pulled off. These are also used to pre/post season cleaning once the dryer has been emptied.

Optional Features:

- Plug Switch for Discharge Equipment: Additional protection for the auxiliary and dryer systems. Plug switch can be mounted in the auxiliary unloading equipment to recognize and prevent plugging of the dryer's conveyance equipment and stop operation.
- Wrap-Around/Intermediate Catwalks: These catwalks attach to the side of the dryer at intermediate locations up the dryer. These catwalks allow for easy monitoring of the grain as it moves through the dryer and for manual sampling at various locations.
- Additional RTD Grain Temperature Sensors: Additional sensors can be located at desired increments down the length of the dryer to provide the user with even more drying information.
- Remote PC/Mobile Device Monitoring: This feature allows the dryer operator to monitor the dryer from a remote PC or mobile device via an internet connection. Customer can also make certain operational adjustments and shut-down the dryer from this connection. Further, an email and text alert can be sent to the customer in real time.
- Dryer Master Auto Moisture Controller: Controls the dryer in an automatic mode controlling the speed of the dryer to achieve target moisture. It reads the incoming moisture and discharging moisture

Control Panel Guide

Note: Each individual HMI program may be customized to specific needs, thus specific dryer HMI panel screens may vary slightly from those shown in this section. However, all major functions and operations will be consistent.



Control Panel Functionality:

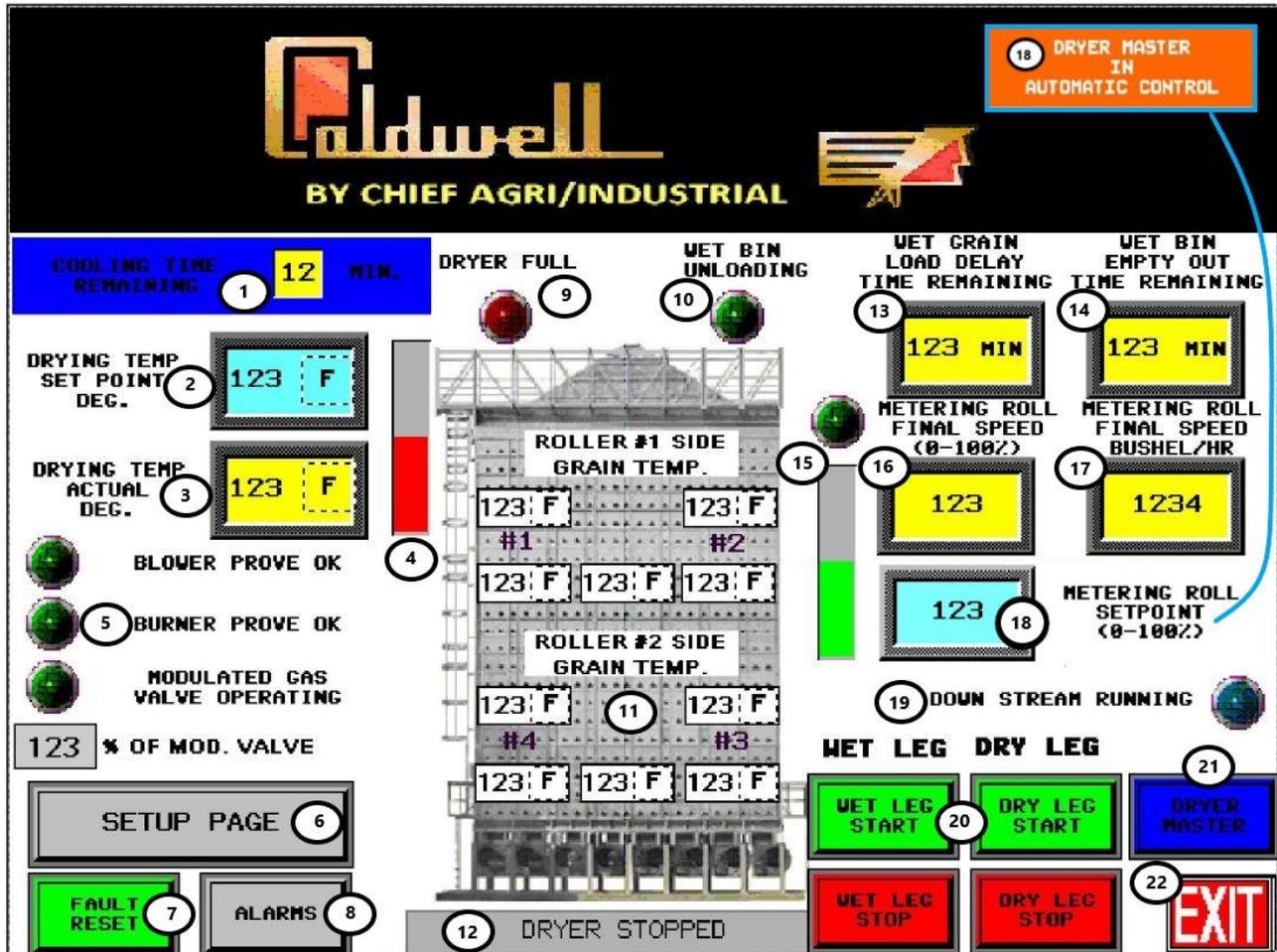
- **System Off Position** - While the system switch is in the OFF position the dryer is not running, the fans are not running, and the burner cannot be lit. In the OFF position unloading can be activated.
- **System Run Position** - While the system switch is in the RUN position the fans will be engaged but the burner cannot be lit. In the RUN position unloading can be activated.
- **System On Position** - The primary purpose of the ON switch position is to begin the burner ignition sequence.
 - For ignition to occur the Fuel OFF/ON switch must be in the ON position. The switch is spring loaded between the RUN and ON positions, in which RUN is the default home position.
 - To engage the ON position, momentarily hold the switch into the ON position. Release the switch and the ON position will engage. The ON state will remain engaged until the switch is manually moved to OFF or a fault occurs.
 - The dryer will be fully operational in the ON position. Fans will be running. The burner will be lit only if the fuel switch is in the ON position. In the ON position unloading can be activated.
 - If the switch is reverted back to the OFF position the burner will be shut-down and unloading will shut-down.
- **Fuel Switch (OFF/ON)** - In the OFF position the burner cannot be lit. In the ON position the burner is ready to be lit.
- **Unload Button** - When pushing the UNLOAD button the dryer's unloading system will be turned on. Unloading can be cycled ON and OFF as necessary throughout the drying process.
 - Once running, the unloading system can be stopped by simply pushing the button again.
 - NOTICE: Unload button must be pushed within 5 minutes of burner ignition or dryer will shut down.
- **Reverse Switch (OFF/ON)** - This is a spring loaded switch in which OFF is the home position. The purpose of this switch is to reverse the rotation of the metering rolls momentarily. For example, this function would be used to attempt to clear any obstructions from the rollers.
 - Turn the switch to the ON position and HOLD. While holding in the ON position, the rollers will turn in the reverse direction. Release the switch and it will return to the OFF position and the rollers will return to normal rotation

HMI Touchscreen Functionality:

Main Screen (Home Page) - This is the top level main navigation screen. Simply touch one of the boxes to proceed to the corresponding dryer screen.



Operations Screen – During dryer operation the operations screen will be the main screen referenced unless you are using a DryerMaster unit. In that case you may use the DryerMaster Screen.



The identification and description of functions on the operations screen is shown below. Simply touch one of the boxes to proceed to the corresponding dryer screen.

- **1 - Cooling Time Remaining Indication:** This data will only be present when the dryer is in “cool down” mode and shows a minute by minute countdown of the time remaining to complete the cool down cycle.
- **2 - Drying Temperature Set-Point Button:** The desired drying temperature is entered here.
- **3 - Current Drying Temperature Indication:** The current drying temperature indication displays instantaneous temperature readings from the thermocouple located at the top in the hot air plenum.
- **4 - Drying Temperature Indication Bar:** The drying temperature indication bar displays a graphic indication of the percentage of the current drying temperature to the high grain temperature limit setting made in the operation set-up screen.

- **5 - Proving Indication Lights:** The indication lights provide feedback on the following drying functions:
 - **Blower Prove** – This correlates to the dryer’s differential air pressure switch. Air flow must be proven for the dryer to proceed with lighting the burner.
 - **Burner Prove** – This correlates to the dryer’s ultraviolet flame sensor and flame management system. It verifies that there is a flame present and the burner is operating correctly.
 - **Modulating Gas Valve Operating** – This correlates to the dryer’s gas modulating/control valve and indicates that the valve is being supplied with power and is operating correctly.
 - **Percent of Mod. Valve** – This percentage value allows the operator to evaluate the stroke of the modulating valve.

- **6 - Setup Page:** Pressing the Setup Page button will take the operator to the Setup Page.

- **7 - Fault Reset Button:** If a fault is present this button will be illuminated. The operator must press this button to clear an indicated fault.

- **8 - Alarms Button:** Pressing the alarms button will take the operator to the alarms screen.

- **9 - Dryer Full Light:** This indicates that the dryer’s fill switch in the reserve/gravity fill section is covered with grain. When this light is illuminated, the wet bin unloading light should not be illuminated, as the dryer is not requesting grain.

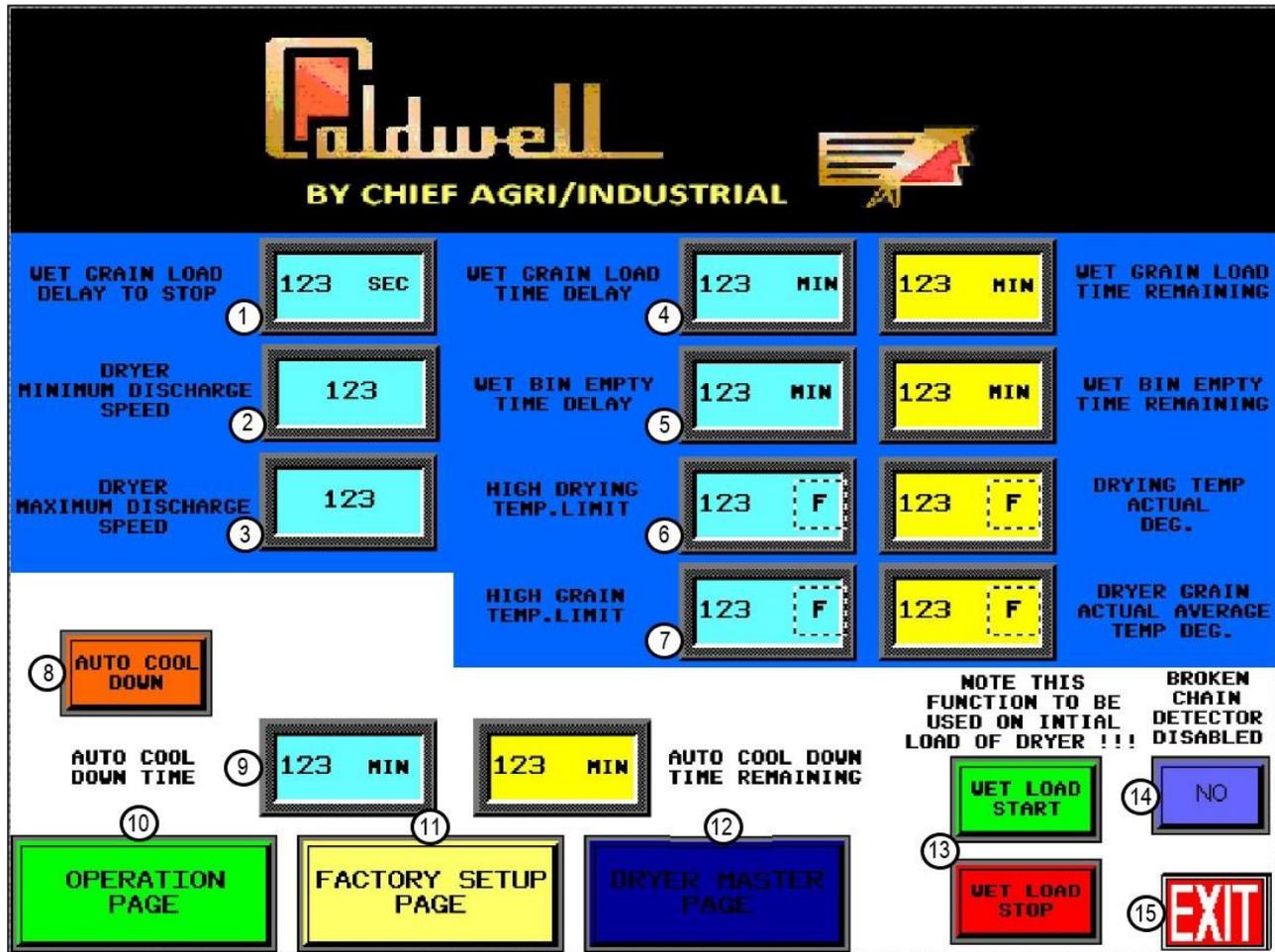
- **10 - Wet Bin Unloading Light:** This indicates when the auxiliary wet grain loading equipment is in operation. When this light is illuminated, the dryer full light should not be illuminated.

