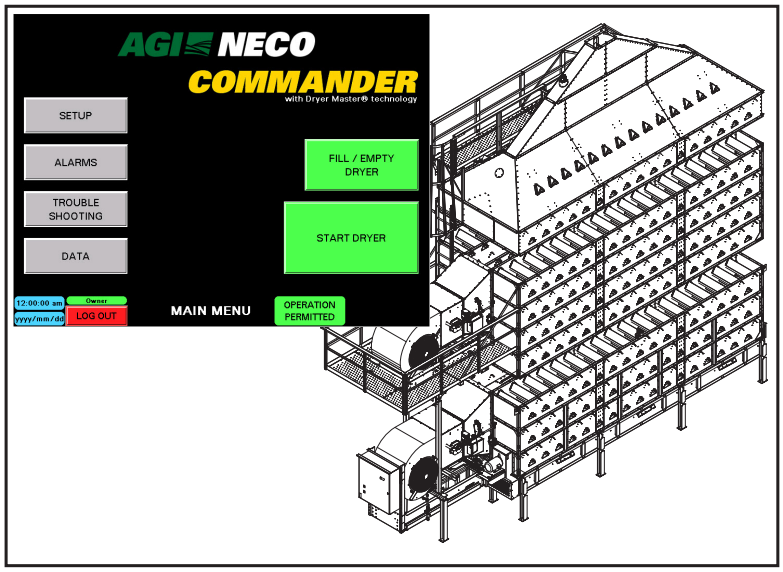
Continuous Mixed-Flow Grain Dryer with COMMANDER Control System

Operator's Manual

This manual applies to the following models:

D1660, D1670, D1680, D1690, D16106, D16120, D16140, D16160
D24108, D24150, D24180, D24210, D24240, D24260, D24330, D24380
D32260, D32340, D232440, D32500

Original Instructions



Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: 7713395 R2
Revised: November 2021
Original Instructions

This product has been designed and manufactured to meet general engineering standards. Other local regulations may apply and must be followed by the operator. All personnel must be trained in the correct operational and safety procedures for this product. Use the sign-off sheet below to record initial and periodic reviews of this manual with all personnel.

Date	Employee Name and Signature	Employer Name and Signature

CONTENTS

1. Introduction

Thank you for your purchase. Follow the instructions in this manual for safe use of this grain dryer. Following proper operation and maintenance will help to keep the grain dryer running in optimal condition.

Keep this manual handy for frequent reference and to review with new personnel. A sign-off form is provided on the inside front cover for your convenience. If any information in this manual is not understood or if you need additional information, please contact AGI or your representative for assistance.

This manual should be regarded as part of the equipment.

1.1. Product Information

Always give your dealer the following product information when ordering parts or requesting service. Please record the product information in the table below for easy reference.

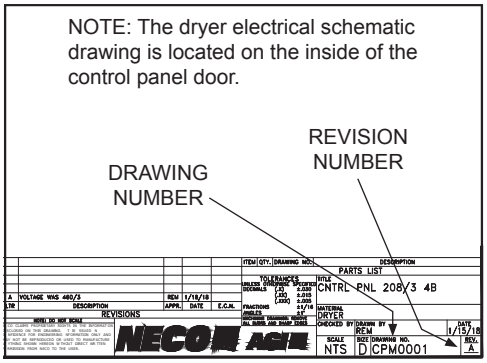
Local Dealer's Name and Address:		Phone:	
Local Contractor's Name:		Phone:	
Service Contractor's Name:		Phone:	
Purchase Date:		Installation Date:	
Model Number:		Serial Number:	
Fuel Type:		Number of Blowers:	
Wiring Diagram Drawing Number:			

Figure 1. Dryer Rating Label — CE

Figure 2. Dryer Rating Label — CSA

Figure 3. Dryer Rating Label — Domestic

Figure 4. Electrical Schematic Drawing



To register your grain dryer, scan the following QR code, or call AGI NECO at 402-453-6912. For SureTrack Dryer Manager registration, see the instructions included with the SureTrack gateway or call 855-835-5231.

1.2. Intended Use

The grain dryer is intended for use as listed below and described throughout this manual. Use in any other way is considered contrary to the intended use and is not covered by the warranty.

Intended use for the grain dryer:

- Designed to dry free-flowing grains, field crops and oil seeds.

1.2.1 Misuse

Do not install/use the grain dryer for/with:

- drying grains at temperatures higher than recommended.
- applications other than drying farm crops.
- excessive chaff, seed pods, half cobs, leafy materials, and other foreign material.
- finely milled grain dust.
- bypassed safety sensors.

2. Safety

2.1. Safety Alert Symbol and Signal Words

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

Signal Words: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

DANGER Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury or death.

CAUTION Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

NOTICE Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

2.2. General Safety Information

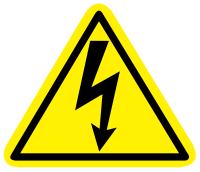
Read and understand all safety instructions, safety decals, and manuals and follow them.

- Owners must give instructions and review the information initially and annually with all personnel. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- Use for intended purposes only.
- Do not modify the grain dryer in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety. Any unauthorized modification will void the warranty.
- Follow a health and safety program for your worksite. Contact your local occupational health and safety organization for information.
- Always follow applicable local codes and regulations.

2.3. Overhead Power Lines

WARNING

- Keep grain dryers a horizontal distance of at least 100 ft (30.5 m) from power lines.
- Do not use the grain dryer if there is a chance of any loading or unloading equipment contacting power lines.
- Do not locate grain dryers on both sides of a power line.
- Electrocution can occur without direct contact.



2.4. Grain Dryer Safety

⚠ WARNING

- Do not overheat grain or operate the dryer temperature too high. Keep the maximum plenum temperature not more than the maximum set point temperature.
- Be cautious of spontaneous combustion when working with oil seeds.
- Grain dust is a fire hazard. Keep all areas (including areas under the perforated floors) free from dust and fines.
- Clean out the dryer after using to remove grain dust, husks, and other materials.
- Screen grain before it goes into a bin to help prevent dust and trash buildup. Using a grain spreader will help distribute dust/fines.
- Ventilate, purge all contaminates, and allow burner, and drying areas to cool inside the heater, in the heater area and the dryer area before any persons enter these areas.
- Do not remove covers, touch, or service internal components during operation.
- Do not install or combine with products from other manufacturers. The design and safety features may not be compatible.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of dryer.
- Do not use the dryer where a high concentration of grain dust or flammable liquids or vapors exist, such as milled grain dust.
- Use the dryer only with the gas types intended, connecting alternate fuel sources to the dryer can result in fires.
- Shut off and lock out or disconnect power and close valve at gas source before inspecting or servicing the heater, or when not in use.
- Keep away from fan impeller/blade; high suction can pull a person toward the inlet. Contact with an unguarded impeller/blade will cause severe injury.
- Keep the fan inlet screen in place at all times.
- Remove foreign material from the fan inlet before operating.
- Do not operate the fan if there is excessive vibration or noise.
- When the power is locked out, fans can still be dangerous because of potential “windmilling.” Always block the impeller/blade before working on any moving parts.

In case of a dryer fire:

- Turn off gas at the heater and supply tank.
- Shut off and lock electrical power.
- Seal the aeration fan inlet and any other opening to smother the fire.
- Evacuate all personnel from the area.
- Call the fire department.

2.5. Gas Leak Hazards

⚠ WARNING **If You Smell Gas:**

- Turn off gas at the source if possible.
- Do not try to light or relight any appliance.
- Extinguish any flames and remove any sources of ignition from the vicinity of the bin.
- Do not touch any electrical switch.
- Evacuate all personnel from the vicinity of the source of the smell.
- Immediately call your gas supplier. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

2.6. Guards Safety

⚠ WARNING

- Keep guards in place. Do not operate with guard removed.
- Do not walk on, step on, or damage guards.
- Lock out power before removing a guard.
- Ensure all guards are replaced after performing maintenance.

2.7. Work Area Safety

⚠ WARNING

- Have another trained person nearby who can shut down the grain dryer in case of accident.
- The work area should be kept clear of bystanders, including children.
- Keep the work area clean and free of debris.

2.8. Drives and Lockout/Tagout Safety

Inspect the power source(s) before using and know how to shut down in an emergency. Whenever you service or adjust your equipment, make sure you shut down your power source and gas supply and follow lockout and tagout procedures to prevent inadvertent start-up and hazardous energy release. Know the procedure(s) that applies to your equipment from the following power sources.

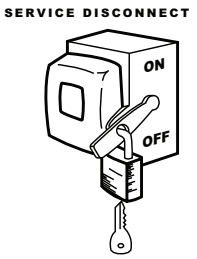
For example:

- De-energize, block, and dissipate all sources of hazardous energy.
- Lock out and tag out all forms of hazardous energy.
- Ensure that only 1 key exists for each assigned lock, and that you are the only one that holds that key.
- After verifying all energy sources are de-energized, service or maintenance may be performed.
- Ensure that all personnel are clear before turning on power to equipment.

For more information on occupational safety practices, contact your local health and safety organization.

2.8.1 Electric Motor Safety

⚠ WARNING **Power Source**



- Electric motors and controls shall be installed and serviced by a qualified electrician and must meet all local codes and standards.
- Do not modify the magnetic starter. This component provides overload and under-voltage protection.
- Motor starting controls must be located so that the operator has full view of the entire operation.
- Locate main power disconnect switch within reach from ground level to permit ready access in case of an emergency.
- Motor must be grounded.
- Guards must be in place and secure at all times.
- Ensure electrical wiring and cords remain in good condition; replace if necessary.

Lockout

- The main power disconnect switch should be in the locked position during shutdown or whenever maintenance is performed.
- In the event of unexpected fan shutdown, the fan can be reset using the main power switch located on the fan or using a reset button when equipped.

2.9. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn when installing the equipment.

Safety Glasses

- Wear safety glasses at all times to protect eyes from debris.

Coveralls

- Wear coveralls to protect skin.

Hard Hat

- Wear a hard hat to help protect your head.

Steel-Toe Boots

- Wear steel-toe boots to protect feet from falling debris.

Work Gloves

- Wear work gloves to protect your hands from sharp and rough edges.

Fall Protection

- Use a fall arrester or fall restraint when climbing or working at heights.

2.10. Safety Equipment

The following safety equipment should be kept on site.

Fire Extinguisher

- Provide a fire extinguisher for use in case of an accident. Store in a highly visible and accessible place.

First-Aid Kit

- Have a properly-stocked first-aid kit available for use should the need arise, and know how to use it.

2.11. Safety Decals

- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** from your distributor, dealer, or factory as applicable.

2.12. Decal Installation/Replacement

1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the decal backing paper.

2.13. Safety Decal Locations and Details

Replicas of the safety decals that are attached to the grain dryer and their messages are shown in the figure(s) that follow. Safe operation and use of the grain dryer requires that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.