- **11 - Grain Temperature Indicators (RTD’S):** These refer to the temperature readout boxes shown on the animated dryer figure and correspond to the grain temperature probes installed in the grain columns.
 - **Note:** These temperature values are to be used as a general guide only and do not represent the grain’s actual temperature as some of the drying air flowing through the grain will be sensed by these probes. Wind can also effect these readings based on airflows through the dryer.

- **12 - Dryer Status Indication:** This corresponds to the shaded text box located at the bottom of the animated dryer figure (Currently shown status: DRYER STOPPED). This text indicates to the operator what status the dryer is in at all times.

- **13 - Wet Grain Load Delay Time Remaining Indicator:** This is a minute by minute countdown of the time remaining until the auxiliary loading equipment will begin filling the dryer. This box will only appear when the dryer full light is not illuminated and when the fill switch at the top of the dryer is no longer covered with grain.
 - **Note:** This corresponds to the wet grain time delay setting made in the operation set-up screen.
- **14 - Wet Bin Empty Out Time Remaining Indicator:** This is a minute by minute countdown of the time remaining to fill the dryer before the dryer goes into cooling mode. This box will only appear when the dryer full light is not illuminated.
 - **NOTE:** This corresponds to the wet grain time delay setting made in the operation set-up screen.
- **15 - Metering Roll “ON” Light and Speed Indication Bar:** This light indicates that the metering rolls are operating and the speed indication bar is a graphic indication of the current metering roll speed based on a 0-100% scale.
- **16 - Metering Roll Final Speed (0-100%) Indicator:** This indicates the speed at which the metering rolls are operating.
- **17 - Metering Roll Final Speed Bushel/Hr:** This provides an approximate throughput rate based off metering roll speed.
- **18 - Metering Roll Speed Setpoint (0-100%) Button:** The set point at which the desired operating speed of the dryer is set.
 - **NOTE:** If applicable, the “Dryer Master In Automatic Control” will pop up over top of the set point box if the Dryer Master is set to control the dryer.
- **19 – Down Stream Running Light:** This light will be an indicator if the downstream equipment is running to show that it is safe to start the unload.
 - **CAUTION:** Sometimes this connection has to be jumpered because no wiring was available from the downstream equipment. Understand and know your system before trusting this light.
- **20 - Dry/Wet Leg Start and Stop Buttons:** If applicable, this will start and stop the wet leg grain loading.
- **21 - DryerMaster Button:** If applicable, this button will take the operator to the DryerMaster screen.
- **22 - Exit Button:** This button will return the operator to the main screen/home page screen.

Setup Screen – Pre-operation settings will be made from this screen.



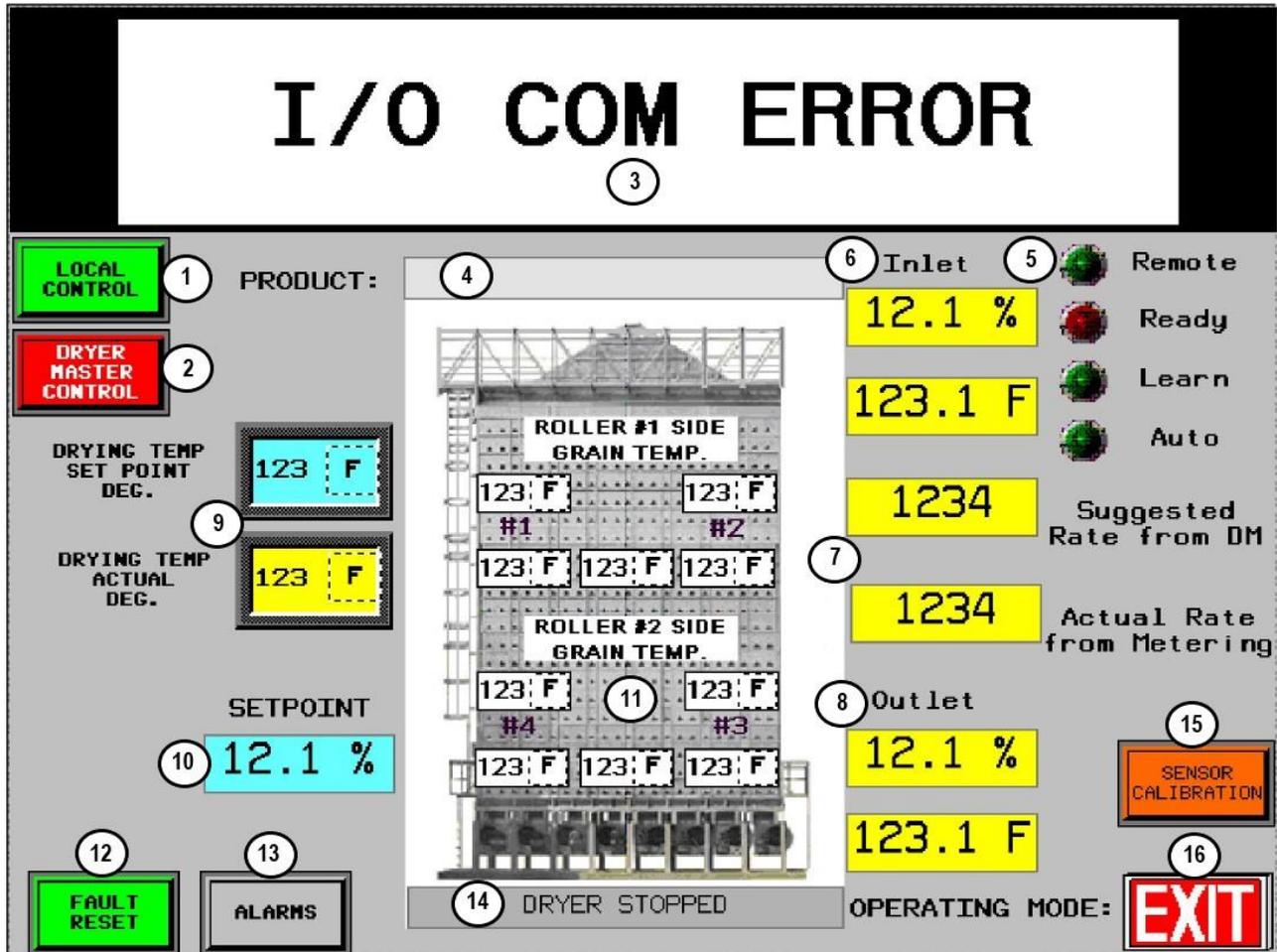
The identification and description of functions on the setup screen is shown below. Simply touch one of the boxes to proceed to the corresponding dryer screen.

- **1 – Wet Grain Load Delay To Stop:** Set the wet grain load delay in the blue box. This is the delay to start loading when the fill switch is uncovered.
- **2 – Dryer Minimum Discharge Speed:** Set the dryer minimum discharge speed in the blue box. This is the minimum speed that the dryer will be able to run. Usually used in conjunction with the DryerMaster Auto to prevent the dryer from unknowing slowing down too much and getting the grain too hot.
- **3 – Dryer Maximum Discharge Speed:** Set the dryer maximum discharge speed in the blue box. This is the maximum speed that the dryer will be able to run. Used to prevent plugging of downstream equipment by not allowing the discharge to go faster than what the downstream equipment can handle. Also used in conjunction with the DryerMaster Auto to prevent the dryer from unknowing speeding up too much.

- **4 - Wet Grain Load Time Delay Setting and Time Remaining:** Set the wet grain loading time delay in the blue box. When activated, the yellow box indicates a minute by minute countdown of the time remaining until the auxiliary loading equipment will begin filling the dryer.
- **5 - Wet Bin Empty Time and Time Remaining:** Set the wet bin empty time in the blue box. When activated, the yellow box indicates a minute by minute countdown of the time remaining to fill the dryer before the dryer goes into cooling mode.
- **6 - High Limit Drying Temperature Limit Setting and Indicator:** Set the high limit drying temperature in the blue box. The yellow box indicates the current operating drying temperature. While drying, if the high limit drying temperature is reached, the dryer will shut down and fault will be present. **Note:** This relates to the drying HOT AIR temperature.
- **7 - High Grain Temperature Limit Setting and Indicator:** Set the high grain temperature limit in the blue box. The yellow box indicates an average of the grain temperature readings. While drying, if the high grain temperature limit is reached, the dryer will shut down and a fault will be present.

Note: This is an average of the grain temperature readings shown on the dryer face.
- **8 - Auto Cool Down Button:** Auto shutdown of the dryer is engaged by pressing the auto shutdown button for the time set in the dialog box in #9. This should be used to shut down the dryer after it has been running to allow the grain in the dryer to cool down properly.
- **9 - Remaining Time:** Enter a time in minutes in the blue boxes. This time will countdown and then the dryer will automatically shut down. When activated, the yellow box indicates a minute by minute countdown of the time remaining in cooling mode before the dryer shuts down.
- **10 - Operation Page Button:** This will navigate the operator to the dryer's operations screen.
- **11 - Factory Setup Page Button:** This navigates the operator to the dryer's factory set-up security screen.
- **12 - Dryer Master Page Button:** This navigates the operator to the dryer master screen.
- **13 - Wet Load Start and Wet Load Stop Buttons:** These buttons are used in some applications for initial filling of the dryer. The start button engages the auxiliary unloading equipment and the stop button disengages this equipment.
- **14 - Broken Chain Detector Disable Button:** In the case of nuisance tripping or a faulty proximity sensor, this button can be pushed to disable the sensor. Press again to re-enable the sensor.
 - **WARNING:** Disabling this sensor is not recommended during normal operation. Do not leave dryer unattended when this sensor is disabled.
- **15 - Exit Button:** This button will return the operator to the main screen/home page screen.

DryerMaster Screen (If Applicable) – During dryer operation the DryerMaster screen will be the main screen referenced if using the DryerMaster system added.



The identification and description of functions on the DryerMaster screen is shown below. Simply touch one of the boxes to proceed to the corresponding dryer screen.

- **1 – Local Control Button:** This button puts the dryer back in local control where the rate is set by the metering roll set point on the operations screen.
- **2 – Dryer Master Control Button:** This button puts the DryerMaster in control of the rate at which the dryer discharges. The rate will be shown in item 7 boxes. After this button is pushed, the Remote and Auto Light should come on as shown in item 5.

Note: DryerMaster will only take control if the Ready Light is on but Great care must be used with this feature, as the DM510 Dryer Master may not have sufficient information to set the correct discharge or unload rate.

- **3 – I/O Com Error Message:** The message “I/O Com Error” displays when the DM510 computer has lost communication with the sensors and other field signals.
- **4 – Product Selection Bar:** This will indicate what product (grain) is selected within the DryerMaster system for it to keep its calibration of the sensors and calculations correct. To change, simply tap on the word “Product” and the list of products (grains) will pop up to choose from.
- **5 – Status Lights:** The indication lights provide feedback on the following DryerMaster Status:
 - **Remote** – The Remote Status light is illuminated when the DM510 system is in control of the dryers discharge system either manually or automatically. When this status light is NOT illuminated dryer control is from the dryer panel.
 - **Ready** – The Ready status light is illuminated when the DM510 system has gathered sufficient information to be placed into Automatic mode when this status light is lit, the operator can select Automatic Mode. The supervisor can also select Auto Fast Start. When auto fast start is enabled the operator can select ‘Automatic Mode’ as soon as the learn status light is lit. Great care must be used with this feature, as the DM510 Dryer Master may not have sufficient information to set the correct discharge or unload rate.
 - **Learn** – The Learn status light is illuminated when the dryer is operating and the moisture sensors have product.
 - **Auto** – The Auto status light is illuminated when the DM510 is controlling the dryer automatically.
- **6 - Inlet Moisture Sensor, Product Moisture & Temp.:** The moisture and temperature of the product at the top of the dryer as measured by the inlet moisture sensor.
- **7 – Dryer Discharge Rate:** The dryer unload rate as sent to the DM510 by the dryer’s unload system. The suggested rate message is displayed while the system is in local or manual mode and the system is able to predict a reasonable rate. This value is based on the drying factors, the current inlet and outlet moistures, drying temperature and actual discharge speeds. This value serves as a suggested starting point for manual operation.
- **8 - Outlet Moisture Sensor, Product Moisture & Temp.:** The moisture and temperature of the product leaving the dryer as measured by the outlet moisture sensor.
- **9 - Drying Temperature Set-Point Button and Current Indication:** The desired drying temperature is entered at the set point box. The current drying temperature indication displays instantaneous temperature readings from the thermocouple located at the top in the hot air plenum.
- **10 - Moisture Set-Point:** The target moisture for the product leaving the dryer. In Automatic mode the DM510 will attempt to attain this setting by adjusting the dryer’s discharge or unload rate.

- **11 - Grain Temperature Indicators (RTD'S):** These refer to the temperature readout boxes shown on the animated dryer figure and correspond to the grain temperature probes installed in the grain columns.
 - **Note:** These temperature values are to be used as a general guide only and do not represent the grain's actual temperature as some of the drying air flowing through the grain will be sensed by these probes. Wind can also effect these readings based on airflows through the dryer.
- **12 - Fault Reset Button:** If a fault is present this button will be illuminated. The operator must press this button to clear an indicated fault.
- **13 - Alarms Button:** Pressing the alarms button will take the operator to the alarms screen.
- **14 - Dryer Status Indication:** This corresponds to the shaded text box located at the bottom of the animated dryer figure (Currently shown status: DRYER STOPPED). This text indicates to the operator what status the dryer is in at all times.
- **15 - Sensor Calibration Button:** Accesses the moisture 'sensor selection' menu. Permits the entry of manual moisture samples for the purpose of calibrating the DM510 moisture sensors.
 - See DryerMaster Calibration of Sensor Section
- **16 - Exit Button:** This button will return the operator to the main screen/home page screen

DryerMaster Sensor Calibration Screen – Permits the entry of manual moisture samples for the purpose of calibrating the DryerMaster moisture sensors. Simply touch one of the boxes to proceed to the Inlet or Outlet sensor calibration.



Reasons for Calibration

The DM510 controls your drying based on its moisture sensor readings. For proper operation it is important that the DryerMaster (on-line) moisture sensors agree with your bench top (off-line) moisture tester. This means that for a given sample of grain, both your bench top tester and your DryerMaster moisture sensor will give a similar moisture reading.

While it may sound straightforward to have the on-line DryerMaster sensor read the same as your bench top unit, there are a few points that make it a little more complex.

The DryerMaster measures the moisture in slightly less than $\frac{1}{4}$ of a cubic foot (7 liters) of product, in corn at 56lbs/bushel (that equates to about 10lbs (4.5Kg) of corn. The bench top sample is usually less than 250 grams. It is possible to have bench top samples that differ significantly from the reading the DryerMaster

sensor provides. Differences in product temperature and the temperature of the bench top tester and test area will contribute to errors. The heating or cooling of exposed product in the bench top tester and test area will change its moisture.

Let's look at an example where an operator takes two moisture samples 20 seconds apart and puts them into two separate containers.

If you take the first sample and put it into your bench top sensor, you will get a moisture reading. Now if you put the same sample back into the tester again, you may get a slightly different reading. This is called equipment error and it occurs because most bench top testers have a $\pm 0.2\%$ error range. The DryerMaster moisture sensors have a similar error of $\pm 0.2\%$, so it is possible for the two sensors to read as much as a 0.4% difference and still both be acceptable.

If you now take the second moisture sample and put it into the bench top tester you will most likely get another reading. This time the difference is because all the grain coming out of the dryer is not exactly the same moisture. (For example, there are usually variations between different columns in the dryer.) This is called sampling error. This is also evident when taking samples from inbound trucks and it is the reason that you probe and sample from different parts of the truck, the idea being to obtain a representative sample to get accurate overall average moisture.

Outlet Sensor Calibration Screen – Permits the entry of manual moisture samples for the purpose of calibrating the DryerMaster outlet moisture sensor.



Calibration Procedure

While equipment error cannot be eliminated much can be done to reduce sampling error. This is why the DryerMaster comes with a sampling button for the outlet sensor. The concept is to have the operator and the DryerMaster take a similar sample over the time the sample button flashes, a period of about 30 seconds. This more representative sample provides a more accurate result.

We recommend the following procedure for calibrating the outlet sensor:

- Check the dryer to make sure grain is flowing past the sensor
- Push the sample button next to the DryerMaster outlet sensor (the sample button light will flash for 30 seconds and then remain lit until the sample is entered or cancelled).
- While the light is flashing, take several small samples and put them into a container (DO NOT take just one sample).

- Mix up the sample. Test in the bench top tester. Take 3 or more tests and average them.
- Press “Sensor Calibrate” on the DryerMaster screen to display the “Calibration Menu”. The sensor with the sample waiting will show (“Sampling Complete Awaiting Data Entry” light). Enter the test results in the blue dialog box and press the “Confirm Test Result” button.

Note: If you want to cancel a test, simply press the “Cancel” button to reset the calibration process.

- When the “Sampling Complete Awaiting Data Entry” light goes away, the entry was accepted.
- Press Exit to return.
- Type in your bench top meter result. Press the ‘Enter’ key to accept the value and return to the ‘Main operation’ screen. Type in ‘0’ and ‘Enter’ or ‘Cancel’ to clear the calibration in progress and return to the ‘Main operation’ screen.

The DryerMaster will automatically update its moisture calculation formula. If your bench top reading is more than 1.0% away from the DryerMaster reading we recommend obtaining a second sample. If the second sample gives a similar result you should enter the calibration and verify the product flow past the sensor.

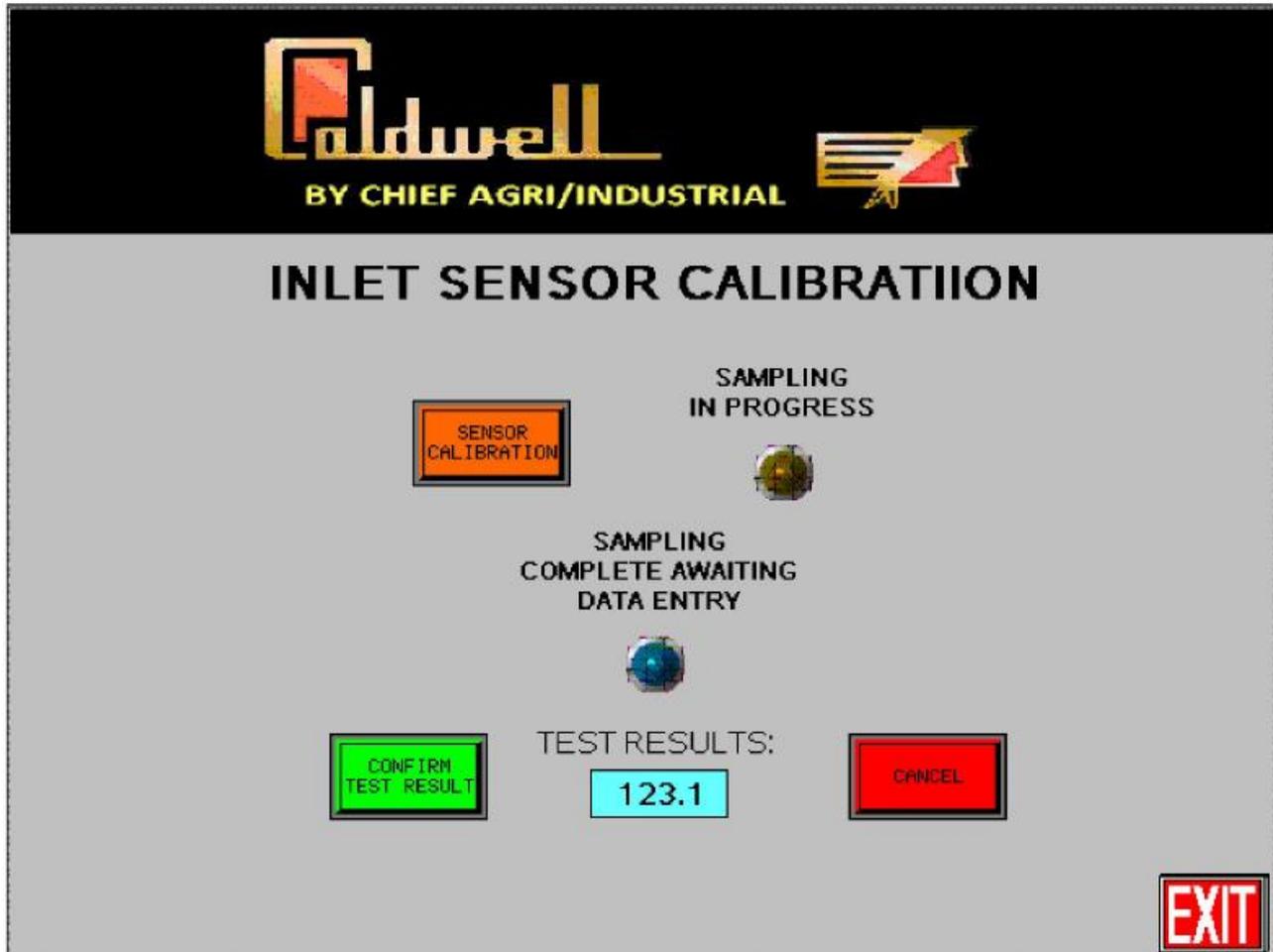
Note: The DryerMaster Moisture sensors are factory calibrated to a standard. New installations can routinely show significantly different readings between the DryerMaster sensors and the bench top meter. A number of calibration or an adjustment in the Supervisor Calibration menu will bring the sensors in line.