Figure 5. Front Left Dryer Safety Decal Locations

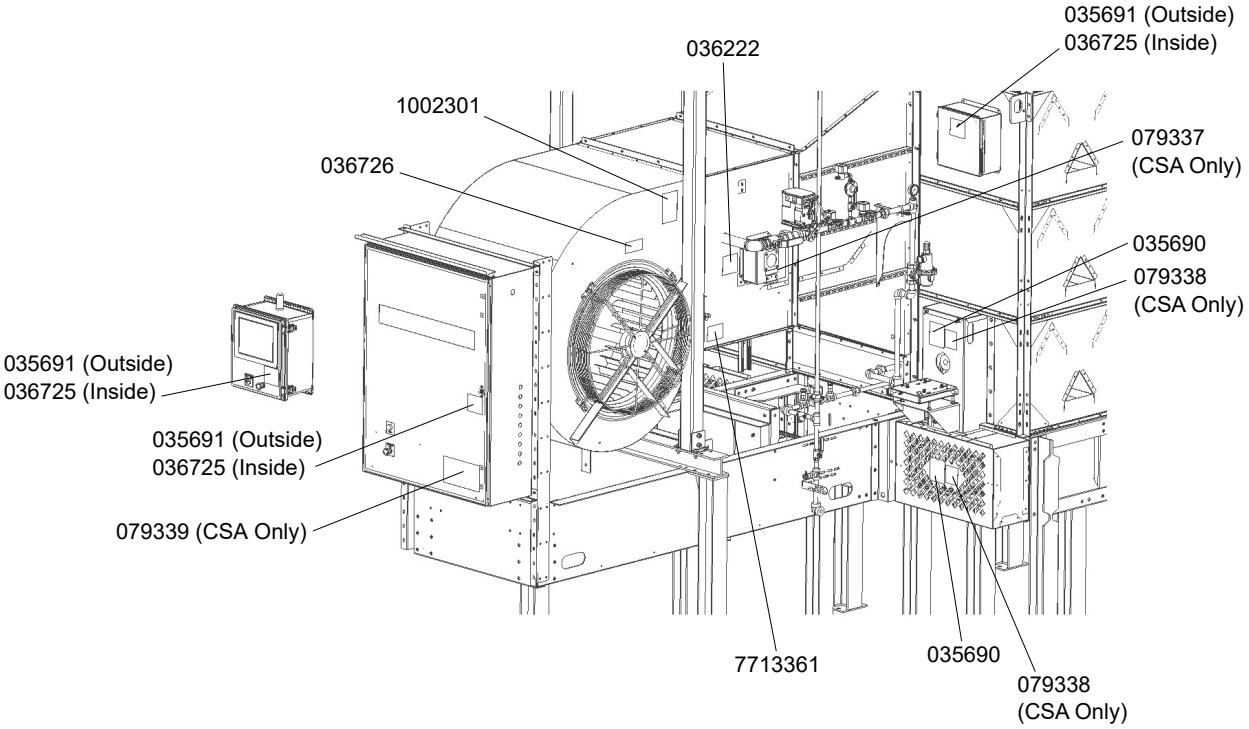


Figure 6. Front Right Dryer Safety Decal Locations

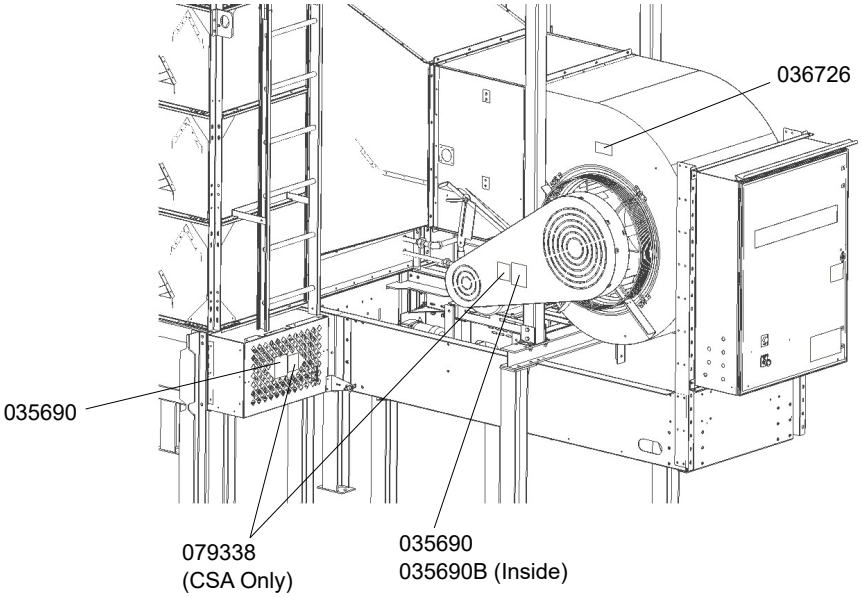


Figure 7. Drag Unload Safety Decal Locations

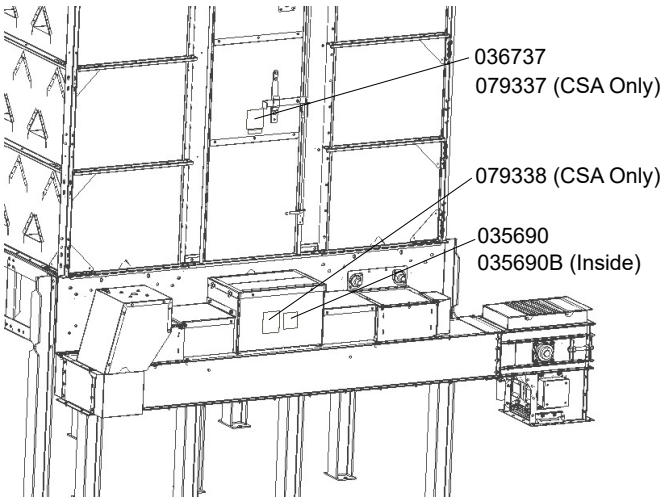


Figure 8. Auger Unload Safety Decal Locations

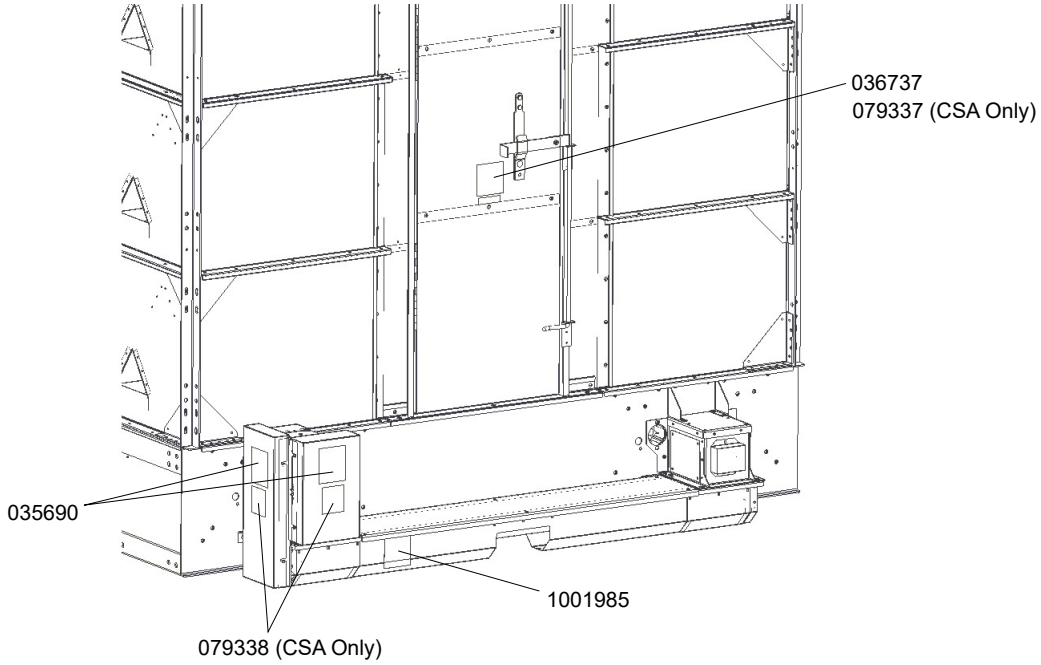


Figure 9. Door Safety Decal Locations

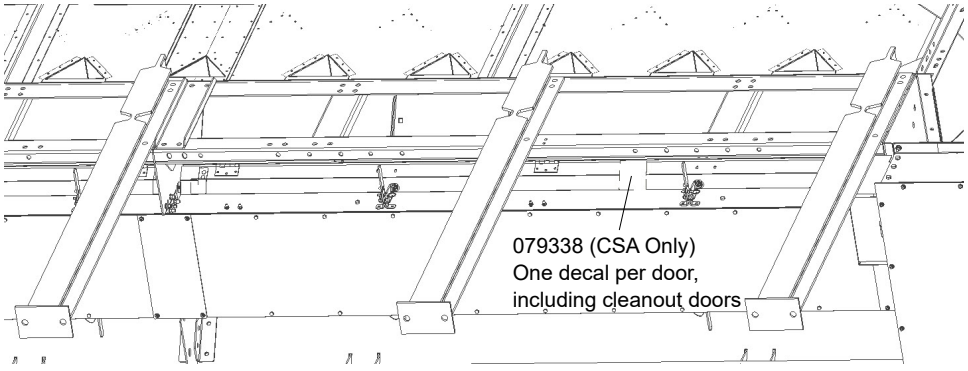
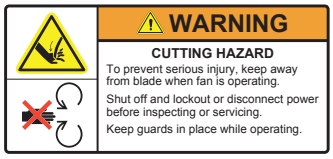
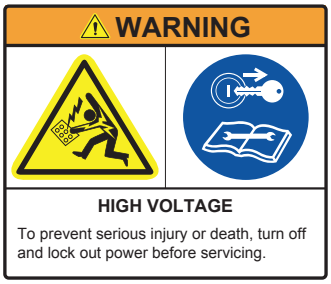


Table 1. Safety Decal Details — CSA

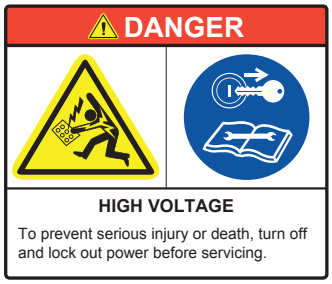
036726



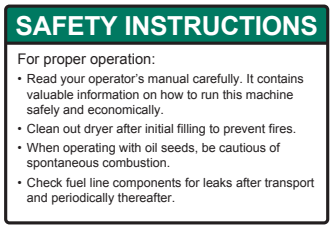
035691



036725

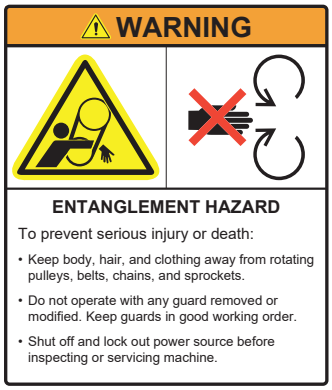


7713361



036222

035690



036737

1001985

1002301

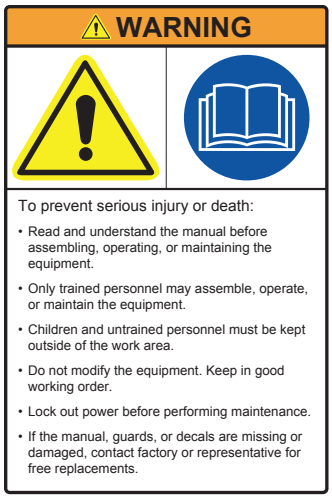
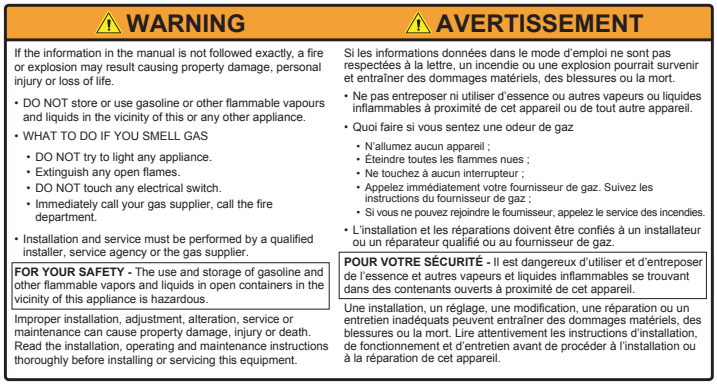


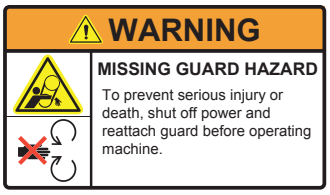
Table 1 Safety Decal Details — CSA (continued)

079338

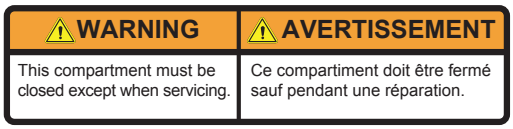
079339



035690B



079337



Note

The towing label is only used on certain models that can be safely towed.

040220

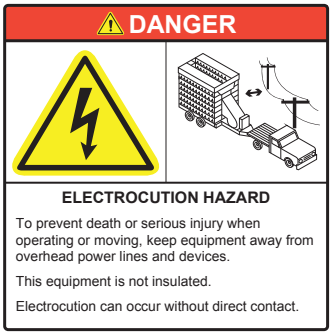
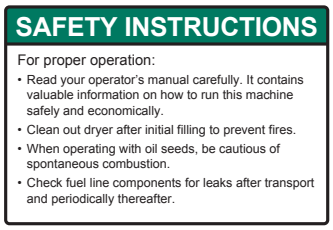


Table 2. Safety Decal Details — CE

036726A 	043695 	035690A 
7713361 	043696 	035690A 

043697

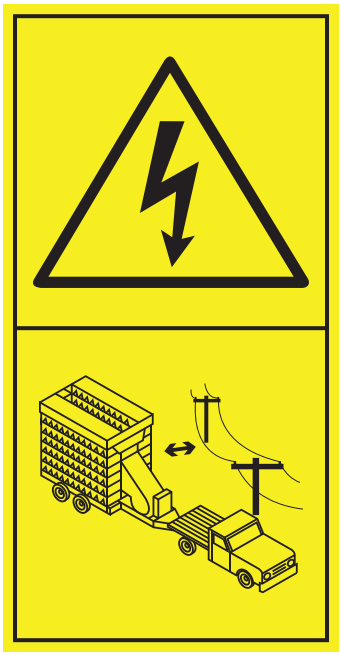
1025080

043699

Note

The towing label is only used on certain models that can be safely towed.

040220A



3. Features

Read this section to familiarize yourself with the basic component names and functions of the grain dryer.

3.1. General Design Criteria

Note

Grain dryer design is based on load factors. If you wish to add more sections to your dryer in the future, please let NECO know when you place your order so it will be designed to fit to your expanding needs.

3.1.1 Tier Information

- A tier is a set of parts that make up ONE layer of the dryer (also called body section).
- The top four tiers on all dryers are made up of 18 gauge material.
- The tiers below the 18 gauge tiers will be made of heavier materials, based on the required strength of that dryer configuration.

3.1.2 Body Section Information

- An assembled dryer section may be made up of:
  - 3 to 7 tiers
  - a blower
  - a burner
- The lowest body section is attached to the dryer frame and includes the entrance door.

3.1.3 Standard Lengths

Table 3. Standard Lengths

Length in feet	Length in inches	Length in meters
16	192	4.88
24	288	7.32
32	384	9.75

3.1.4 Total Tier Levels per Length

Table 4. Total Tier Levels per Length

Length in feet	Length in meters	Minimum Tiers	Maximum Tiers
16	4.88	4	14
24	7.32	6	24
32	9.75	12	24

3.1.5 Dryer Model Number

The dryer model number provides information on the dryer length and capacity.

- The two digits after “D" are the dryer length.
- Multiply the remaining digits by 10 to determine the approximate bushel capacity for corn. In this example: 40 x 10 = 400 bushels

Example: D 16 60

- **16** indicates this model is a 16 foot long dryer
- **60** indicates this model has a capacity of 60 x 10 = 600 bushels

Using the same process, a model D32500 would be a 32 foot long dryer with an approximate capacity of 5,000 bushels.

3.1.6 Dryer Rating Label

Figure 10. Dryer Rating Label — CE

Figure 11. Dryer Rating Label — CSA

Figure 12. Dryer Rating Label — Domestic

3.2. Parts of the Dryer

Important

Understanding the terms used to identify the various components of a dryer system will make the instructions in this manual clearer and easier to follow.

3.2.1 Front of Dryer

Figure 13. Front of Dryer (from Fuel Train Side)