Calibration Frequency

Continue sampling at the frequency you are accustomed to. Calibrations can be performed any time there is product in the moisture sensor. The DryerMaster will track the entries and make adjustments as needed regardless of the operating mode. The Dryer Master support center can use the information to track the performance of the sensor.

A good way of seeing if the DryerMaster is in calibration is to keep a list of calibration pairs. Two columns in which the first column is the bench top reading and the second column is the DryerMaster reading from the calibration data entry screen. The corresponding readings are beside each other and a glance down the page will tell you if the Dryer Master is calibrated or if there is an outlier.

Inlet Sensor Calibration Screen – Permits the entry of manual moisture samples for the purpose of calibrating the DryerMaster inlet moisture sensor.



Calibration Procedure

The inlet calibration is not as critical and it is nearly impossible to gather a sample at the location of the inlet sensor. Inlet calibration involves estimating the moisture at the sensor. The inlet sample is gathered at ground level prior to elevating into the dryer. The calibration sequence is started from the DM510 calibrate menu after sufficient time has passed for the product to reach the sensor.

We recommend the following procedure for calibrating the inlet sensor:

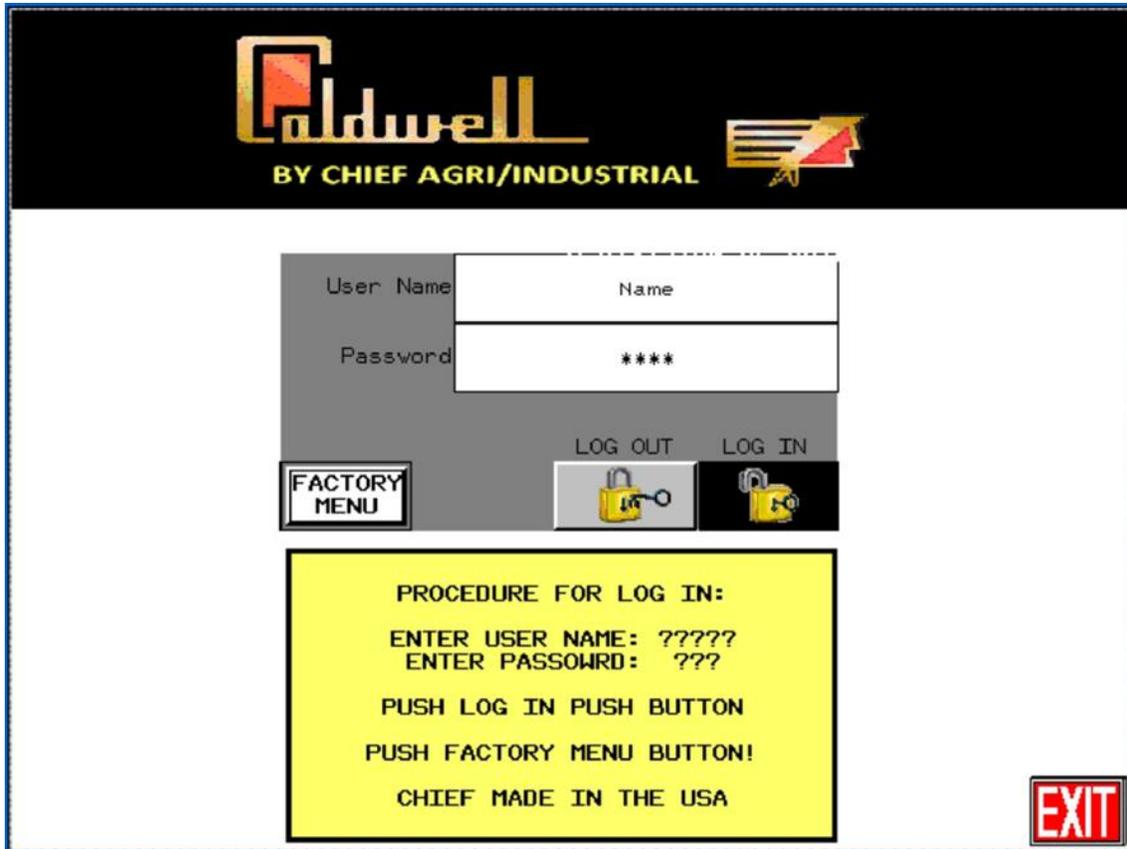
- Take sample from area before inlet sensor.
- Wait until time assumed that sampled grain would be near the inlet sensor at the top of the dryer.
- Press “Sensor Calibration” button.

- Wait for “Sampling Complete Awaiting Data Entry” light to illuminate.
- Enter the test results in the blue dialog box and press the “Confirm Test Result” button.

Note: If you want to cancel a test, simple press the “Cancel” button to reset the calibration process.

- When the “Sampling Complete Awaiting Data Entry” light goes away, the entry was accepted.
- Press Exit to return.

Security Screen – This is a username and password protected entrance for access to the factory set-up screens. This is for Chief Personnel Use Only and the factory set-up screens cannot be accessed by the end user without explicit permission from Chief Agri/Industrial.



The identification and description of functions on the security screen is shown below. Simply touch one of the boxes to proceed to the corresponding dryer screen

PLC Input Screen – This is used for troubleshooting purposes only. Illuminated lights indicate inputs which are active or are in fault mode.

RED = FAULT/INACTIVE

GREEN = ACTIVE/OK/READY

INPUT DEVICES

	START SWITCH		METERING ROLL VFD# FAULT		BLOWER #7 FAIL
	RUN SWITCH		TUB DRAG FAIL		BLOWER #8 FAIL
	FUEL SWITCH		FLAME DETECT SW.		BLOWER #9 FAIL
	UNLOAD SWITCH		DRYER FILL SW.		BLOWER #10 FAIL
	REVERSE SWITCH		CHAIN SENSOR SW.		BLOWER #11 FAIL
	BLOWER #1 FAIL		DISCHARGE PLUG SW.		BLOWER #12 FAIL
	BLOWER #2 FAIL		DRY BIN FULL SW.		LOW GAS PSI SW.
	BLOWER #3 FAIL		DRY LEG FAIL		HI GAS PSI SW.
	BLOWER #4 FAIL		WET LEG FAIL		CROSS DRAG #1 FAIL
	AIR PROVE SWITCH		BLOWER #5 FAIL		CROSS DRAG #2 FAIL
	METERING ROLL MOTOR PROTECTOR FAILURE		BLOWER #6 FAIL		

INPUTS PAGE 2 **EXIT**

INPUT DEVICES

	DRY DRAG#1 FAIL		WET DRAG#1 FAIL		
	DRY DRAG#2 FAIL		WET DRAG#2 FAIL		
	DRYING TEMP ACTUAL	123: F	SPEED REFERENCE FROM METERING ROLL VFD#1	123 VDC	
			SPEED REFERENCE FROM METERING ROLL VFD#2	123 VDC	
	GRAIN TEMP ROLL #1 FAR SIDE SENSOR	123: F	GRAIN TEMP ROLL #1 FAR SIDE UPPER SENSOR	123: F	
	GRAIN TEMP ROLL #1 NEAR SIDE SENSOR	123: F	GRAIN TEMP ROLL #1 NEAR SIDE UPPER SENSOR	123: F	
	GRAIN TEMP ROLL #2 FAR SIDE SENSOR	123: F	GRAIN TEMP ROLL #2 FAR SIDE UPPER SENSOR	123: F	
	GRAIN TEMP ROLL #2 NEAR SIDE SENSOR	123: F	GRAIN TEMP ROLL #2 NEAR SIDE UPPER SENSOR	123: F	
	GRAIN TEMP ROLL #1 MID POINT SENSOR	123: F	GRAIN TEMP ROLL #2 MID POINT SENSOR	123: F	

INPUTS PAGE 1 **EXIT**

PLC Output Screen – This is used for troubleshooting purposes only. Illuminated lights indicate inputs which are active or are in fault mode.

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<input checked="" type="checkbox"/>	BLOWER #1	<input checked="" type="checkbox"/>	DRY LEG	<input checked="" type="checkbox"/>	CROSS DRAG #2
<input checked="" type="checkbox"/>	BLOWER #2	<input checked="" type="checkbox"/>	WET LEG	<input checked="" type="checkbox"/>	DRY DRAG #1
<input checked="" type="checkbox"/>	BLOWER #3	<input checked="" type="checkbox"/>	BLOWER #5	<input checked="" type="checkbox"/>	DRY DRAG #2
<input checked="" type="checkbox"/>	BLOWER #4	<input checked="" type="checkbox"/>	BLOWER #6	<input checked="" type="checkbox"/>	WET DRAG#1
<input checked="" type="checkbox"/>	PRIMARY GAS VALVE	<input checked="" type="checkbox"/>	BLOWER #7	<input checked="" type="checkbox"/>	WET DRAG#2
<input checked="" type="checkbox"/>	SEC. GAS VALVE	<input checked="" type="checkbox"/>	BLOWER #8	VFD SPEED REF.	
<input checked="" type="checkbox"/>	IGN. XFORMER	<input checked="" type="checkbox"/>	BLOWER #9	123.1 HZ	12.1 VDC
<input checked="" type="checkbox"/>	FLAME DETECT	<input checked="" type="checkbox"/>	BLOWER #10	MODULATING GAS VALVE	
<input checked="" type="checkbox"/>	TUB DRAG	<input checked="" type="checkbox"/>	BLOWER #11	123 %	12.1 VDC
<input checked="" type="checkbox"/>	METERING ROLL FWD	<input checked="" type="checkbox"/>	BLOWER #12		
<input checked="" type="checkbox"/>	METERING ROLL REV	<input checked="" type="checkbox"/>	CROSS DRAG #1		

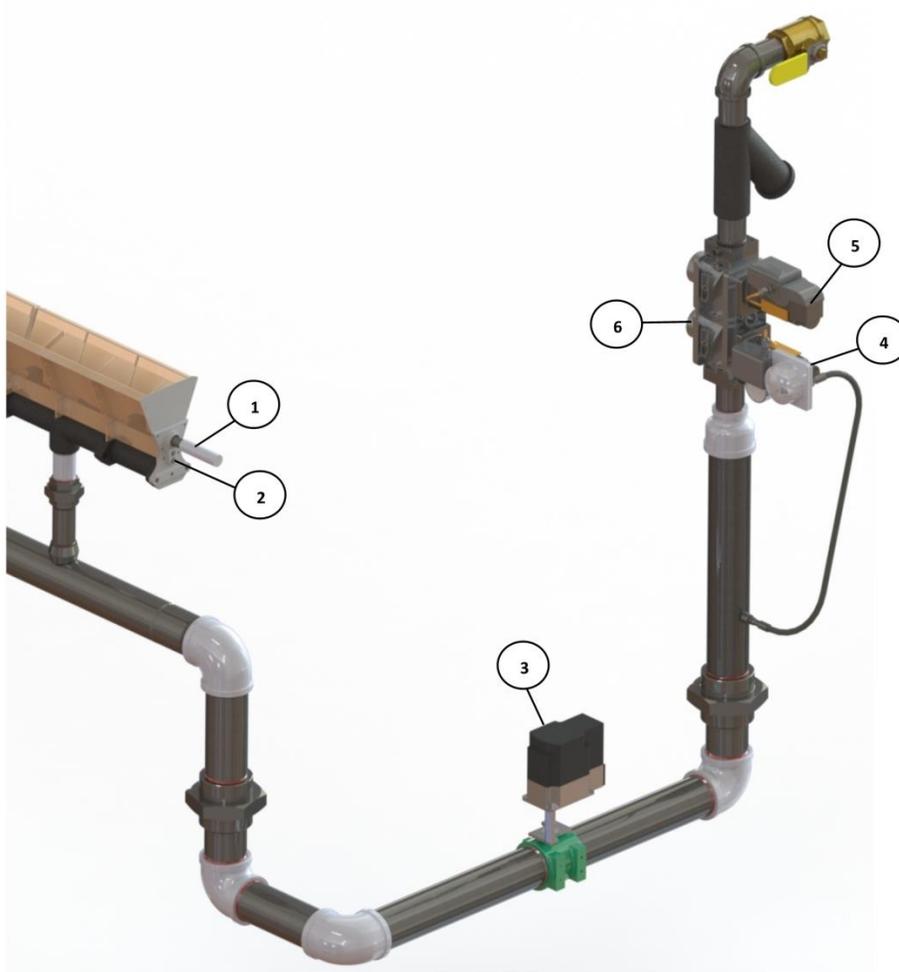
EXIT

Gas Supply Overview

Note: Dryer is intended for use with LP and NG sources only.

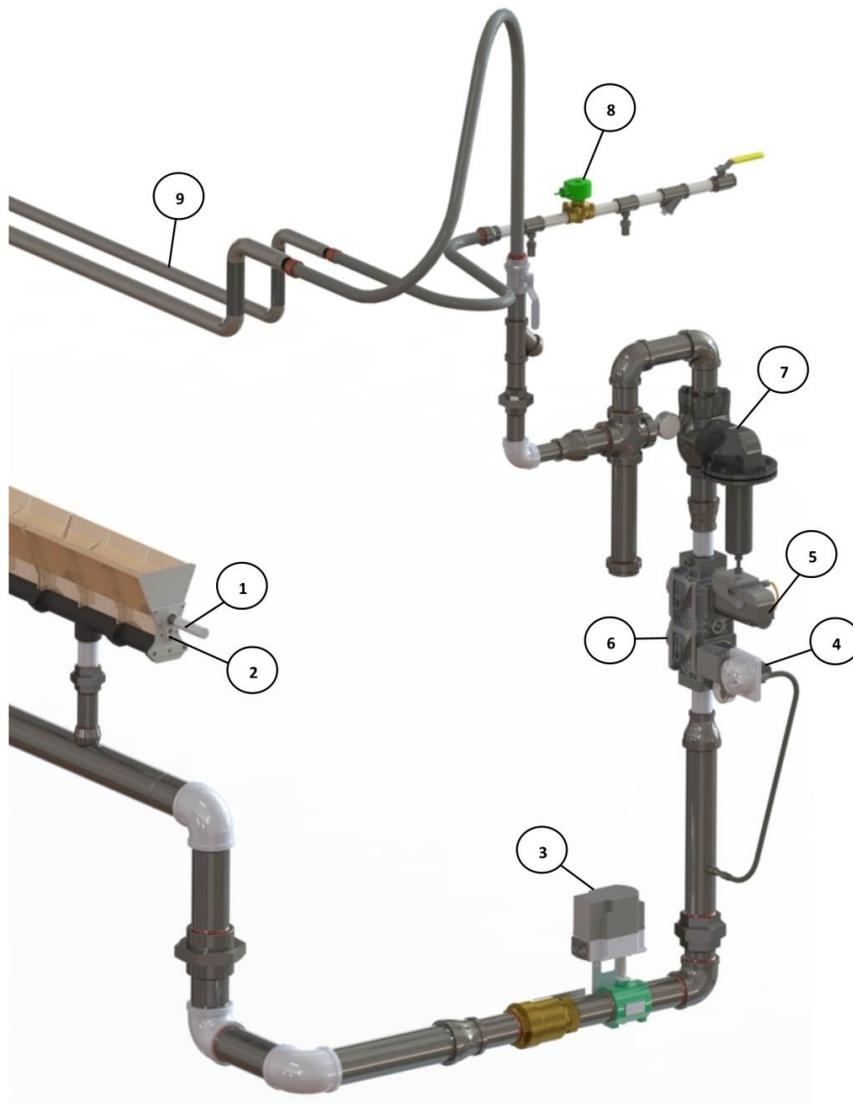
1. The gas supply is required to be connected to the dryer gas train. With the dryer fuel control valve in the “off” position, the gas supply connections need to be checked for leaks from all fittings and lines feeding the dryer.

Natural Gas Components



1. Minipeeper, Flame
2. Spark Plug, EL, 14MM Thread, Maxon
3. Modulating (Butterfly) Valve (SQM40)
4. Gas Pressure Regulating Actuator (SKP25)
5. Gas Shut Off Actuator (SKP15)
6. Dual Gas Valve (VGD)

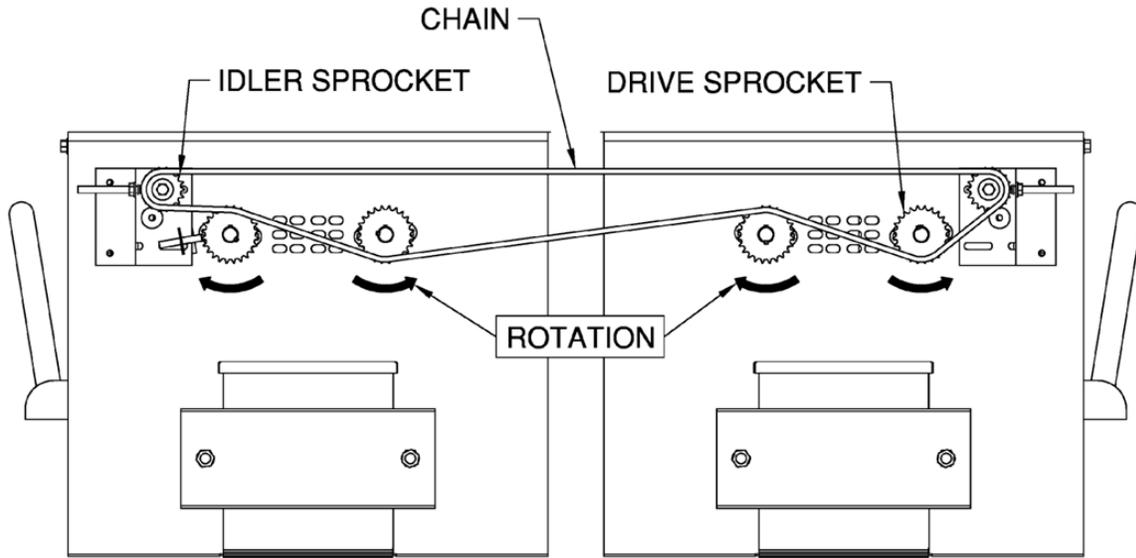
Liquid Propane Components



1. Minipeeper, Flame
2. Spark Plug, EL, 14MM Thread, Maxon
3. Modulating (Butterfly) Valve (SQM40)
4. Gas Pressure Regulating Actuator (SKP25)
5. Gas Shut Off Actuator (SKP15)
6. Dual Gas Valve (VGD)
7. Primary Pressure Regulator
8. Liquid shut off valve
9. Internal Vaporizer

Metering Roll Overview

The metering rolls are the dryer's primary means of unloading the dryer. Metering rolls are run by a variable speed drive and coupled by a chain. Verify the chain tracking and sprocket rotation directions.



Initial Dryer Set-Up

Before starting the dryer there are several initial settings that must be made. These settings must always be made and/or verified before every dryer start-up. **Note:** When power to the dryer’s HMI panel is lost or cycled, these settings will be reset and must be re-entered prior to being able to operate the dryer.

Drying Temperature

The drying temperature is dependent on the product being dried. This is the drying air temperature that will be maintained during operation. **Note:** This setting can be implemented in the Operations Screen.

	Feed	Seed
Corn (Yellow)	220	180
Corn (White)	200	150
Wheat	220	160
Oats	220	160
Barley	220	160
Soybeans	170	110
Sunflower	150	110
Dry Beans	170	110
Rapeseed/Canola	150	110

Metering Roll Speed

This is the rate at which grain is discharged from the dryer. This value is a percentage of full speed and is based on numerous factors including: inlet grain moisture content, desired outlet moisture content, drying temperature setting, and limitations in auxiliary equipment. **Note:** Refer to the Caldwell dryer discharge speed setting guide attached to the panel. This setting is made in the operations screen.

Wet Grain Load Time Delay

This value is dependent upon the capacity of the auxiliary loading equipment. A recommended starting point is a set time of 1-2 minutes. This value will need to be adjusted as the operator gets a better feel for the system. This setting is made in the operations set-up screen.

Wet Bin Empty Time Delay

This is the set time value in which the dryer will automatically shut down if the fill switch in the top of the dryer has not been proven. **Note:** A recommended starting point is a set time of 10-15 minutes. This value will need to be adjusted as the operator gets a better feel for the system. This value needs to be set to a time low enough that the grain level in the main drying section does not become void of grain. This setting is made in the operations set-up screen.

High Drying Temperature Limit

Set approximately 30-50°F above drying temperature. This setting is made in the operations set-up screen.

High Grain Temperature Limit

Set values are dependent on operators desired drying temperate and grain temperature. This value will be determined by the grain temperature RTD probes located in the grain columns. This setting is made in the operations set-up screen.

Wet Grain Load Delay To Stop

Set the wet grain load delay to stop. This is the delay to start loading when the fill switch is uncovered. This setting is made in the operations set-up screen.

Dryer Minimum Discharge Speed

Set the dryer minimum discharge speed. This setting is made in the operations set-up screen.

Dryer Maximum Discharge Speed

Set the dryer maximum discharge speed. This setting is made in the operations set-up screen.

Dryer Start-Up Procedure

1. Fill dryer with grain
 - a. Turn on the main power supply to the dryer and control panel. Also, verify that the 120 V control power is being supplied. Refer to the operations set-up screen.
 - b. If the loading and unloading equipment is to be automatically started by the dryer's controls, switch all auxiliary controls to automatic operation. This should begin the filling of the dryer. With the dryer control panel on, the fill switch in the dryer's reserve section will be open and automatically request grain to fill the dryer.
 - c. If the loading and unloading equipment is started manually (not by the dryer's controls), manually start the loading equipment to fill the dryer.
 - d. **Verify** that the manual slide gate doors are in the fully open position (handle should be in the vertical position).
 - e. Grain bounce will be observed both inside and outside of the dryer during filling.
 - i. Verify the burner cover supplied with your dryer is installed during filling.
2. Inspect the interior of the dryer.
 - a. Ensure that the burner and fans are clear of all debris and grain, if any are present clean immediately.
 - b. **Verify** that the burner cover has been removed before proceeding to start-up.