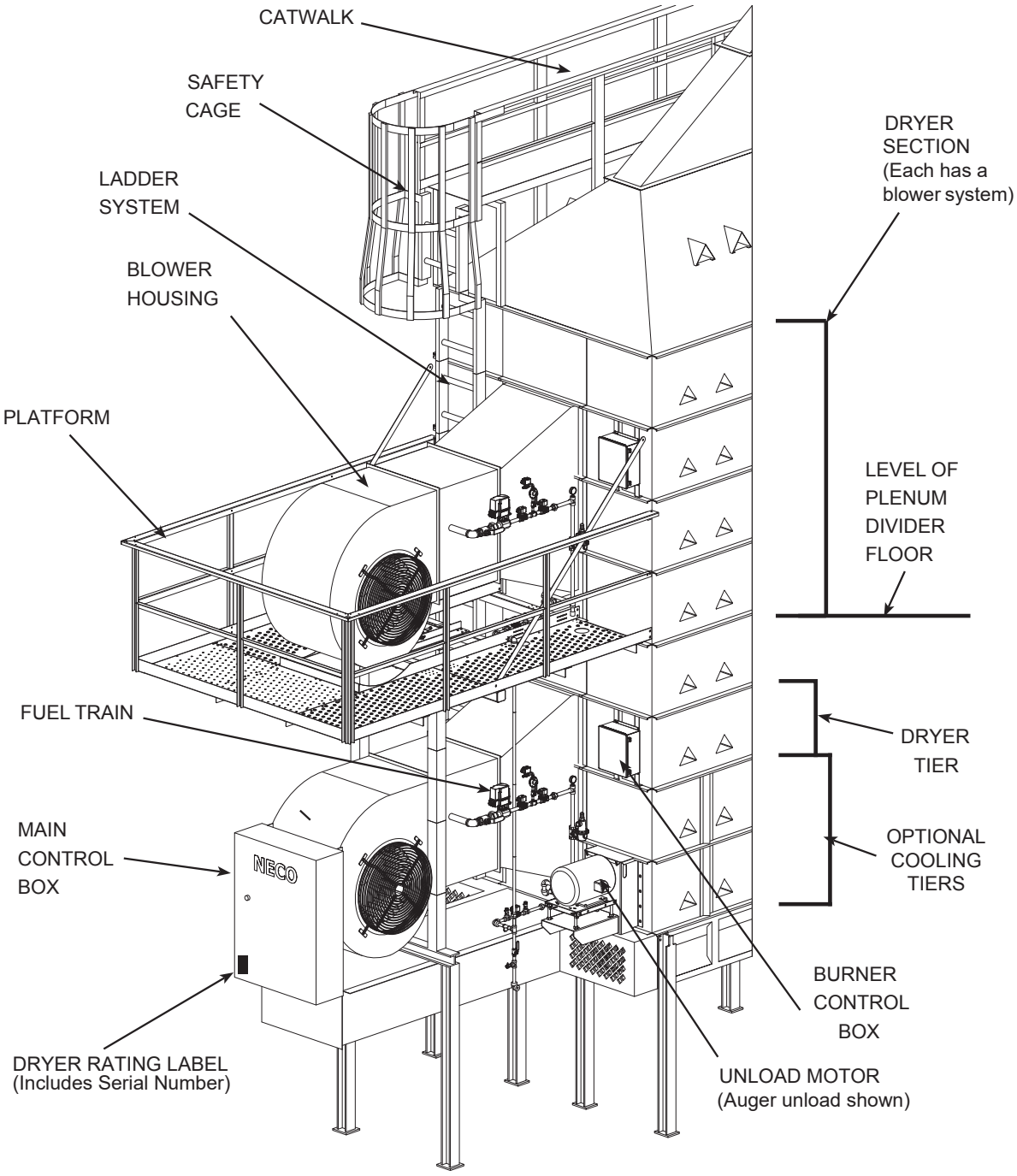
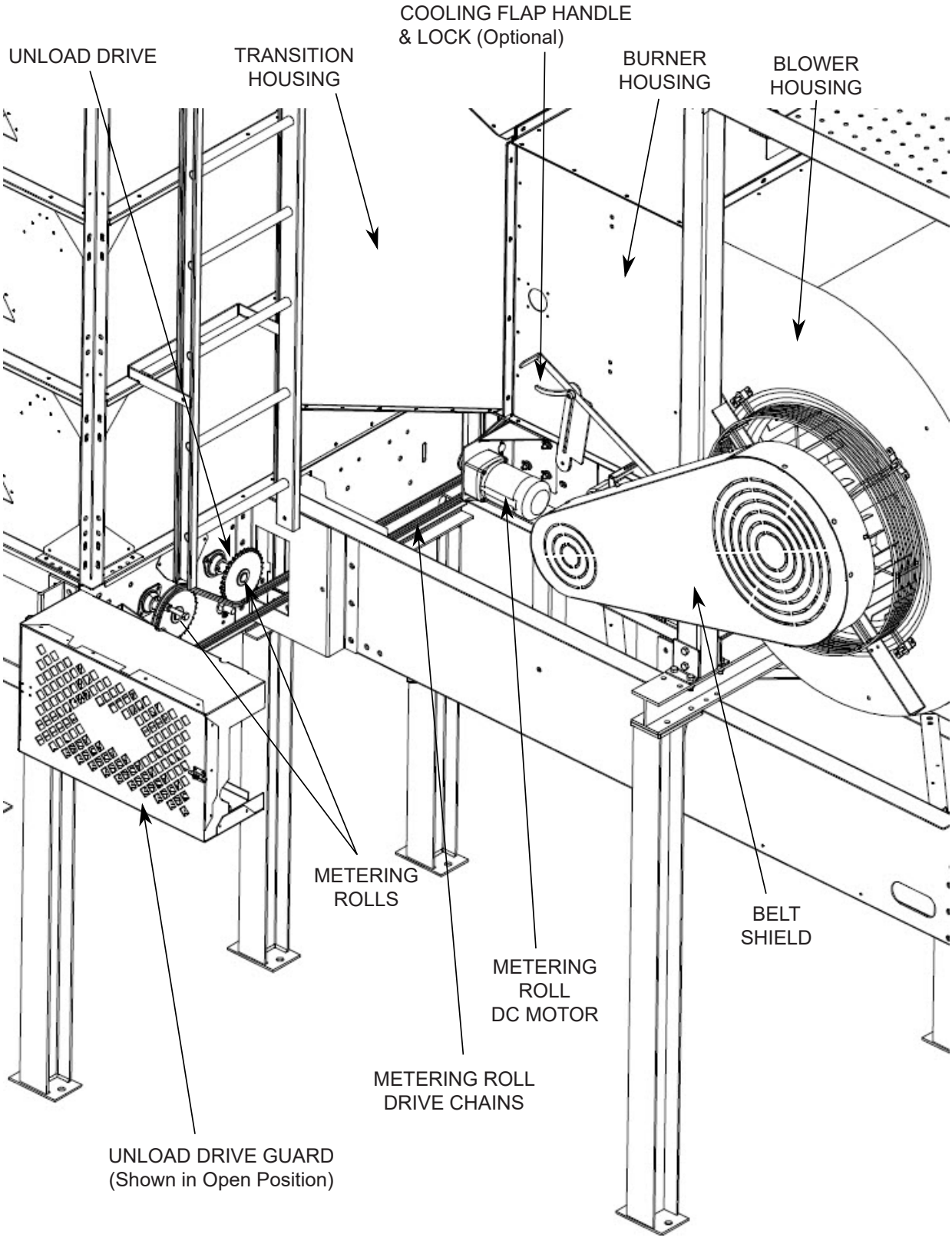


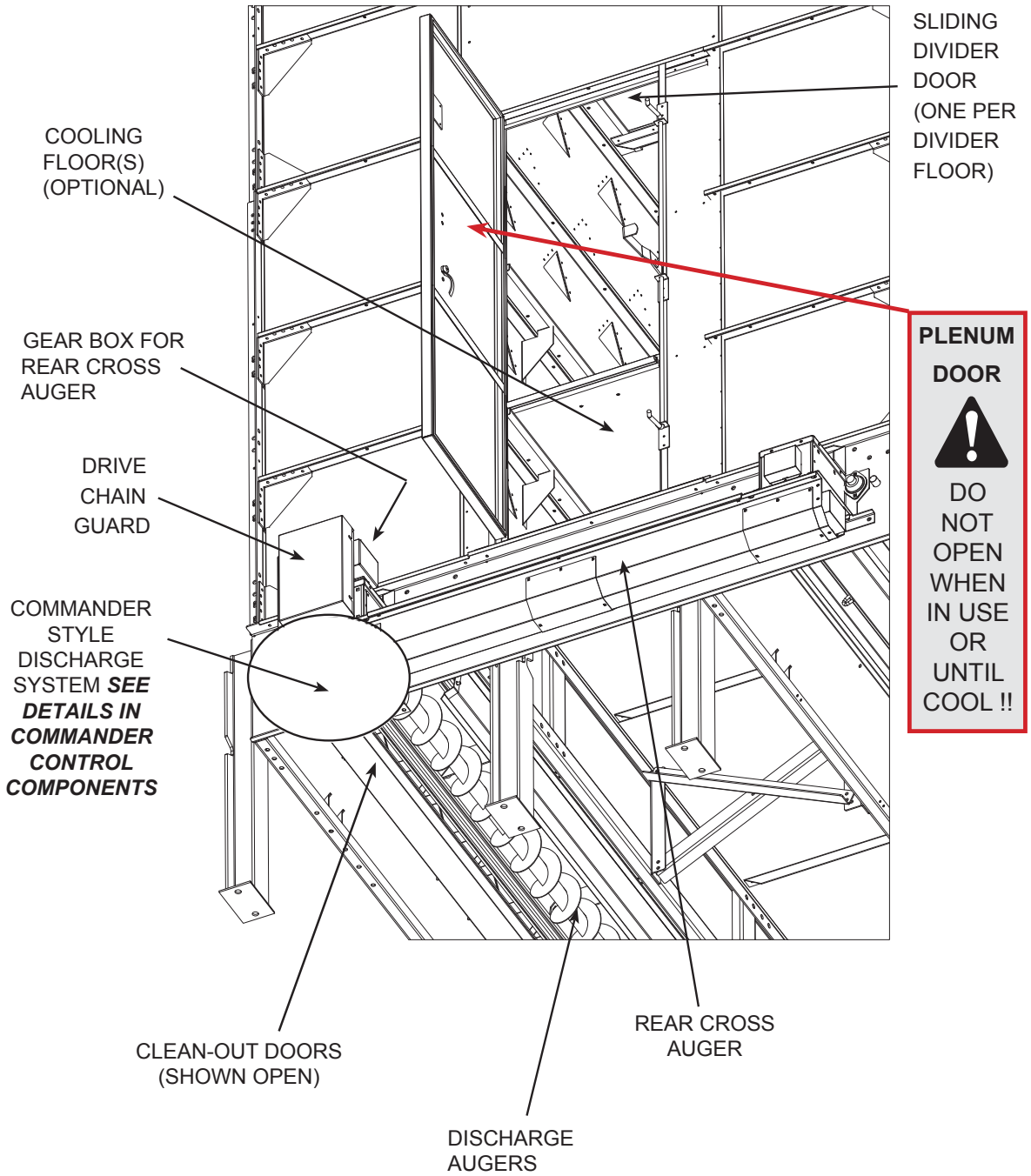
Figure 14. Front of Dryer (from Blower Belt Shield Side)



3.2.2 Rear of Dryer

Figure 15. Rear of Dryer (from Below)

NOTE: The Plenum Door is at the rear of dryer and allows access into the center plenum area. Each dryer section ABOVE THE PLENUM DOOR is separated by a Divider Floor with one Divider Door for plenum access. Divider Doors should always be closed during operation. Optional Cooling Floor(s) & Doors serve a totally different purpose - See Grain Cooling System.



3.2.3 Catwalk Positions

Figure 16. Topside Filling Options

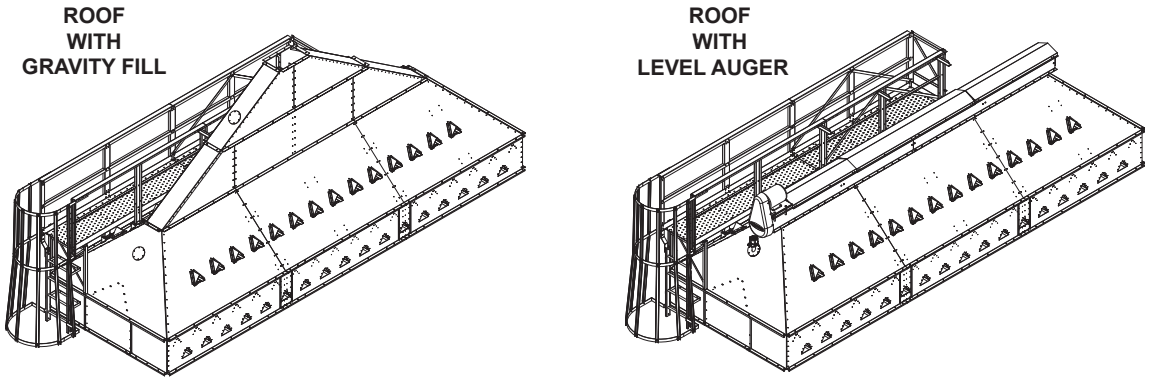
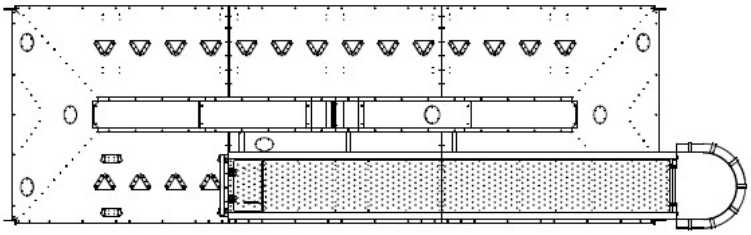
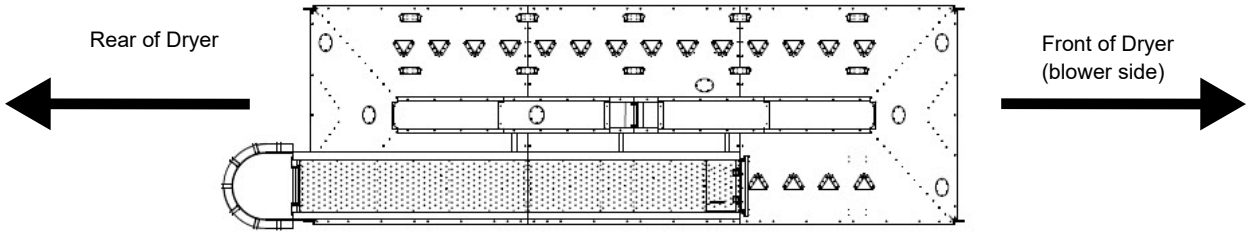


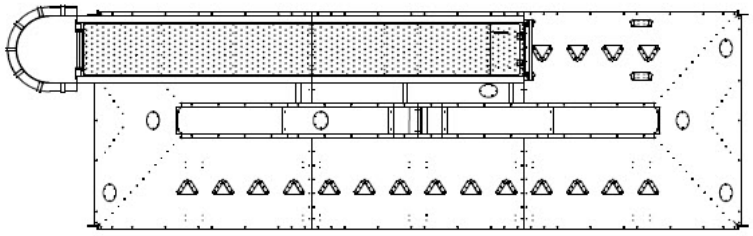
Figure 17. Catwalk Positions



Multi-Blower Dryer



Single-Blower Dryer
(left, center, right, right extended discharge)



Single-Blower Dryer
(left extended discharge)

3.3. Fuel Supply Components

⚠ WARNING Explosion Hazard.

- Know where the main shut-off is.
- Make sure all required personnel are trained.
- Observe all safety rules when working with the fuel system
- Use lockout/tagout.

Note

The layout of fuel train components varies for different dryer types. Although your fuel components may not exactly match what is shown in the following diagrams, the general function of each identified component remains the same.

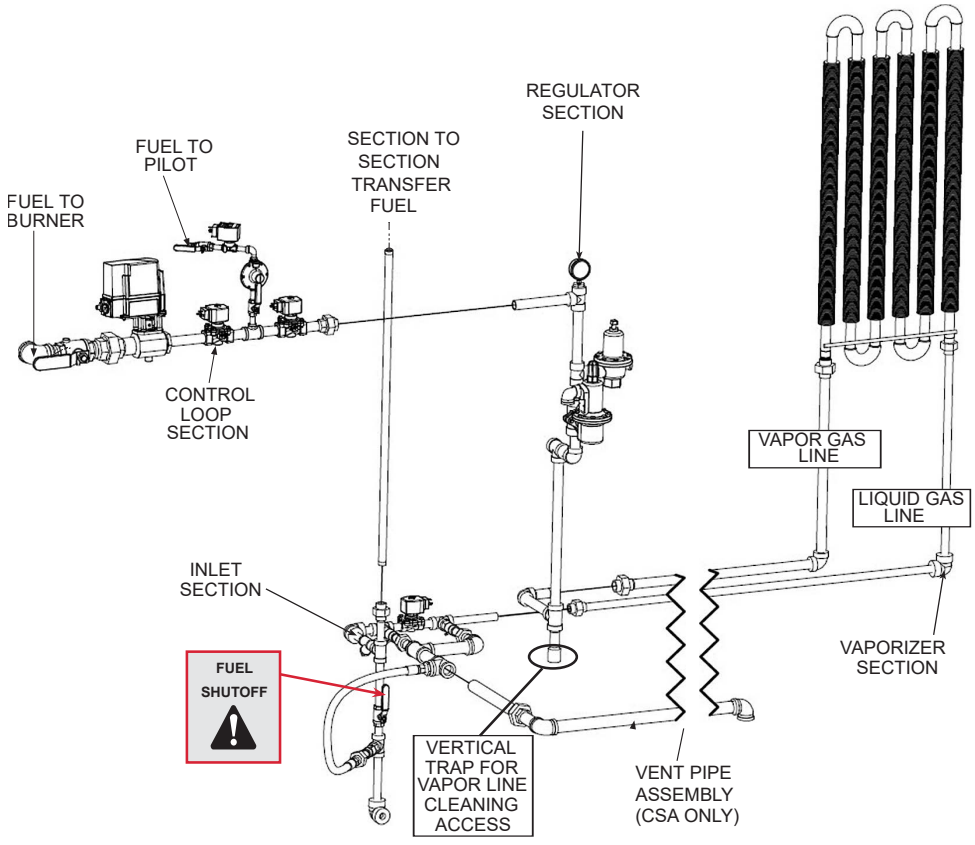
3.3.1 Liquid Propane (LP)

Overview Layout

Each dryer section with a burner has the following fuel system components:

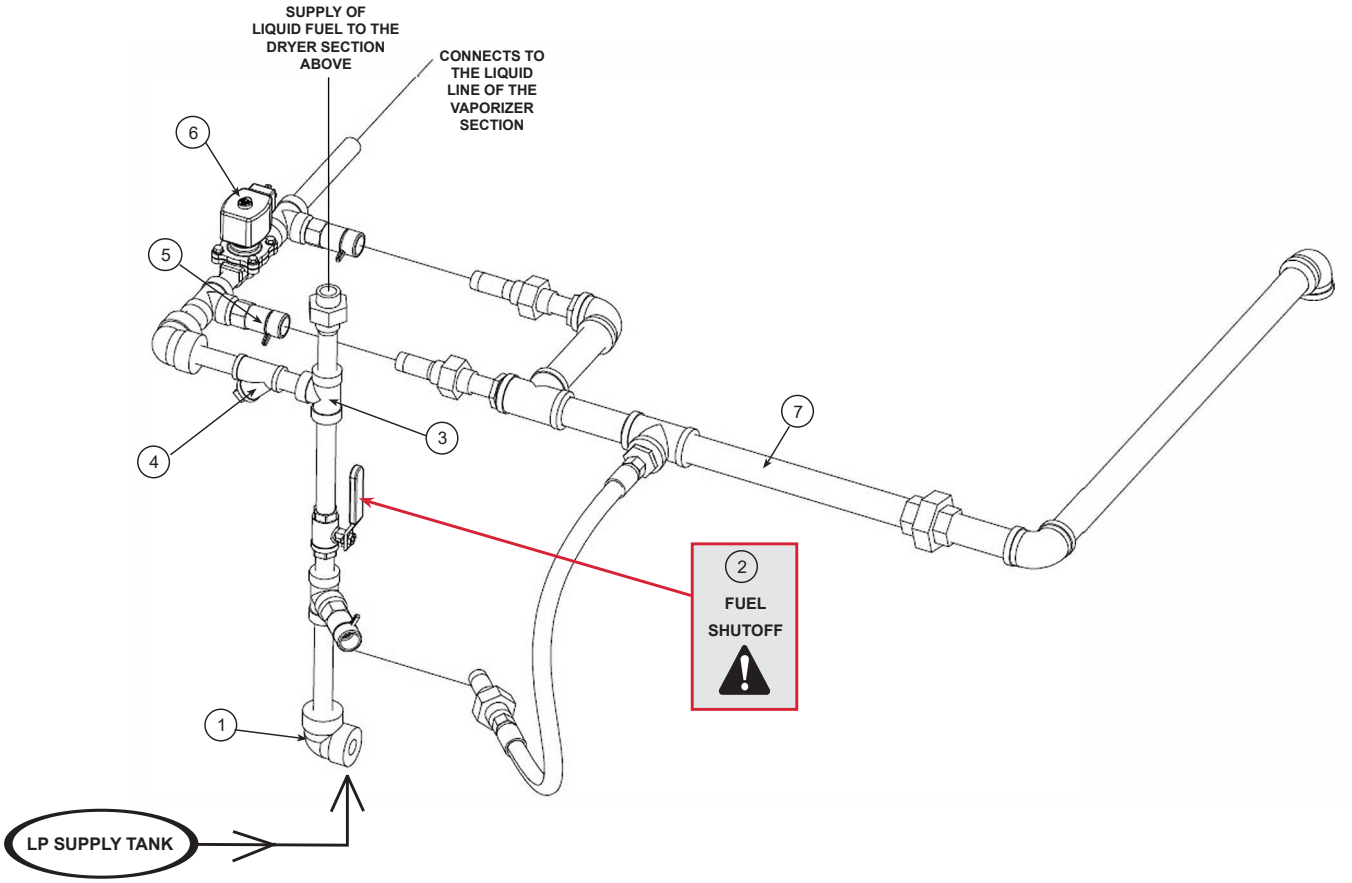
- Inlet section
- Vaporizer section
- Regulator section
- Control loop section

Figure 18. LP overview layout



LP Fuel - Inlet Section

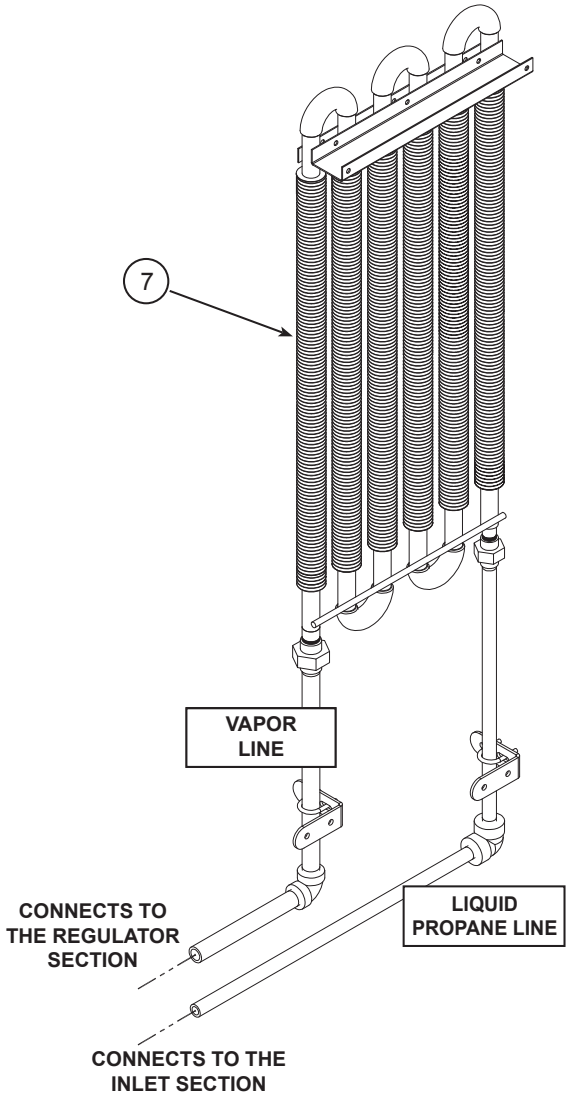
Figure 19. LP fuel — inlet section



Item # in Diagram	Component	Description
1	**Fuel supply inlet elbow**	The main fuel supply connects here on the bottom dryer section. Note that the top dryer section also uses an elbow.
2	**Fuel shut–off valve**	The fuel supply for ALL dryer sections can be shut off here.
3	**Fuel supply "T" and transfer line**	All middle dryer sections connect here. The upper-most dryer section has an elbow at this location.
4	**Fuel strainer**	The fuel strainer traps foreign debris that may be in the liquid fuel line.
5	**Hydrostatic relief valve**	The hydrostatic relief valve relieves the hydrostatic pressure that may develop in sections of liquid piping between closed shutoff valves.
6	**Liquid solenoid valve**	This is an electrically actuated valve to turn fuel ON or OFF.
7	**Vent pipe assembly (CSA Only)**	This piping carries away any liquid discharged from hydrostatic relief valves.

LP Fuel — Vaporizer Section

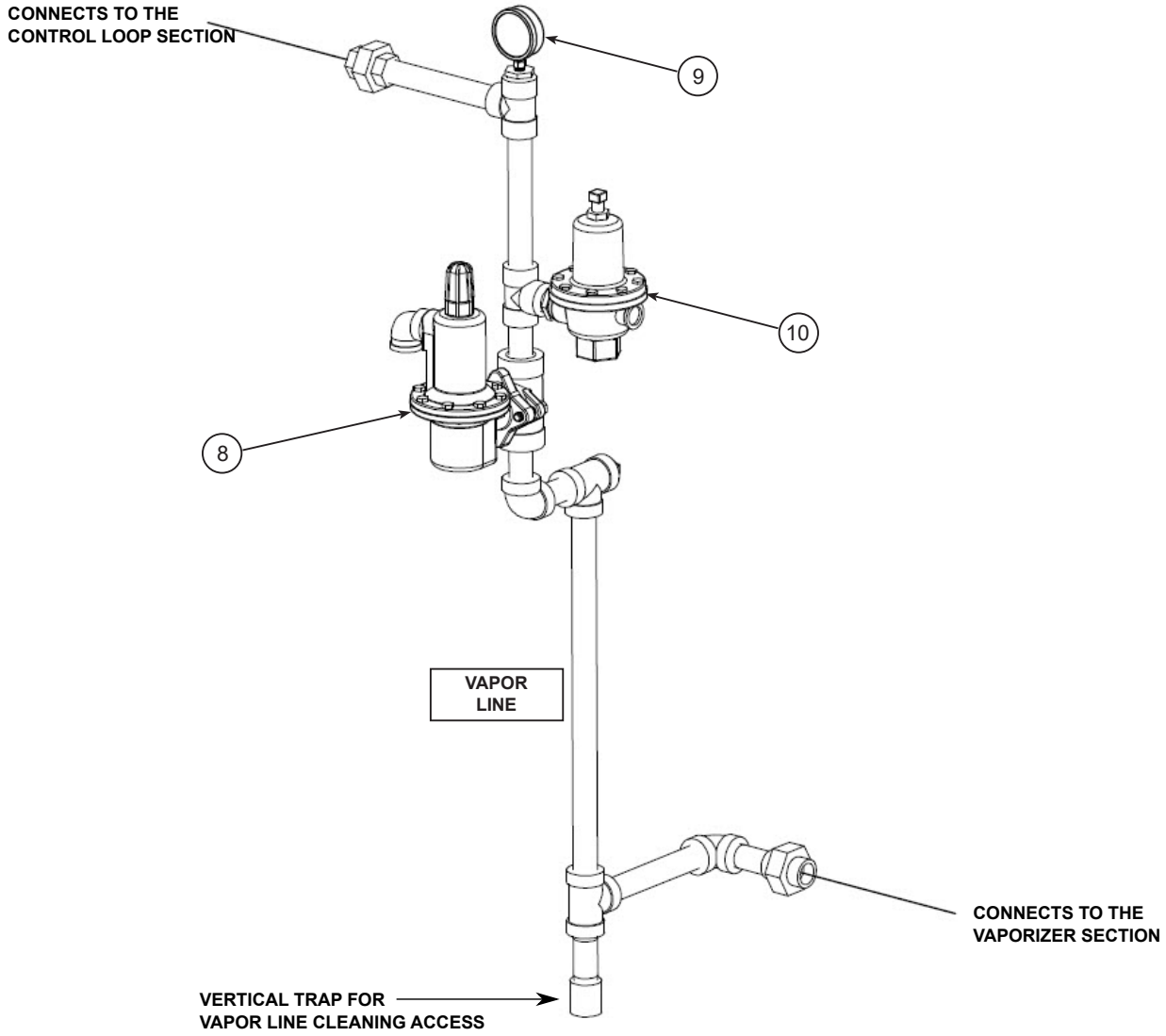
Figure 20. LP fuel — vaporizer section



Item # in Diagram	Component	Description
7	**Vaporizer coils**	Finned tubes that vaporize the liquid propane. These are located in the dryer plenum.

LP Fuel — Regulator Section

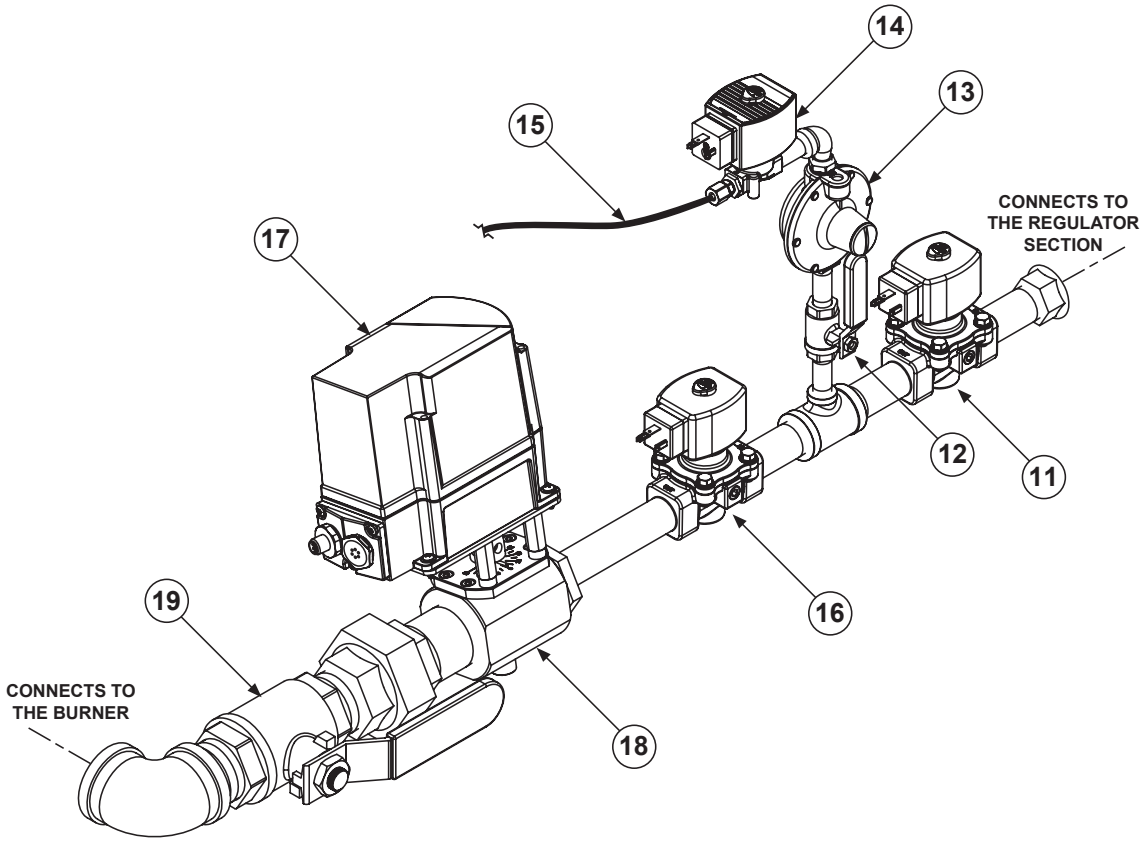
Figure 21. LP fuel — regulator section



Item # in Diagram	Component	Description
8	**Pressure regulator**	Reduces fuel pressure to the downstream sections of the fuel system.
9	**Pressure gauge**	Indicates fuel pressure at the regulator output.
10	**Overpressure relief valve (CSA Only)**	Vents excessive vapor pressure that may build up downstream of the regulator.

LP Fuel - Control Loop Section

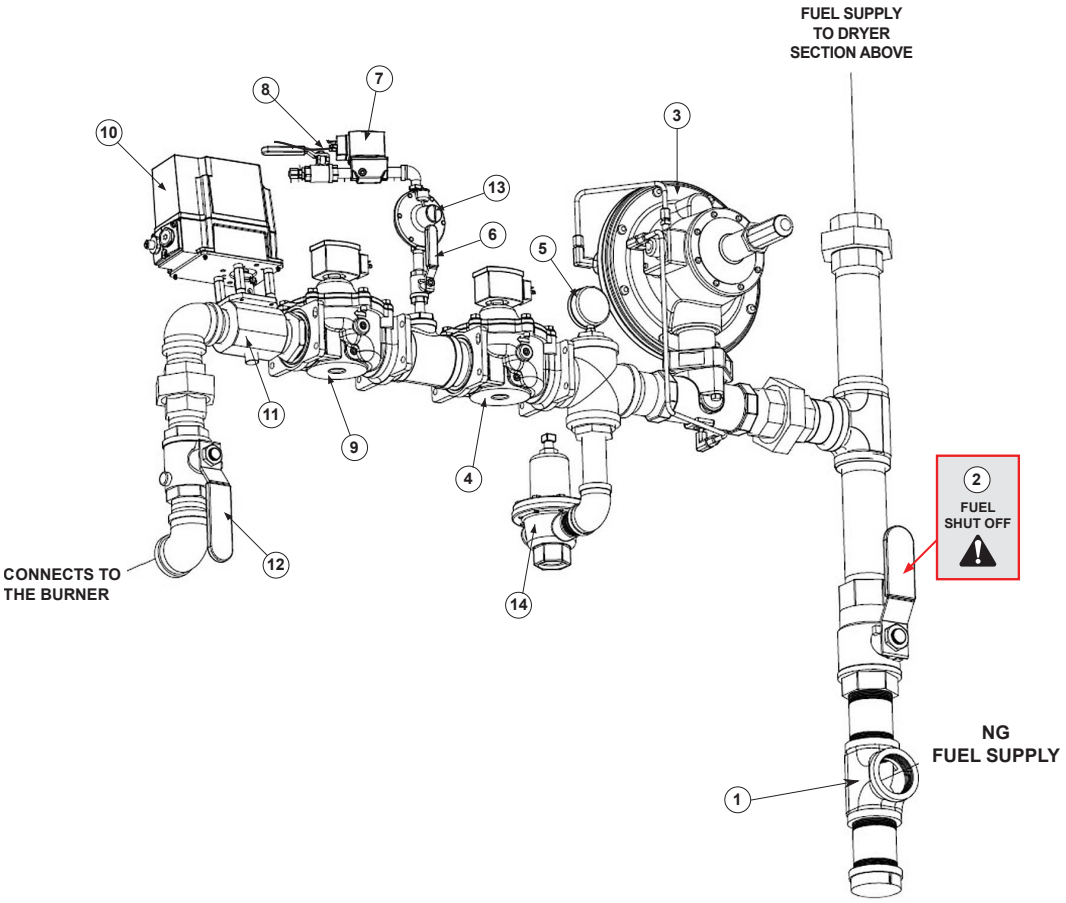
Figure 22. LP fuel — control loop section



Item # in Diagram	Component	Description
11	**Main valve 1**	Electrically actuated valve to turn the fuel ON or OFF to the pilot and burner
12	**Pilot shut-off valve**	Manual valve for shutting off fuel to the pilot
13	**Pilot pressure regulator**	Further reduces fuel pressure to the pilot solenoid valve
14	**Pilot solenoid valve**	Electrically actuated valve to turn the fuel ON or OFF to the pilot
15	**Pilot line**	Supplies fuel to the pilot
16	**Main valve 2**	Electrically actuated valve to turn fuel ON or OFF to the burner
17	**Electronic modulating motor**	Receives signal from the temperature controller. Moves a linkage attached to the butterfly valve to modulate the fuel flow to the burner.
18	**Butterfly valve**	Controls flow of fuel to the burner to maintain the desired temperature.
19	**Burner shut-off valve**	Manually operated to shut off fuel to the burner

3.3.2 Natural Gas (NG)

Figure 23. NG fuel layout



Item # in Diagram	Component	Description
1	**Fuel supply inlet**	The main fuel supply connects at this location.
2	**Fuel shut–off valve**	The fuel supply for ALL dryer sections can be shut off here.
3	**Pressure regulator**	Reduces fuel pressure to the downstream sections of the fuel system.
4	**Main valve 1**	Electrically actuated valve to turn fuel ON or OFF to the pilot and burner.
5	**Pressure gauge**	Indicates fuel pressure at the regulator output.
6	**Pilot shut-off valve**	Manual valve for shutting off fuel to the pilot.
7	**Pilot solenoid valve**	Electrically actuated valve to turn the fuel ON or OFF to the pilot.
8	**Pilot line**	Supplies fuel to the pilot.
9	**Main valve 2**	Electrically actuated valve to turn the fuel ON or OFF to the burner.
10	**Electronic modulating motor**	Receives signal from the temperature controller. Moves a linkage attached to the butterfly valve to modulate the fuel flow to the burner.
11	**Butterfly valve**	Controls flow of fuel to the burner to maintain the desired temperature.
12	**Burner shut-off valve**	Manually operated to shut off fuel to the burner
13	**Pilot Pressure Regulator (CSA Only)**	Further reduces fuel pressure to the pilot solenoid valve
14	**Overpressure relief valve**	Vents excessive pressure that may build up downstream of the regulator

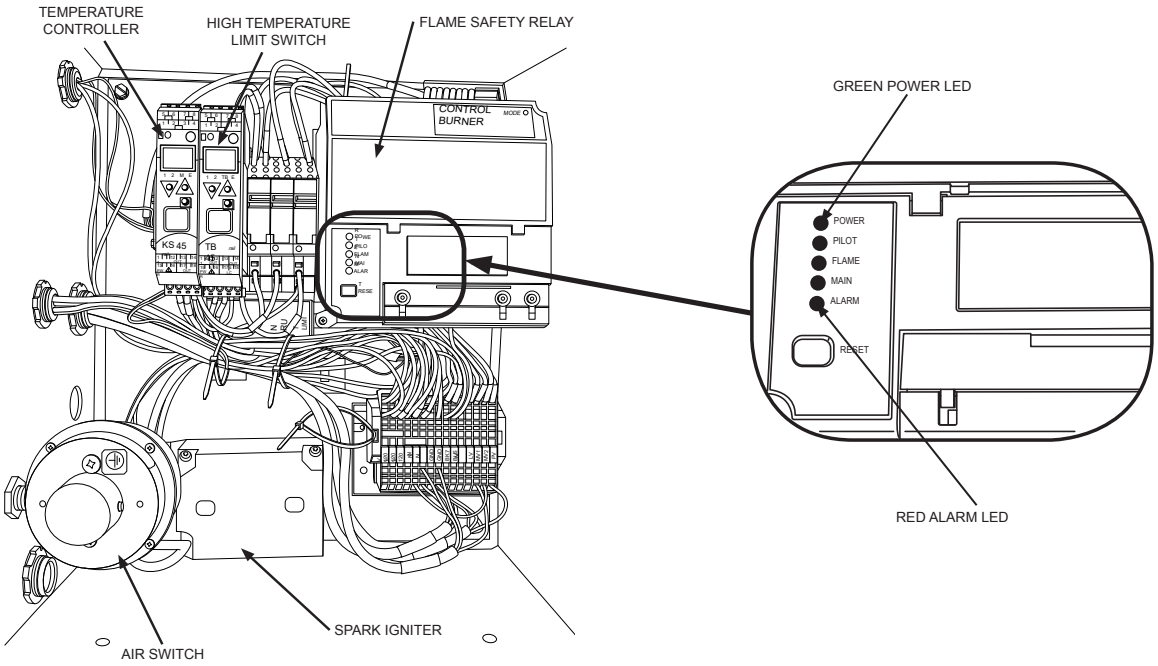
3.4. Burner Control and Temperature Control

⚠ WARNING Electrocution Hazard

- Know where the main shut-off is.
- Make sure all required personnel are trained.
- Observe all safety rules when working with the electrical system
- Use lockout/tagout.

Burner Control Box Components

Figure 24. Burner box components



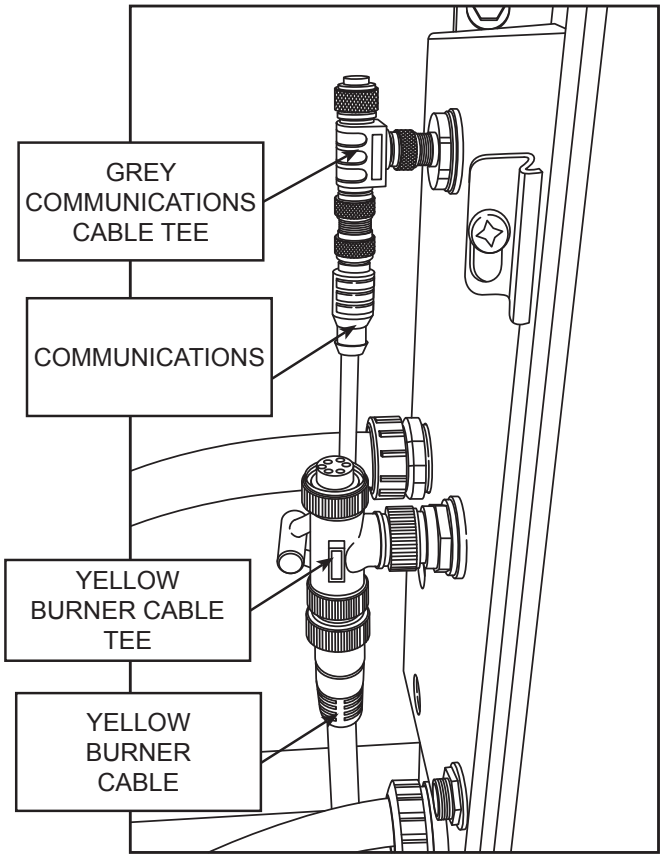
The Burner Box contains five primary components, which work together to control the combustion inside the dryer. They are:

- The **Air Switch** checks for airflow across the burner.
- The **Spark Igniter** sends voltage to the spark plug to light the pilot.
- The **KS45 Temperature Controller** sends and receives temperature data.
- The **TB45 High Temperature Limit Switch** allows manual control of the high temperature setting by adjustment of the knob. If the high temperature limit is exceeded, the dryer shuts down immediately with NO cool-down period.
- The **Honeywell Flame Safety Relay** checks functions related to combustion:
  - Absence of pilot flame
  - Adequate air flow
  - Presence of burner flame
  - High Temperature Limit
  - Controls outputs for ignition, inlet valves, pilot valve, main valve, and burner reset.

Burner Box Cable(s)

- The grey cable entering the left side of the burner box(es) from each modulating motor is pre-wired at NECO. This cable signals the modulating motor to adjust the butterfly valve, controlling the flow of fuel.
- The yellow burner cable(s) and the grey communication cable(s) are used between each burner box and also from the lowest burner box to the main control box.
  - The yellow cable connects to the T-connector on the top burner box, as does the yellow splitter cable for the fill and low switches.
  - The grey cable plugs directly into the top burner box, while the T-connector is used for lower burner boxes when present.

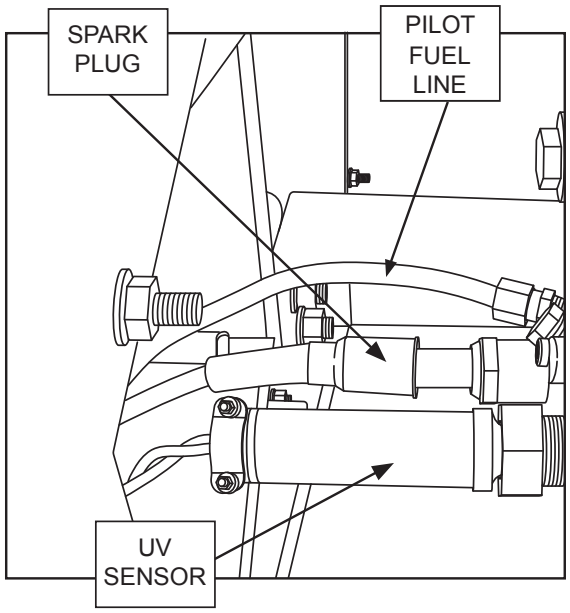
Figure 25. Burner box cable connections



Components Located at Each Burner

- The spark plug lights the pilot upon signal from the spark igniter.
- The UV sensor checks for two separate conditions relating to the absence or presence of flame.
- The pilot fuel line supplies the fuel for the pilot. This line comes from the main fuel train and has its own manual shut-off, pressure regulator, and solenoid valve.
- The air switch line is connected to the air switch and must sense airflow in order for the burner to light and stay lit.

Figure 26. Components located at each burner

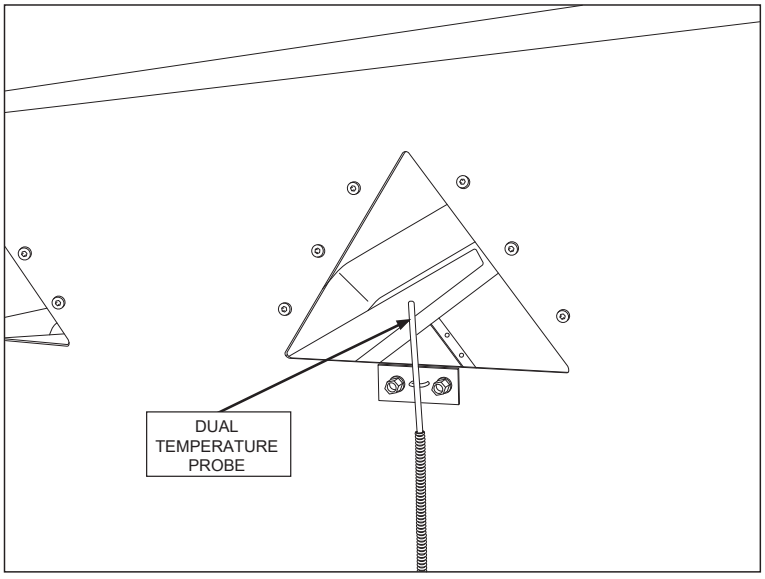


Temperature Control

(each plenum section with a burner)

- The sealed dual temperature probe has two thermocouples: one for the temperature control (KS45), and the other for the high temperature limit sensing (TB45).

Figure 27. Thermocouple probe



Note

Locate the dual temperature probe in the plenum, 5 ducts away from the burner horizontally and 3 ducts from the floor vertically.

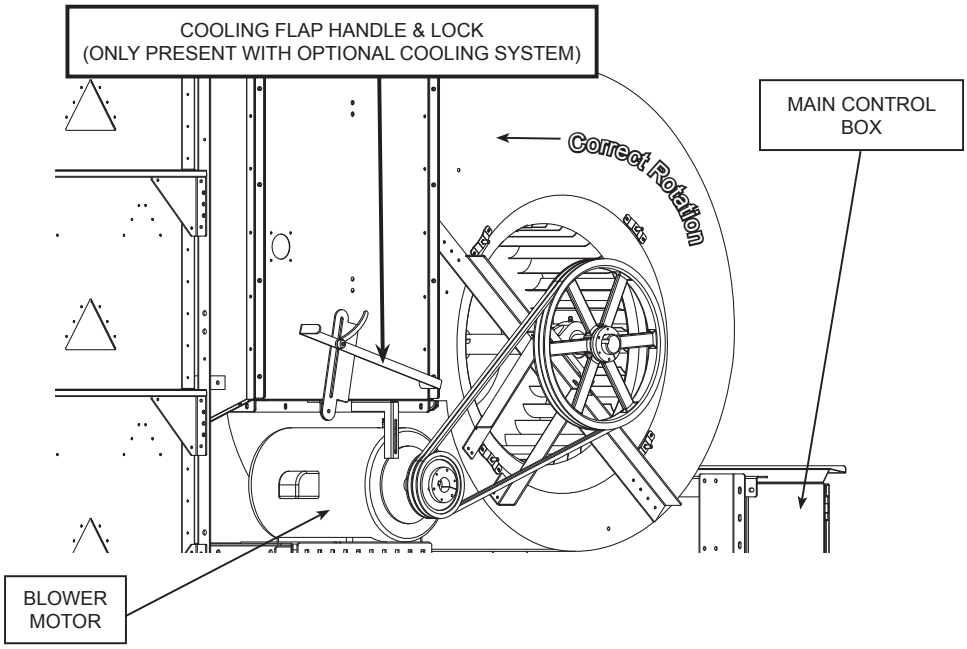
⚠ WARNING Fire Hazard

Observe the temperature values regularly to ensure that the system is working properly. At the beginning of each drying season, test the high limit shut-off system.