- c. **Verify** that the manual gas valves that supply the dryer are in the open position.
3. Enter/verify all initial dryer settings. Refer to the dryer operation section and initial dryer set-up
4. Turn on the fans
 - a. To start the fan, switch the system OFF/RUN/ON switch to the ON position. The air prove light will illuminate green on the HMI screen.
5. Light the burner.
 - a. When lighting the burner, turn the fuel ON/OFF switch to the ON position. Then switch the system OFF/RUN/ON to the ON position. Hold momentarily and release. The system ON switch is a spring loaded switch and it will return to the RUN position once released.
 - b. The dryer will trial for ignition 3 times. After 3 trials, if a flame has not been established an ignition fault will appear. The dryer start-up procedure must be restarted. Recycle the power quickly by turning the system OFF/RUN/ON switch to OFF, then quickly turn it back to run. (This process will prevent the fans from completely stopping and eliminate the large load required to start all fans from the locked rotor position).
 - c. Repeat lighting process. Attempt to light burner through 3 faults. If attempting to ignite for the first time of the season, several trials may be required in order for gas to process through the train and burner. If the burner fails to ignite after 3 faults, see the troubleshooting guide in this manual.
6. Start Unloading
 - a. Press the UNLOAD button and the dryer's metering rolls and drag conveyors will start. If the dry auxiliary motors are tied into the program, pressing the UNLOAD button will also start these devices.
 - b. **Note:** Discharging of grain should be initiated immediately once the burner flame has been established. If discharging does not begin after a pre-programmed 5 minute safety time period, the burner will shut off and the dryer will enter a 45 minute cool down period before finally completely shutting down. GRAIN SHOULD ALWAYS BE DISCHARGING ONCE FLAME HAS BEEN ESTABLISHED.

Dryer Operation

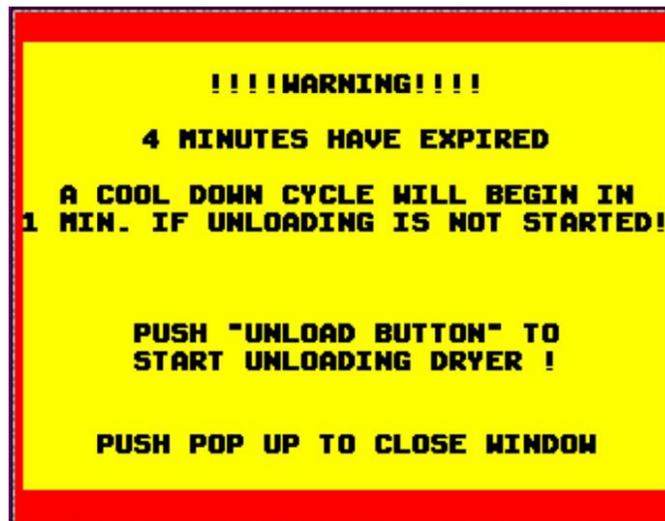
Once the dryer has been started it should be closely monitored for at least the first 2-3 hours of operation or at least until one full batch of grain has been completely run through the unit. During this time monitor the grain condition discharging from the dryer closely by taking frequent moisture samples.

All of the initial dryer settings can be adjusted at any time during dryer operation. However, allow approximately 30 minutes to 1 hour to observe the results of any changes before making any subsequent operational changes. **Note:** Because the effect of any changes in drying temperature or discharge rate will not be immediately noticeable in the grain being discharged from the dryer, do not make abrupt changes to the dryer's operational setting. If frequent and abrupt changes are made the dryer will not perform consistently and it could be difficult to find the optimal operation settings.

DO NOT leave dryer unattended for an extensive period of time.

During operation the unloading of the dryer can be periodically stopped or paused. Press the UNLOAD button to stop the unloading equipment. A timer of 5 minutes will begin once the unloading equipment stops.

To restart the unloading equipment, simply press the UNLOAD button again. A warning screen will appear on the screen after a period of 4 minutes to alert the operator that unloading needs to be resumed. If unloading is not resumed within the 5 minute period, a fault will occur and the dryer will change to the cool down mode. A complete dryer restart will then be required.



Turn off the dryer fans immediately if any malfunction is observed or if any visible smoke is exiting the dryer. Do this by turning the system OFF/RUN/ON switch to the OFF position.

On liquid propane (LP) dryers, ice/frost on the gas lines may be observed at the start of operation. This is due to incomplete vaporization at the start of drying. Once the flame begins to warm the internal vaporizer and the plenum temperature rises, the ice/frost should melt.

Note: If ice/frost on the gas lines do not go away over the course of dryer for several hours, it may be necessary to lower the internal vaporizer closer to the burner/flames.

CAUTION: The gas train lines/vaporized gas should NOT exceed 140°F or damage to the gas train components can occur.

For Systems with DryerMaster

When the Dryer volumes and throughput have been reviewed and confirmed, after the initial 24 hours of operation and the information matches the dryer specifications and installed information, and you are comfortable with the DryerMaster sensor moisture readings, it is acceptable to use 'Automatic' mode.

1. Once the dryer has been started and running in manual mode for an hour or so, it is important to start calibrating the DryerMaster inlet and outlet sensors as instructed in the sections before. These sensors must be close in order for the DryerMaster to learn the dryers operations and calculations correctly in order for it to run the dryer automatically in a safe manner.
2. The DryerMaster will need at least 1 or 2 dryer loads to learn the dryers settings and for all of its calculations to have enough accurate information to take over control.
3. Set the target moisture setpoint on the DryerMaster Screen.
4. When the Ready light is indicated, the DryerMaster has gathered sufficient information to be placed into Automatic mode.

Note: Look at the suggested rate to see if it is close to what the manual mode is running for discharge rate or at least that the suggested rate makes sense for the conditions the dryer is running.

5. To place the dryer in Automatic mode, on the DryerMaster Screen, press the Dryer Master Control button for the DryerMaster to take control of the discharge. It will automatically change the discharge speed to the dryer to try and keep the Moisture Set Point entered.

CAUTION: Even with the DryerMaster in control of the dryer, it is important to NOT leave the dryer unattended for extensive periods of time.

6. If the DryerMaster's Ready light goes out, it will kick the dryer back to manual mode and the dryer will run with last discharger setting it had. The Ready light can go out for multiple reasons including (but not limited to) any alarms that pop up from the DryerMaster or the current outlet moisture has to be within 2 % of the moisture setpoint (target) and second the predicted outlet moisture (by the Dryer Master model) must be within 2% of the actual moisture.

See the DryerMaster's DM510 User's Guide for more information.

Dryer Shutdown Procedure

Standard Shut-Down Procedure (for periodic shutdown with the dryer remaining full of grain)

1. First, turn the fuel ON/OFF switch to the OFF position. This will turn off all fuel equipment and the burner.
2. Press the UNLOAD button. This will turn off the unloading equipment.
3. Go to the SETUP SCREEN and enter you amount of time to cool down the dryer and press the AUTO COOL DOWN button. This will allow the fans to run for the time entered and then automatically shut down.
 - Typical time for cool down is 30-60 minutes to cool the grain in the dryer but it is the operator's responsibility to make sure the grain is cool after the shutdown occurs to prevent possible fires.
4. Turn the system OFF/RUN/ON switch to OFF to turn off fans.

End of Season/Dryer Emptying Shut-Down Procedure

1. Adjust the wet bin empty time to the max setting of 120 minutes.
2. Adjust the wet grain time delay to the max setting of 120 minutes.
3. Turn the fuel ON/OFF switch to the OFF position. This will turn off all fuel equipment and the burner.
4. Press the UNLOAD button. This will turn the unloading equipment off.
5. Allow the fans to run for 30-45 minutes to cool the grain in the dryer.
6. Turn the system OFF/RUN/ON switch to the OFF position to turn off the fans.
7. Press the UNLOAD button to start unloading the equipment again. The dryer will now unload without fault until the max wet grain time delay and/or wet bin empty limit of 120 minutes has been reached. Unload the dryer at an appropriate rate so that this limit is not reached and that the auxiliary unloading equipment will not overload. **Note:** Stop steps if dryer will be used again this season. Continue, if dryer will not be used again this season or will not be run for a long period of time.
8. Manually shut off the gas supply at beginning of the gas train.
9. Turn the system OFF/RUN/ON switch to the ON position to turn on fans.
10. Turn the fuel ON/OFF switch to the ON position.
11. Turn the system OFF/RUN/ON switch to the ON position. Hold momentarily and release.
12. After flame fails, the lines are purged. Turn the fuel ON/OFF switch to the OFF position.
13. Turn the system OFF/RUN/ON switch to the OFF position.
14. Perform end of season maintenance. Refer to post season maintenance/service section.

Troubleshooting Guide

This section is intended to help the user troubleshoot some of the most common types of faults that can occur when drying.

Dryers can be customized to each individual user's needs, thus some of the faults or error messages listed may not be applicable to all dryers. This troubleshooting guide is designed to encompass all makes and models. In addition, a customized dryer may have additional faults/error messages not listed in this section.

HMI FAULT MESSAGE	MEANING OF MESSAGE
Blower #1 Overload	Motor Switch Protector (MSP) for fan #1 has tripped
Blower #2 Overload	MSP for fan #2 has tripped
Blower #3 Overload	MSP for fan #3 has tripped
Blower #4 Overload	MSP for fan #4 has tripped
Blower #5 Overload	MSP for fan #5 has tripped
Blower #6 Overload	MSP for fan #6 has tripped
Blower #7 Overload	MSP for fan #7 has tripped
Blower #8 Overload	MSP for fan #8 has tripped
Blower #9 Overload	MSP for fan #9 has tripped
Blower #10 Overload	MSP for fan #10 has tripped
Blower #11 Overload	MSP for fan #11 has tripped
Blower #12 Overload	MSP for fan #12 has tripped
Dry Leg Overload	MSP for the dry leg has tripped
Wet Leg Overload	MSP for the wet leg has tripped
Dry Drag #1 Overload	MSP for the dry drag #1 has tripped
Dry Drag #2 Overload	MSP for dry drag #2 has tripped
Cross Drag #1 Overload	MSP for the cross drag #1 had tripped
Cross Drag #2 Overload	MSP for cross drag #2 has tripped
Wet Bin Drag #1	MSP for the wet bin drag #1 has tripped
Wet Bin Drag #2	MSP for the wet bin drag #2 has tripped
Dry Bin Fault	Dry bin is full
Metering Roll VFD Fault	The VFD has encountered a fault. Check the face of the VFD to identify the fault type
Metering Roll MSP Fault	MSP for the VFD has tripped
Tub Drag Overload	MSP for the tub's dual drag conveyors has tripped
Discharge Fault	Failure to start unloading the dryer within 5 minutes of establishing a flame
Discharge Plug Switch Fault	The plug switch for the unloading equipment has been actuated. Indicating plugged unloading equipment
Blower Fault	The air prove switch has not been proved or has been lost. Inspect the air switch and tubing
Wet Bin Empty Time Out	Timer for the Wet Bin Empty Time Out as set in the Operations User Set-Up HMI screen has expired. This

	indicates that the wet bin is likely out of corn.
Ignition Restart Fault	Dryer has failed to light the burner after 3 attempts
High Grain Temp Warning	Grain temp is nearing the high temp limit as set in the Operations User Set-Up HMI screen
Over Temp Grain Fault	Grain temp has exceeded the high temp limit as set in the Operations User Set-Up HMI screen
Drying Air Temp Fault	Drying temp has exceeded the high temp limit as set in the Operations User Set-Up HMI screen
External Controller Temp Fault	Omron controller has shut down the dryer. Drying temp has exceeded the high limit set on the Omron controller (inside main control panel)
Broken Chain Detected	The chain sensor has not sensed that the sprocket for the chain has moved in the required time since the metering roll start has been started

Specific Faults

High Drying Temperature Limit - The high drying temperature limit is based on the settings from the Omron temperature controller in the main panel and on the operations set-up screen.