3.5. Blower System

- The blower motor, pulley, and blower housing are located at the lowest level of each dryer section. A transition housing connects the blower housing to specific tiers of that section.
- Proper airflow is verified by the static pressure air switch located within the burner box.
- The primary purpose for the blower system is to provide airflow for each dryer section. Most blower/ transition housings include a burner system. However, a bottom dryer section can be ordered with a blower, but NO burner. This would be used for cooling only.
- The blower motor size is provided per dryer configuration and customer requirements, and ranges from 15 to 30 HP.
- Refer to Section 7.1 – Standard Model Specifications on page 125 for more information, including total air flow, etc.
- The blower system in the lowest dryer section with a burner can also include an optional system that will cool grain using cooling floors and cooling doors. See Section 3.6 – Grain Cooling System (optional) on page 35.

Figure 28. Blower system



Note

Shown without safety guard for clarity.

⚠ WARNING Do not run the dryer without the proper guard in place.

3.6. Grain Cooling System (optional)

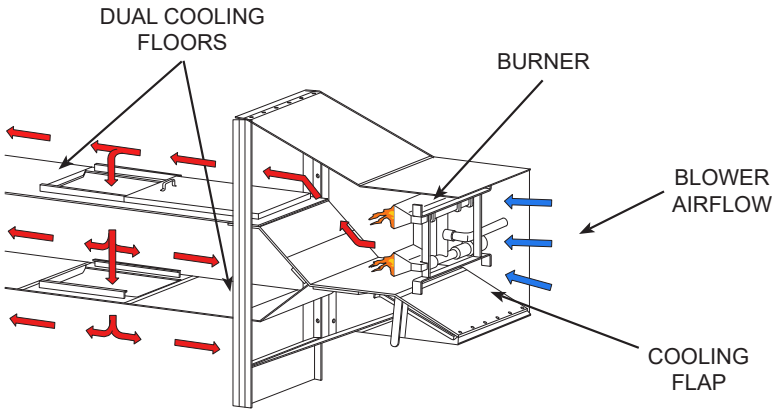
Overview

- An optional grain cooling system with either one or two cooling floors can be supplied with the dryer. Each of the cooling floors has door openings spaced evenly along the length of the dryer. The operator has several grain cooling options from which to choose.
- The cooling floor(s) work in combination with a manually positioned cooling flap that can direct a portion of the blower system airflow. The cooling flap is in-line with the position of the exterior handle so that the operator can tell at a glance where the cooling flap is positioned. The handle position should be secured with the locking system.
- The cooling flap position determines the amount of cooling air that reaches the grain. Moving the handle down lowers the cooling flap and increases the cooling. To decrease the cooling, move the handle up. To shut off the cooling move the handle all the way up.

Batch Mode Drying / All Heat

- Cooling doors all open
- Cooling flap fully raised for all heat

Figure 29. Batch mode drying / all heat



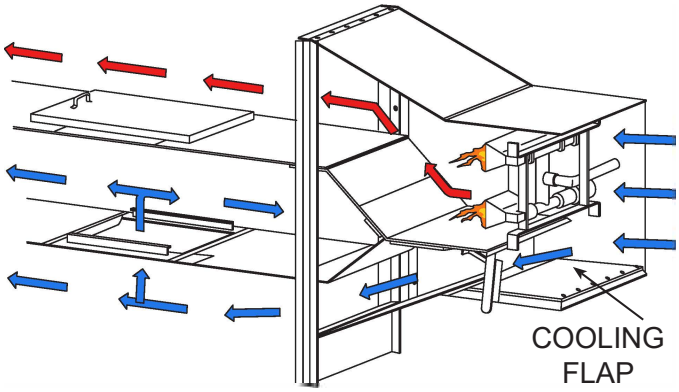
Continuous Mode Drying / with Cooling

- Cooling doors shut in the top cooling floor give two levels of cooling
- Cooling doors in the bottom cooling floor give one level of cooling
- Cooling flap shown closed for maximum cooling

Note

It is common to operate with the cooling flap only partially closed to achieve the desired level of cooling.

Figure 30. Continuous mode drying / with cooling



3.7. Grain Level Switches

Overview

In continuous mode the system is capable of monitoring five safety/operational switches. The following three switches are included with the system and are field-installed:

- Fill Dryer switch
- Low Dryer switch
- Plugged Discharge switch

Two optional switches (customer supplied and installed) can be wired into the dryer control:

- Wet Bin Empty switch
- Dry Bin Full switch

Fill Dryer Switch and Low Dryer Switch

Note

Location of the Fill Dryer and Low Dryer switches depend on the style of fill and configuration of the intake grain supply. Refer to the figures in this section for details.

- The Fill Dryer switch senses the presence of grain. It signals the PLC to shut off the filling auger.
- The Low Dryer switch is designed to shut off the dryer just before any ducts are empty so that fuel will not be wasted.

Note

The Commander Control ignores the loss of signal from this switch for a period of time to prevent nuisance alarm triggers due to grain movement.

Figure 31. Switch — side view

ATTENTION: Correctly set switches MUST be used at the proper locations for both FILL & EMPTY - switches are identified with a decal as to the internal dip switch setting of “H” for fill switch or “L” for low switch.

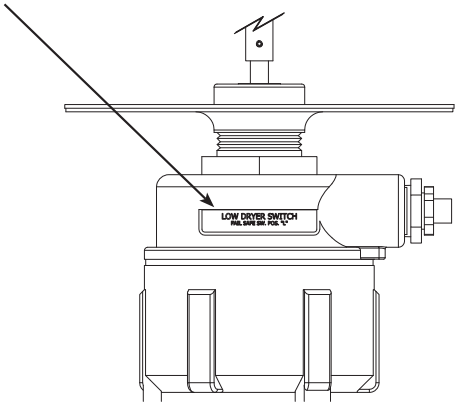
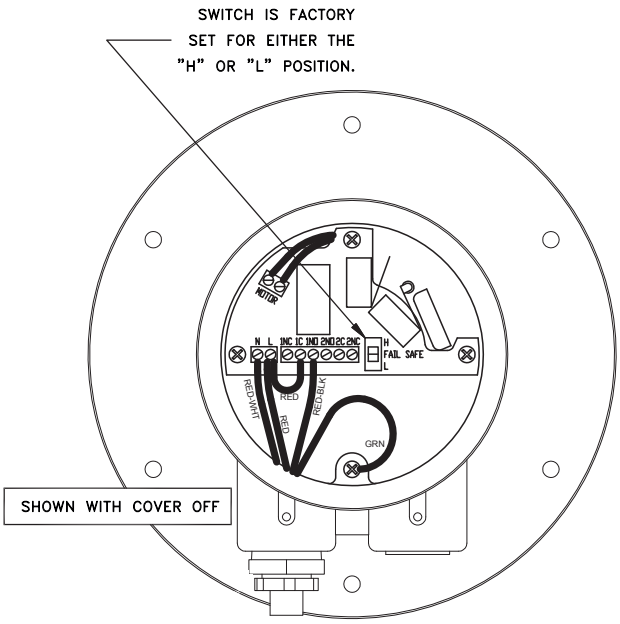


Figure 32. Switch — top view



Roof with Gravity Fill System

Gravity fill system intake grain at the center. The intake auger system must match to this location.

Figure 33. Gravity Fill Switch and Cover Locations

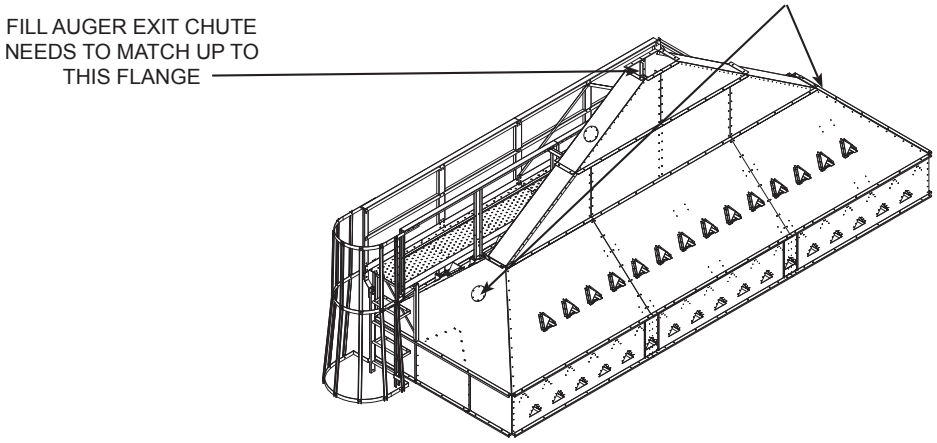


Figure 34. Hole Cover and Switch Flanges

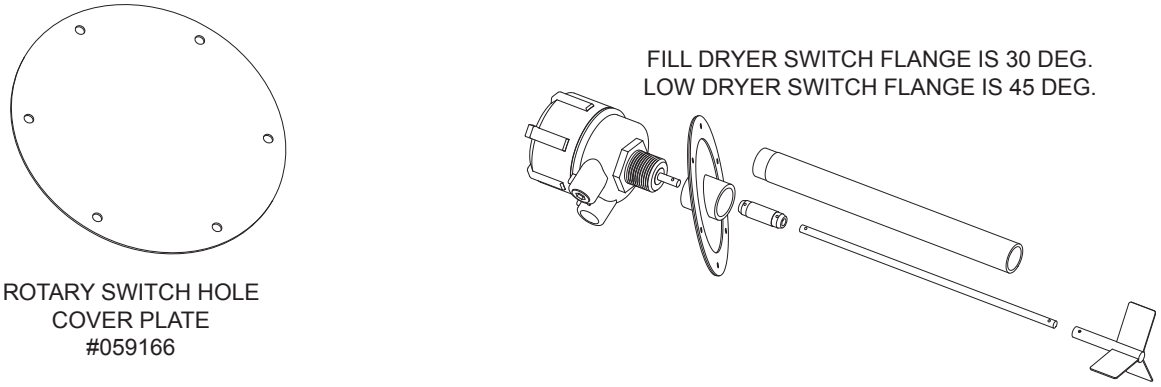


Figure 35. Fill Dryer Switch Location – Gravity Fill System

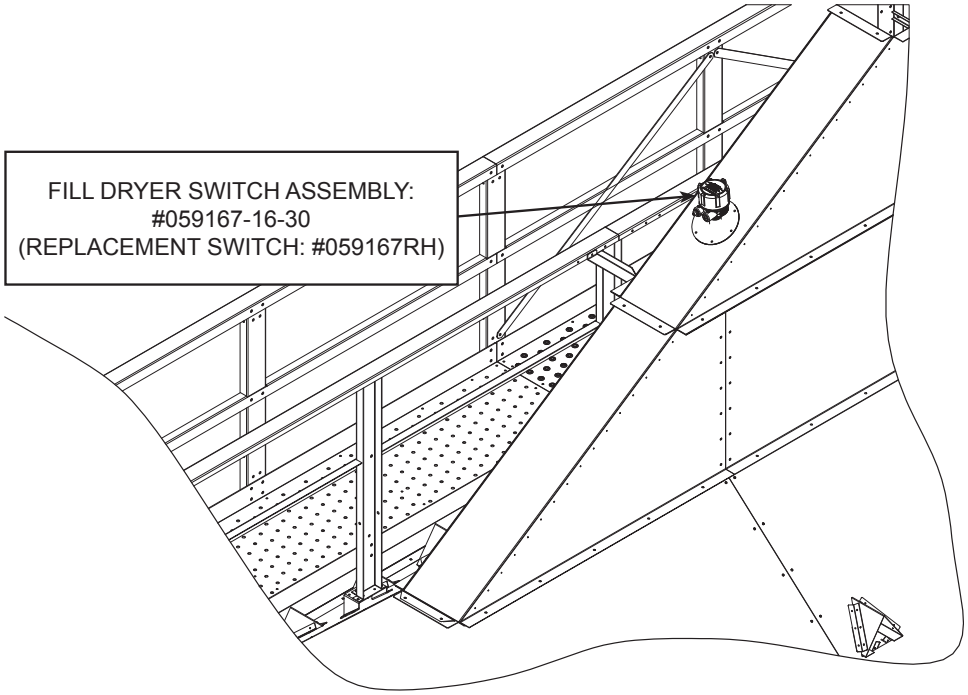
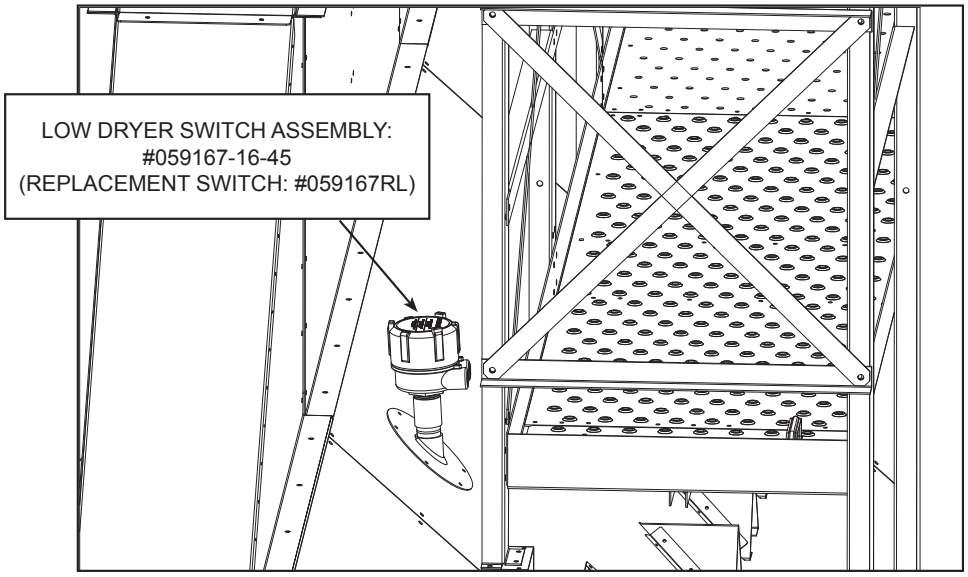


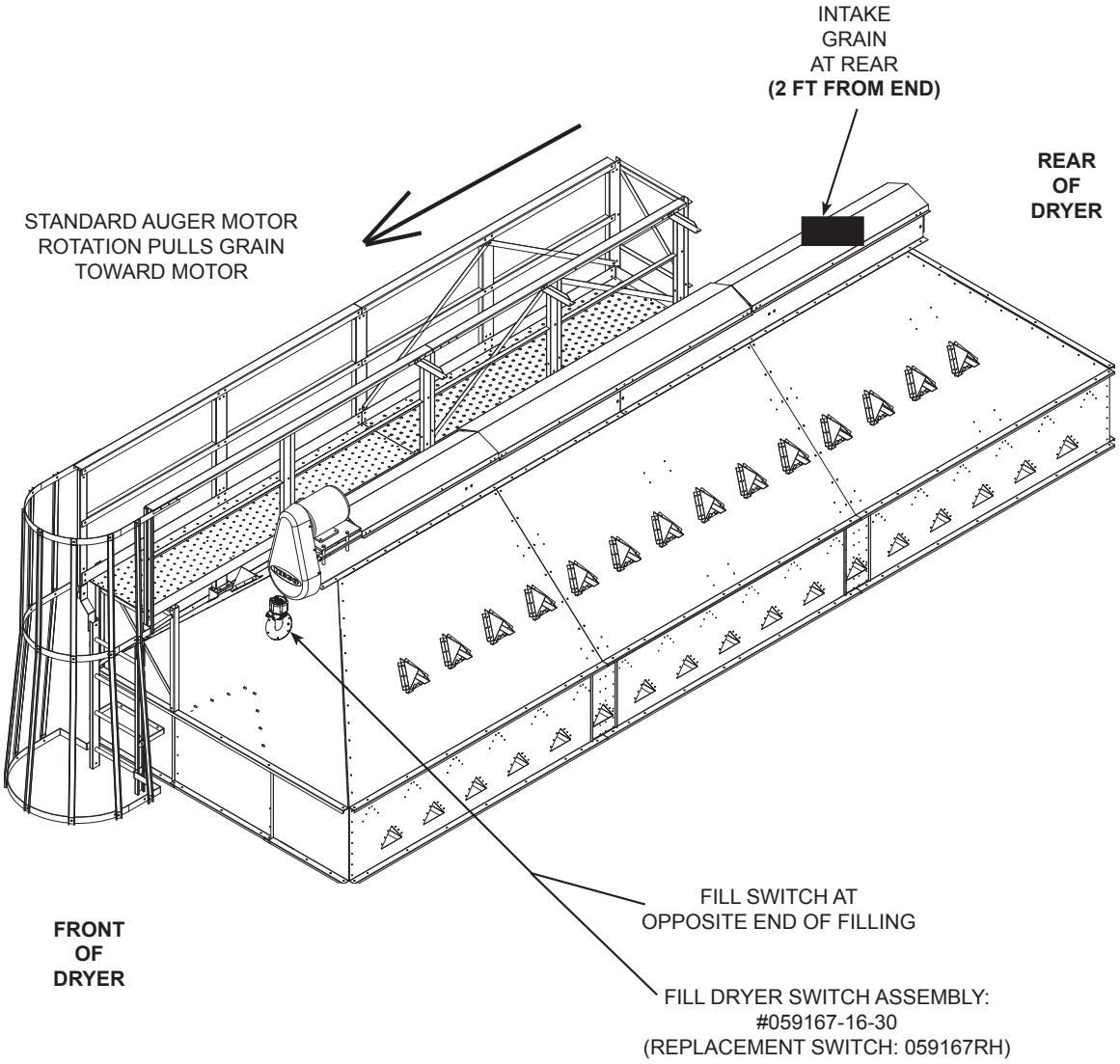
Figure 36. Low Dryer Switch Location – Gravity Fill and Level Auger Fill Systems



Level Auger Fill System Overview

- Grain intake position must be between 1' and 2' from the end of the dryer level auger.
- Factory configuration, per motor cable length and catwalk access, has the level auger motor located at the front end of the dryer closest to the control box.
- The Fill dryer switch and the Low dryer switch must be located at the OPPOSITE end of the intake grain entry for correct operation.
- Standard auger motor rotation brings the intake grain FORWARD from a grain entry position located at the rear end of the dryer. Reversed auger rotation results in the opposite.

Figure 37. Level Auger Fill Switch Location



Roof with Level Auger System

Figure 38. Fill Dryer switch location – Roof with level auger

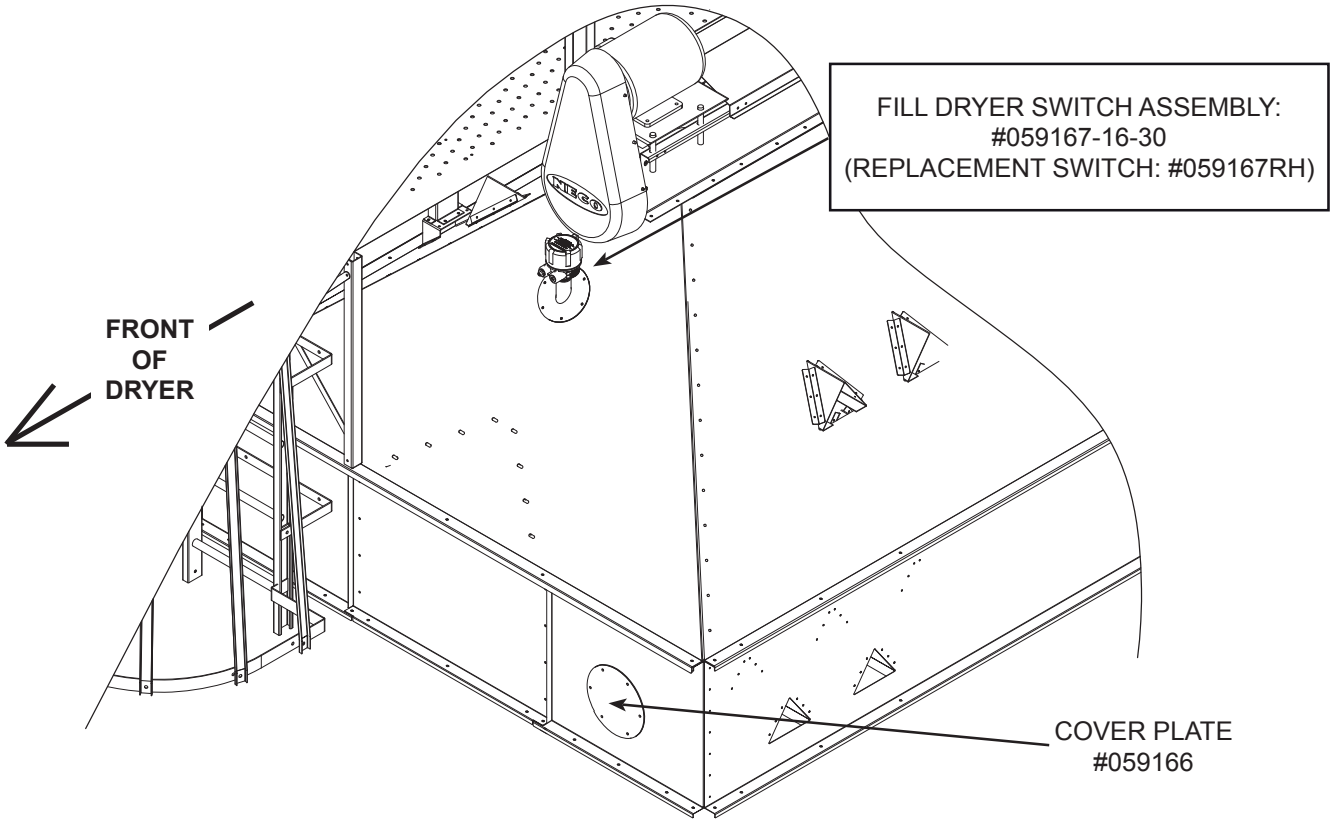
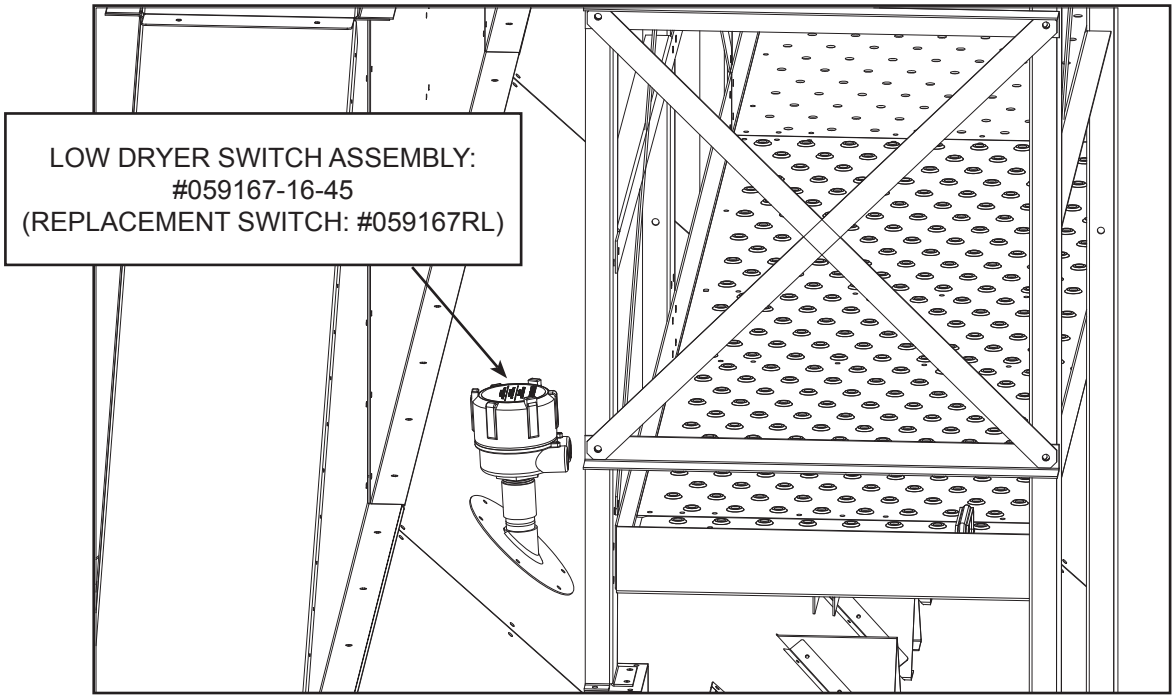


Figure 39. Low Dryer switch location – gravity fill AND level auger fill systems



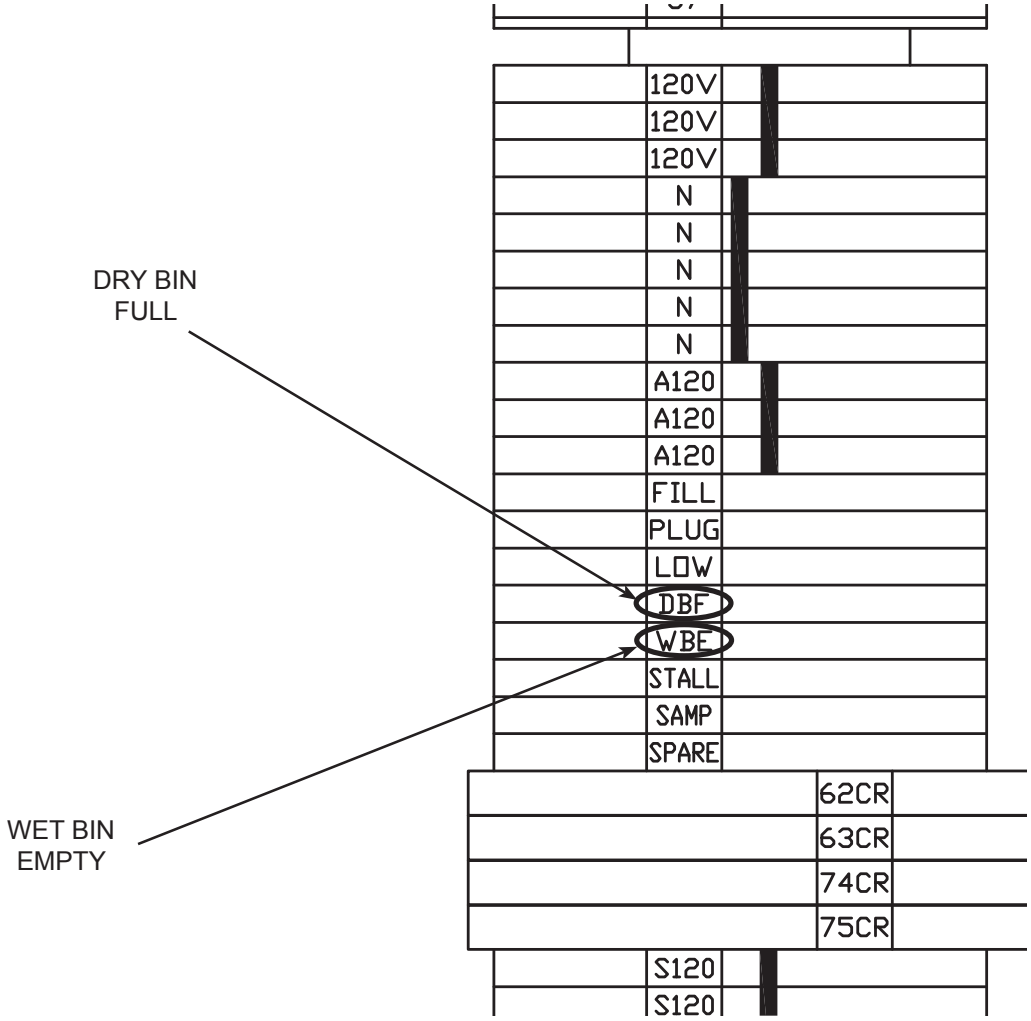
Wet Bin Empty and Dry Bin Full Switches (optional)

Note

These OPTIONAL switches are provided and installed by the customer.

- The Dry Bin Full switch should be placed near the top of the dry holding bin.
- The Wet Bin Empty switch should be placed near the bottom of the wet holding bin.
- The wires route to the main control box terminal strip and connects shown below:

Figure 40. Wet Bin Empty and Dry Bin Full sensor connections



3.8. Discharge Equipment

Overview

The discharge system is offered using either auger or drag.

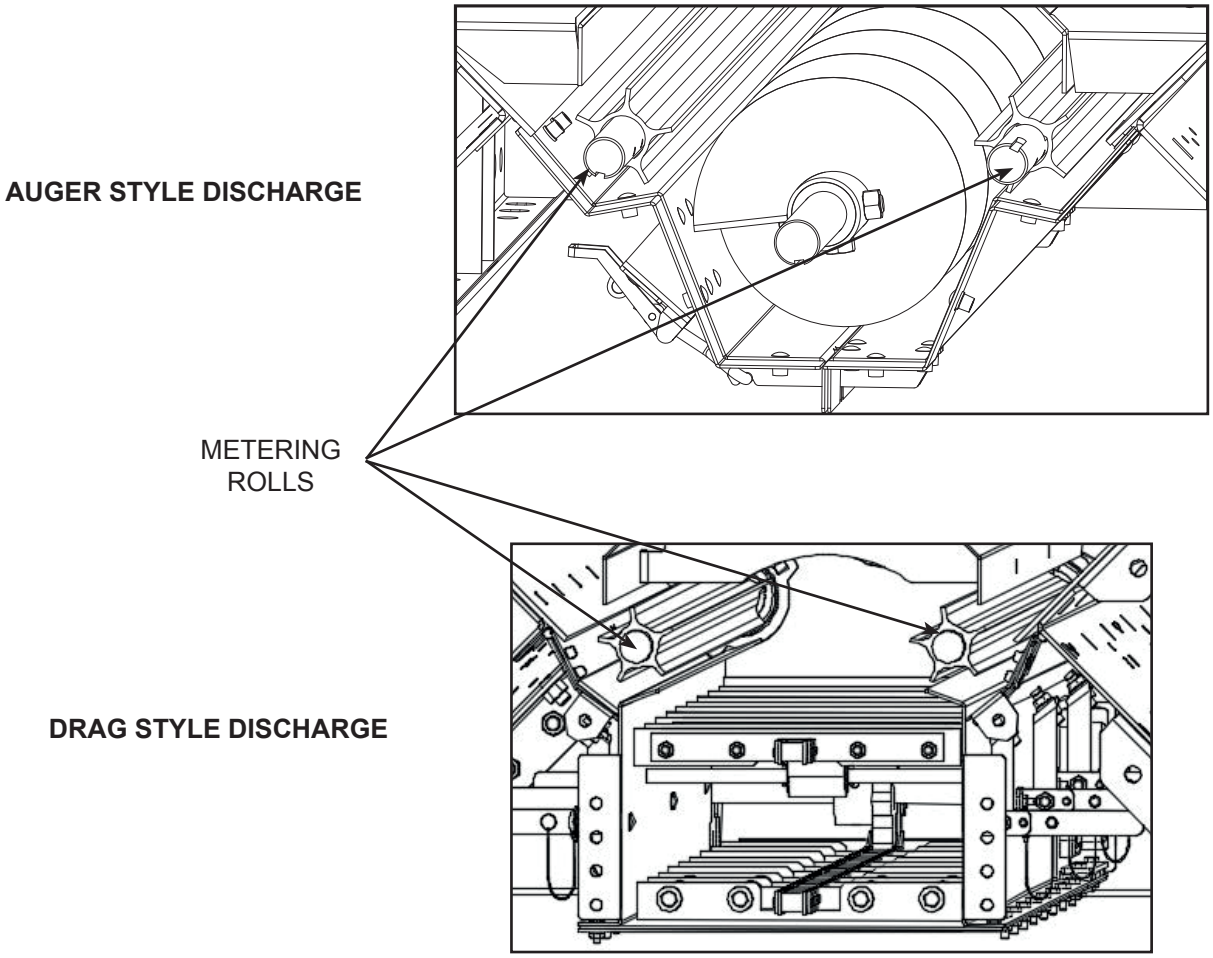
- The grain is fed into a discharge system by a pair of metering rolls powered by a DC drive motor and controlled to discharge grain at the target moisture content.