During operation, if the high dryer temperature limit is reached, a dryer shut-down fault will occur and a pop-up screen will appear. Entire drying operation will be shut-down, including the fans, due to the possibility of a grain fire being present. The fault will remain present until the plenum temperature sensors detect a temperature below the high limit setting.

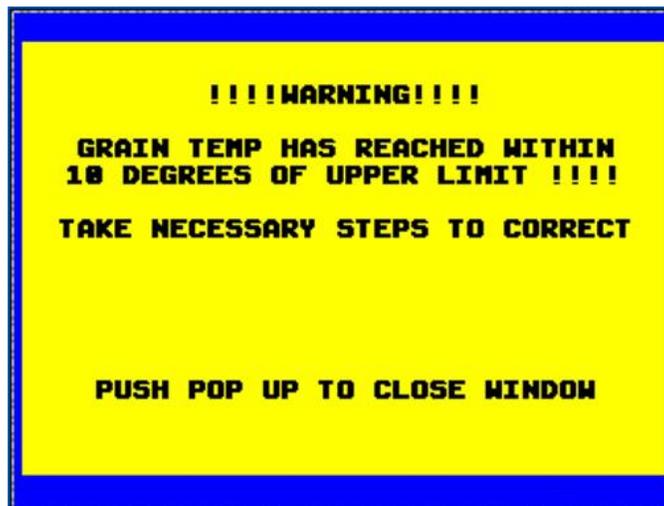


- Possible causes of a high drying temperature limit fault:
 - Grain may not be moving through the dryer either in a localized area or an entire grain column. Inspect metering roll bearings, drive chain, gearbox, motor, and the rolls themselves. Verify slide gate doors are fully opened. **Note:** If the chain break switch has been disabled a broken chain or bearing fail will not be detected.

- Trash build-up or foreign material may be accumulating in the dryer and preventing the proper flow of grain into the metering rolls or through the ducts.
- Faulty operation of gas modulating/control valve
 - Inspect the valve for any broken linkages/connections. When restarting the dryer, inspect that the valve's shaft is rotating. See valve installation manual for further information.
- Faulty thermocouple
 - Faulty Omron temperature controller located inside Chief's main control panel.
- Possible solution of a high drying temperature limit fault
 - Clear the pop-up window to acknowledge the alarm. If unloading of grain is immediately required at this point, turn the system OFF/RUN/ON switch to the OFF position. Press the green UNLOAD button to begin unloading.
 - **IMPORTANT: IF A FIRE IS PRESENT DISABLE THE AUXILLIARY LOADING EQUIPMENT SO GRAIN WILL NOT CONTINUE TO ENTER THE DRYER WHILE UNLOADING.**
 - Once temperature has been reduced below the high limit setting, the dryer may be restarted. Prior to restarting the dryer be sure to conduct a thorough inspection of the grain condition inside the dryer and the internal and external dryer surfaces. Attempt to identify the cause of the problem

High Grain Temperature Limit - Based on the settings from the operations set-up screen

During operation, if any one of the RTD grain temperature probes detects a temperature within 10°F of the high grain temperature limit, a warning pop-up screen will appear to alert the operator. During operation the operator should take immediate action to correct the issue.



During operation, if any one of the RTD grain temperature probes detects this high limit temperature, a dryer shutdown fault will occur and a pop-up screen will appear.



Once the dryer shutdown fault has occurred, the entire drying operation will be shut-down, including the fans, due to the possibility of a grain fire being present. The fault will remain present until all the grain temperature sensors detect a temperature below the high limit setting.

- Possible causes of a high grain temperature limit fault.
 - Grain not moving through the dryer is either in a localized area or an entire grain column. Inspect metering roll bearings, drive chain, gearbox, motor, and the rolls themselves. Verify slide gate doors are fully opened. **Note:** If the chain break switch has been disabled a broken chain or bearing fail will not be detected.
 - Faulty grain temperature sensor.
- High grain temperature limit solution
 - Clear the pop-up window to acknowledge the alarm. If unloading of grain is immediately required at this point, turn the system OFF/RUN/ON switch to the OFF position. Press the green UNLOAD button to begin unloading.
 - **IMPORTANT: IF A FIRE IS PRESENT DISABLE THE AUXILLIARY LOADING EQUIPMENT SO GRAIN WILL NOT CONTINUE TO ENTER THE DRYER WHILE UNLOADING.**
 - Once all grain temperature sensors detect that the temperature has decreased to below the high limit setting, the dryer may be restarted. Prior to restarting the dryer be sure to conduct a thorough inspection of the grain condition inside the dryer and the internal and external dryer surfaces. Attempt to identify the cause of the problem.

Broken Chain Detected Fault - Relates to feedback from a proximity sensor located on the chain driven sprockets that run the metering rolls.

During unloading, if the proximity sensor fails to sense the sprocket turning, a chain failure fault will occur.

The chain sensor can be disabled in the condition of nuisance tripping. When the sensor is disabled, an attention pop-up screen will periodically appear to remind the operator of the sensor's disabled condition.



- Possible causes of a chain failure fault
 - Broken chain
 - Chain has lost tension
 - Sheared key and/or set screw on one of the sprockets
 - Chain is skipping. This could indicate a plugged or interference condition on the metering rolls
 - Faulty proximity sensor
- Chain failure fault solution
 - Inspect the chain for a broken or loose condition. Fix chain condition and restart unload to check function before restarting dryer completely. If chain condition looks normal, re-engage unloading and observe chain and sprockets to diagnose a skipping or sheared key/set screw condition.
 - If chain is skipping the chain tension may be too loose. A plugged metering roll condition may be present. Inspect metering rolls for any obstructions.
 - If neither condition above is true, there may be an issue with the proximity sensor. Observe the position of the proximity sensor. Sensor must remain in close proximity to its target. Ensure that set screws locating the sensor are not loose. Inspect the conditions of the sensor wires. During operation an indicator light will change colors or illuminate when the target passes the sensor's eye. Ensure the indicator light is functioning correctly.
 - If neither condition above exists, disable the proximity sensor on the HMI screen and attempt to unload. If unload functions properly, then there is likely a problem with the sensor or PLC input.

Dryer Will Not Ignite After Several Attempts

- Verify that all manual valves from the gas supply to the burner are in the open position.
- When firing, verify that the solenoid valve is firing.
- During the lighting attempt sequence, verify that the shaft of the modulating (butterfly) valve is moving. The valve should be opening slightly during the lighting sequence to allow gas to the burner. The cam adjustments on the modulating valve may need to be adjusted. If adjustments are required, contact Chief Industries, Inc. for assistance.
- Inspect the various pressure gauges present in the gas line to verify the presence of gas.
- During trial for ignition, use the peep hole in the dryer's access door to visually confirm that a spark is present. If necessary, clean spark plug and inspect wiring.
- Inspect the burner orifices. Ensure that they are clear of debris and not plugged. If necessary, clean burner ports with a 5/64" (0.078") bit.
- Check Fuel Source
 - Liquefied Propane (LP) – Verify quantity in the supply tank
 - Natural Gas – Verify supply has not been turned off or is under service by the gas company

Error message on the HMI indicating a loss of communication with the PLC

- Check that the RS485 crossover cable is connected to both the PLC and the HMI (the Ethernet cable that communicates between the two devices).
- Without the 120V being supplied to the PLC unit, check to see if any lights are present on the PLC face. If no lights are present, the PLC battery could have run out and needs to be replaced. If the EPROM in the PLC has been removed or tampered with, the program has likely been lost. A new EPROM will have to be installed before any communication between the PLC and HMI is possible.
- Power on the panel.
 - Check to see if the power light is illuminated on the PLC face. If the "POWER" light is not illuminated, check that the 120V circuit breaker switch in the panel is ON (CB1). Check the circuit breaker fuse. Replace fuse if necessary.
 - Check to see if the "RUN" light is illuminated on the PLC face. If the "RUN" light is not illuminated, then the program has likely been lost. Most likely caused by the above described battery outage and EPROM removal.

Maintenance and Service Information

Pre-Season Maintenance/Service

- Perform all the daily and weekly tasks on the In-Season Maintenance/Service.
- Clean the dryer thoroughly
- Lubricate all necessary components
 - Grease all bearings on metering rolls and conveyors.
- Re-install the conveyor access doors and/or metering roll trays.
- Open manual gas valve and inspect.
 - Inspect gas train for any issues or leaks.

In-Season Maintenance/Service

- **Daily**
 - Inspect and clean plenum interior and burner
- **Weekly**
 - Inspect fill switch neoprene diaphragm.
 - Clean gas strainers (y-strainers) and/or traps.
 - Inspect and clean spark plug.
 - Clear any debris or dust from all electrical components in the control panel.

Post Season Maintenance/Service

- Clean the dryer thoroughly
 - Remove any and all trash or debris build-up on all dryer surfaces.
 - Thoroughly clean the interior plenum area and burner.
- Cover the burner
 - Use the provided plastic/rubber roll to keep the burner covered during off season. This will ensure that water and other contaminants do not enter the burner and cause plugging of the burner ports.
- Remove the conveyor access doors and/or metering roll trays then fully open slide gate doors.
 - It is recommended to remove these doors and trays to prevent debris and water from accumulating on the metering rolls or interior of the dryer during the offseason. **Note:** Often moisture and bees wings will want to settle at the metering rolls. Upon drying, this will form a hard crust that can plug the rollers. This needs to be cleaned prior to loading the grain the following season.
- If electrical panels are mounted outdoors.
 - During offseason, continually supply 120V power to the panels. This will ensure that the panel heaters will run as needed and prevent any moisture build-up inside the panel.

General Maintenance/Service Notes

- Change the PLC battery every 3 years.
- NEVER remove the EPROM chip from the PLC unit.
 - If the EPROM chip is removed, the program may be lost and the dryer operation will be lost.
- Burner should always be covered when dryer is not in use.

Note: Good housekeeping is critical to safe dryer operation. Always be diligent about clearing debris as it builds up on any interior or exterior dryer surfaces and/or components.

- **Fan Motor:**

- The life span of the motor is dependent on proper bearing maintenance. Before lubricating the bearings, inspect the bearings to make sure they are still in good condition. If not, the bearings will need to be replaced. The fan motor uses sealed bearings, however, the bearing cavity should still be lubricated. The motor should be lubricated once a year prior to the operating season per the following instructions. **Note:** The lubricants are designed to operate at high temperature and have a rust inhibitor for extended bearing life. Do not mix other grease types with these lubricants. In addition do not over lubricate the bearings as the lubricant will work its way into the motor and cause premature motor failure.
- To lubricate a motor with filler and drain holes, remove both plugs and clean the holes of any hardened lubricants. Approximately three standard pumps of Shell Dolium R or Chevron SRI-2 lubricant should be added. Allow the motor to run for approximately 10 minutes before reinstalling the drain plug.
- To lubricate a motor without filler and drain holes, first clean out any hardened grease, and then add the Shell Dolium R or Chevron SRI-2 lubricant to fill $\frac{3}{4}$ of the cavity of the end bell.

- **Fan Blades:**

- Clean the fan blade so the unit runs smoothly. This should be done once per year or as needed if vibration develops. Also check the fan to make sure it is mounted properly.

STANDARD LIMITED WARRANTY

Grain Dryer Products

1. **Definitions.** The following terms, when they appear in the body of this Standard Limited Warranty for Grain Dryer Products in initial capital letters shall have the meaning set forth below:
 - A. Accepted Purchase Order shall mean the Purchase Order identified below.
 - B. Chief shall mean Chief Agri/Industrial, a division of Chief Industries, Inc.
 - C. Original Owner shall mean the original owner identified below.
 - D. Product shall mean the Agri/Industrial Equipment as described in the Accepted Purchase Order.
 - E. Reseller shall mean the authorized Chief Agri/Industrial Equipment dealer identified below.

2. **Limited Product Warranty.** Upon and subject to the terms and conditions set forth below, Chief hereby warrants to the Reseller, and, if different, the Original Owner as follows:
 - A. All new Products delivered to the Reseller or the Original Owner by Chief pursuant to the Accepted Purchase Order will, when delivered, conform to the specifications set forth in the Accepted Purchase Order;
 - B. All new Products delivered pursuant to the Accepted Purchase Order will, in normal use and service, be free from defects in materials or workmanship; and
 - C. Upon delivery, Chief will convey good and marketable title to the Products, free and clear of any liens or encumbrances except for, where applicable, a purchase money security interest in favor of Chief.

3. **Duration of Warranty and Notice Requirements.** Subject to the **Exceptions, Exclusions and Limitations** set forth below, the warranties set forth in Section 2 above shall apply to all covered non-conforming conditions that are discovered within the first twelve (12) months following delivery of the Product to the carrier designated by the Reseller and/or the Original Owner at Chief's manufacturing facility in Kearney, Nebraska (the "Warranty Period") and are reported to the Chief as provided in Section 4 below within thirty (30) days following discovery (a "Notice Period").

4. **Notice Procedure.** In order to make a valid warranty claim, the Reseller and/or the Original Owner must provide Chief with a written notice of any nonconforming condition discovered during the Warranty Period within the applicable Notice Period specified in Section 3 above. Said notice must be in writing; be addressed to Chief Industries, Inc., Agri/Industrial Division, Customer Service Department, P.O. Box 848, Kearney, NE 68848; and contain the following information: (a) the Customer's name and address; (b) the Reseller's name and address; (c) the make and model of the Product in question; (d) the current location of the Product; (e) a brief description of the problem with respect to which warranty coverage is claimed; and (f) the date on which the Product was purchased.

5. **Exceptions and Exclusions.** Anything herein to the contrary notwithstanding, the warranties set forth in Section 2 above do **not** cover any of the following, each of which are hereby expressly excluded:
 - A. Defects that are not discovered during the applicable Warranty Period;
 - B. Defects that are not reported to the Chief Agri/Industrial Division Customer Service Department in conformity with the notice procedure set forth in Section 4 above within the applicable Notice Period specified in Section 3;
 - C. Any used or pre-owned Products;
 - D. Any Chief manufactured parts that are not furnished as a part of the Accepted Purchase Order;
 - E. Any fixtures, equipment, materials, supplies, accessories, parts or components that have been furnished by Chief but are manufactured by a third party;
 - F. Any Products which have been removed from the location at which they were originally installed;
 - G. Any defect, loss, damage, cost or expense incurred by the Reseller or the Original Owner to the extent the same arise out of, relate to or result, in whole or in part, from any one or more of the following:

- (i) Usual and customary deterioration, wear or tear resulting from normal use, service and exposure;
 - (ii) Theft, vandalism, accident, war, insurrection, fire or other casualty;
 - (iii) Any damage, shortages or missing parts which result during shipping or are otherwise caused by the Reseller, the Original Owner and/or any third party;
 - (iv) Exposure to marine environments, including frequent or sustained salt or fresh water spray;
 - (v) Exposure to corrosive, chemical, ash, smoke, fumes, or the like generated or released either within or outside of the structure on which the Product is installed, regardless of whether or not such facilities are owned or operated by the Reseller, the Original Owner or an unrelated third party;
 - (vi) Exposure to or contact with animals, animal waste and/or decomposition;
 - (vii) The effect or influence the Product may have on surrounding structures, including, without limitation, any loss, damage or expense caused by drifting snow;
 - (viii) Any Product or portion thereof that has been altered, modified or repaired by the Reseller, the Original Owner or any third party without Chief's prior written consent;
 - (ix) Any Product or portion thereof that has been attached to any adjacent structure without Chief's prior written approval;
 - (x) Any Product to which any fixtures, equipment, accessories, materials, parts or components which were not provided as a part of the original Accepted Purchase Order have been attached without Chief's prior written approval;
 - (xi) The failure on the part of the Reseller, the Original Owner or its or their third party contractors to satisfy the requirements of all applicable statutes, laws, ordinances rules, regulations and codes, (including zoning laws and/or building codes);
 - (xii) The use of the Product for any purpose other than the purpose for which it was designed; and/or
 - (xiii) The failure of the Reseller, the Original Owner and/or any third party to:
 - (a) properly handle, transport and/or store the Product or any component part thereof;
 - (b) properly select and prepare a site that is adequate for the installation and/or operation of the Product or any component part thereof;
 - (c) properly design and construct a foundation that is adequate for the installation and/or operation of the Product or any component part thereof;
 - (d) properly set up, erect, construct or install the Product and/or any component part thereof; and/or
 - (e) properly operate, use, service and/or maintain the Product and each component part thereof.
6. **Resolution of Warranty Claims.** In the event any nonconforming condition is discovered within the Warranty Period and Chief is notified of a warranty claim as required by Section 4 prior to the end of the applicable Notice Period set forth in Section 3 above, Chief shall, with the full cooperation of the Reseller and the Original Owner, immediately undertake an investigation of such claim. To the extent Chief shall determine, in its reasonable discretion, that the warranty claim is covered by the foregoing Limited Product Warranty, the following shall apply:
- A. Warranty Claims With Respect to Covered Non-Conforming Conditions Discovered Within the First Ninety (90) Days and Reported to Chief Within Thirty (30) Days of Discovery. In the case of a warranty claim which relates to a covered non-conforming condition that is discovered during the first ninety (90) days of the Warranty Period and is reported to Chief as required by Section 4 within thirty (30) days of discovery as required by Section 3, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as their sole and exclusive remedy, work in cooperation with the Reseller and the Original Owner to correct such non-conforming condition, and in connection therewith, Chief will ship any required replacement parts to the "ship to address" set forth in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska, and will either provide the labor or reimburse the Reseller or the Original Owner, as may be appropriate in the circumstances, for any out of pocket expense the Original Owner may reasonably and necessarily incur for the labor that is required to correct such non-conforming condition, provided that if work is to be performed by the Reseller or a third party contractor, Chief may require at least two competitive bids to perform the labor required to repair or correct

- the defect and reserves the right to reject all bids and obtain additional bids. Upon acceptance of a bid by Chief, Chief will authorize the necessary repairs.
- B. **All Other Warranty Claims.** Except as is otherwise provided in subsection 6A above, in the case of all other warranty claims which relate to covered non-conforming conditions that are discovered during the Warranty Period and are reported to Chief as required by Section 4 within thirty (30) days following discovery, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as the Reseller's and the Original Owner's sole and exclusive remedy, ship any required replacement parts to the Original Owner at the "ship to address" specified in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska; and **in such event, Chief shall have no responsibility or liability to either the Reseller or the Original Owner for the cost of any labor required to repair or correct the defect.**
7. **Warranty Not Transferable.** This Warranty applies only to the Reseller and the Original Owner and is **not transferable**. As such, this Warranty does **not** cover any Product that is sold or otherwise transferred to any third party following its delivery to the Original Owner.
8. **Limitation on Warranties, Liabilities and Damages.** The Reseller and the Original Owner expressly agree that the allocation of the risk, liability, loss, damage, cost and expense arising from any Product that does not conform to the limited warranty given in Section 2 above are fair and reasonable and acknowledge that such allocation was expressly negotiated by the parties and was reflected in the Purchase Price of the Product. Accordingly the Reseller and the Original Owner expressly agree as follows:
- A. **Disclaimer of Implied Warranties.** EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH HEREIN, CHIEF MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, WHETHER EXPRESS OR IMPLIED, BY OPERATION OF LAW, COURSE OF DEALING OR OTHERWISE WITH RESPECT TO THE PRODUCT, ANY COMPONENT PART THEREOF OR ANY OTHER GOODS OR SERVICES THAT CHIEF MANUFACTURES, FABRICATES, PRODUCES, SELLS OR PROVIDES TO THE DEALER OR THE ORIGINAL OWNER PURSUANT TO THE TERMS OF ANY ACCEPTED PURCHASE ORDER, INCLUDING WITHOUT LIMITATION ANY REPRESENTATION OR WARRANTY WITH RESPECT TO DESIGN, CONDITION, MERCHANTABILITY OR FITNESS OF THE PRODUCT OR ANY OTHER GOODS OR SERVICES FOR ANY PARTICULAR PURPOSE OR USE.
- B. **Limitation on Liability.** EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH IN SECTION 6 ABOVE, CHIEF'S LIABILITY TO THE DEALER AND/OR THE ORIGINAL OWNER WITH RESPECT TO ANY DEFECTS IN ANY PRODUCTS OR FOR ANY OTHER GOODS OR SERVICES WHICH DO NOT CONFORM TO THE WARRANTIES SET FORTH ABOVE SHALL NOT, IN ANY EVENT, EXCEED THE ACTUAL COST OF SUCH NON-CONFORMING PRODUCT, GOODS OR SERVICES AS DETERMINED PURSUANT TO THE ACCEPTED PURCHASE ORDER; AND
- C. **Limitation on the Nature of Damages.** EXCEPT AS EXPRESSLY PROVIDED IN SECTION 6 ABOVE, CHIEF SHALL NOT, UNDER ANY CIRCUMSTANCES, BE LIABLE TO THE DEALER, THE ORIGINAL OWNER OR ANY THIRD PARTY FOR ATTORNEY FEES COURT COSTS OR ANY OTHER SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LIQUIDATED OR PUNITIVE DAMAGES OF ANY NAME, NATURE OR DESCRIPTION AS A RESULT OF THE FAILURE OF ANY PRODUCT OR ANY OTHER GOODS OR SERVICES PURCHASED BY THE DEALER OR THE ORIGINAL OWNER FROM CHIEF PURSUANT TO THE ACCEPTED PURCHASE ORDER TO CONFORM TO THE LIMITED WARRANTIES SET FORTH IN SECTION 2 ABOVE.
8. **Applicable Law.** This Limited Product Warranty has been issued, accepted and entered into by the Reseller, the Original Owner and Chief in the State of Nebraska and shall be governed by, and construed in accordance with, the internal laws of the State of Nebraska. Any legal action or proceeding with respect to any goods or services furnished to the Original Owner by Chief in connection herewith, or any document related hereto shall be brought only in the district courts of Nebraska, or the United States District Court for the District of Nebraska, and, by execution and delivery of this Limited Product Warranty, the undersigned Original Owner hereby accept for themselves and with respect to their property, generally and unconditionally, the jurisdiction of the aforesaid courts. Further, the undersigned Original Owner hereby irrevocably waives any objection,

including, without limitation, any *forum non conveniens*, which it may now or hereafter have to the bringing of such action or proceeding in such respective jurisdictions.

ACKNOWLEDGMENT OF RECEIPT

By its signature hereto, the undersigned Reseller represents and warrants to Chief that the Reseller has provided a true, correct and complete copy of this Standard Limited Warranty to the Original Owner at the time the product was purchased.

Reseller Name and Address: _____

Original Owner Name and Address: _____

Accepted Purchase Order No. _____

Original Jobsite Address: _____

RESELLER:

By: _____
Date

Print name and title

4815-1214-5953, v. 1



Should you have any questions concerning assembly instructions, parts or drawings, please feel free to contact us at any of the following:

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For more information about Chief Industries, Inc. and additional products or services visit our website
www.agri.chiefind.com