- The discharge system runs along both sides of the dryer and moves the grain from front (blower end) to rear (plenum door end).
- Cleanout doors are located below each discharge system for ease of maintenance, etc.
- At the rear of the dryer, the grain is combined and directed to a final discharge area.

Metering Rolls

- The metering rolls direct the grain to the discharge system at a controlled rate.

Figure 41. Metering rolls on auger and drag style discharges



Metering Rolls DC Drive Motor

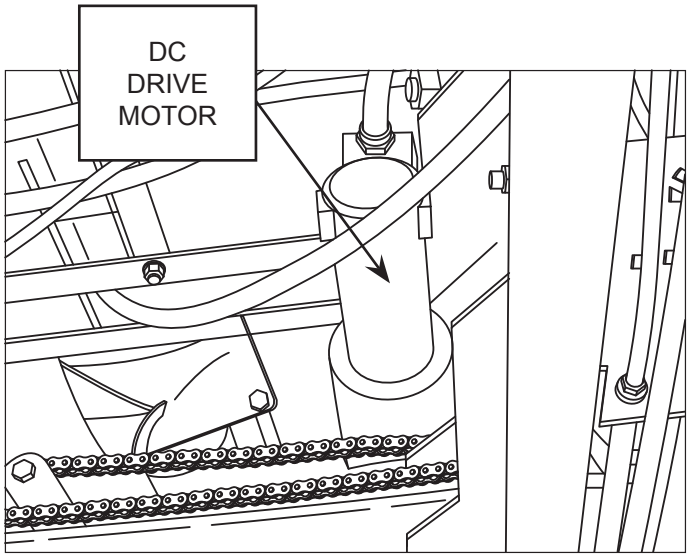
- The DC motor is located under the front frame of the dryer. Chains run from the DC motor to drive sprockets on the ends of the metering rolls.
- When in AUTO mode, the motor receives RPM input from the DC drive unit based on requirements to meet the outlet target moisture content.
- Batch operation and initial automatic mode operation require a manual metering roll speed to be set - this speed would be active until the Dryer Master obtains enough data to begin automated control.
- See Section 8.1 – Manual Dryer Speed on page 127 (in the Appendix) for recommended dryer speed for all dryer models / motor RPMs and desired moisture contents.
  Attention

If the equipment was ordered heavy for future expansion, there may be a higher RPM motor installed than list on the chart in the Appendix. Check the DC drive motor rating plate to be sure.

Table 5. DC drive motor for metering rolls

1/4 HP Drive Motors	1/2 HP Drive Motors
27 RPM	60 RPM
42 RPM	92 RPM
62 RPM	
83 RPM	

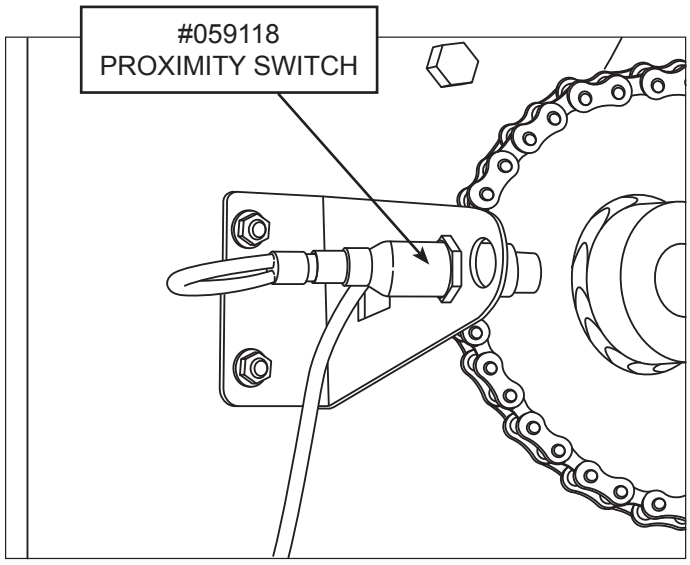
Figure 42. DC Drive Motor



Metering Rolls Stall Switch

- The proximity switch is located to the left of the metering roll drive sprockets. It senses the rotation of the sprocket.
- If the metering rolls jam or stall, the dryer will shut down WITH a cool down period.

Figure 43. Metering rolls stall proximity switch



Auger Style Discharge

⚠ WARNING Shut down the dryer and lock out power before opening any conveyor access points. Use a stick or tool (not hands) for cleanout.

- The discharge motor turns the discharge augers counterclockwise, as seen from the front of the dryer. Grain moves to the rear.
- Each set of clean-out doors open for access to the discharge augers facilitating ease of clean-out.
- Normally, the discharge drive motor has a motor starter, but can be optionally controlled by a VFD. The VFD allows the auger system to match the speed of the metering rolls, resulting in less grain damage, etc.

Note

See Section 8.1 – Manual Dryer Speed on page 127 in the Appendix.

Figure 44. View into the open clean-out doors at the auger

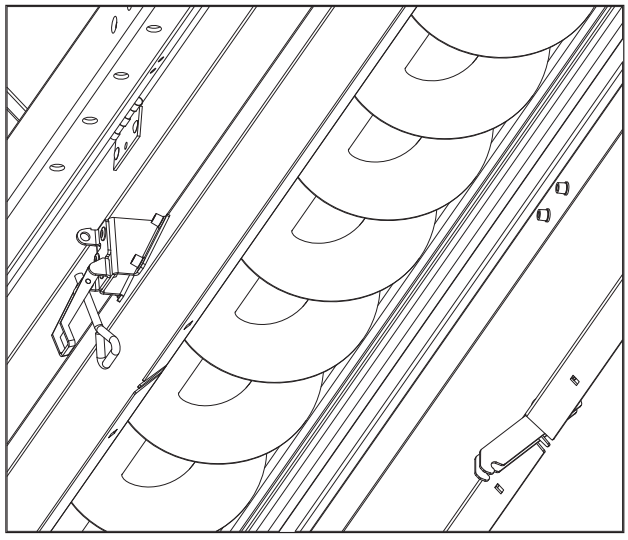
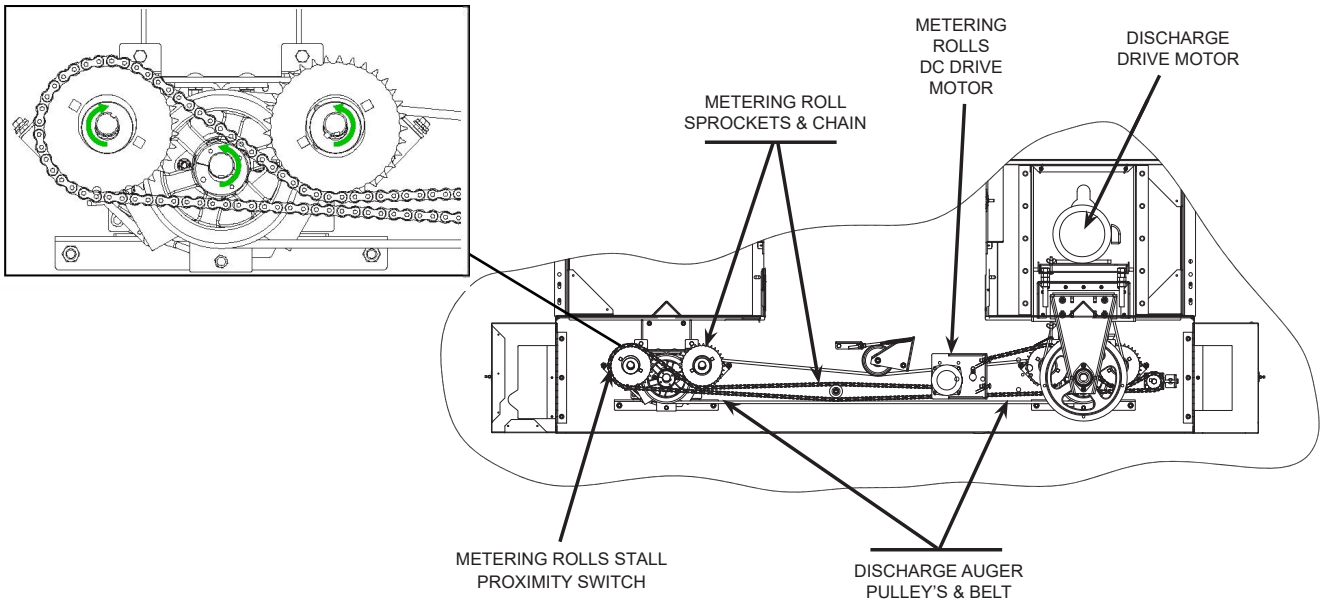
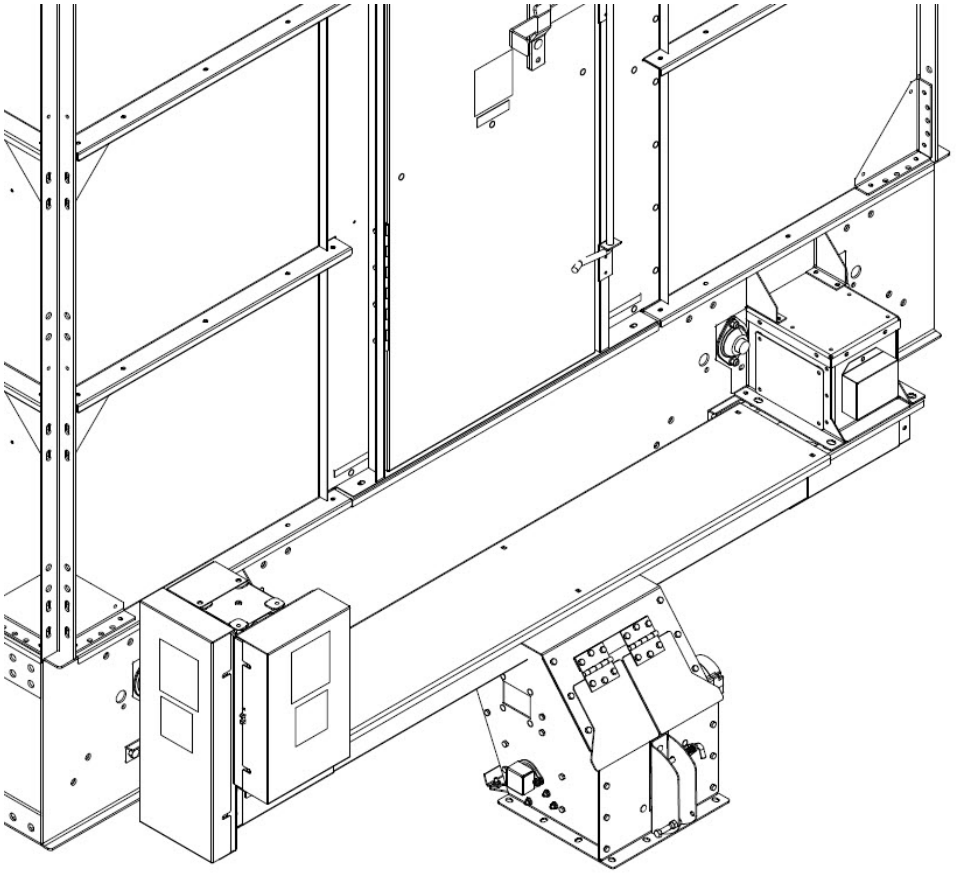


Figure 45. Drive system for auger discharge system (guards are shown open to show detail)



Rear Cross-Auger System

Figure 46. Rear cross-auger system

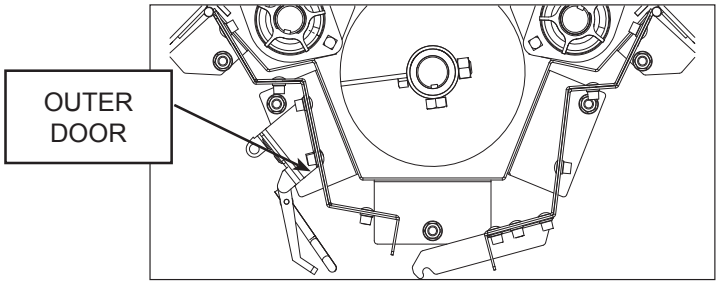


- The cross auger system combines the dried grain from the two main discharge augers and transfers it to a single discharge output that can be supplied with a left-hand discharge, right-hand discharge, or a center discharge.
- If needed, the orientation of the discharge (RHT, LFT, CTR) can be changed. Contact your NECO dealer.

The following steps describe how to close the clean-out doors on the auger system:

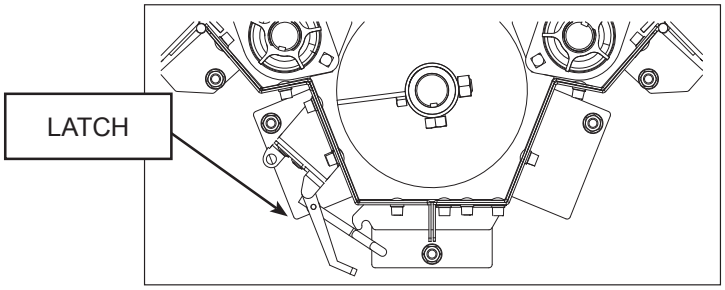
1. Close the outer clean-out door first.

Figure 47. Close the outer door first



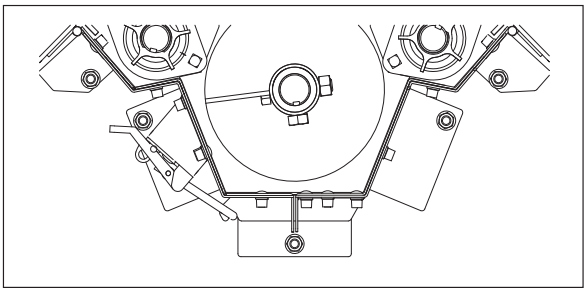
2. While holding the outer door in place, close the inner door until it overlaps with a snug fit.

Figure 48. Adjust the latch



3. Adjust the latch to a reasonable tension.
4. Put the latch's loop into the inner door's hook.
5. Secure by pushing the draw latch closed.

Figure 49. Push the latch closed



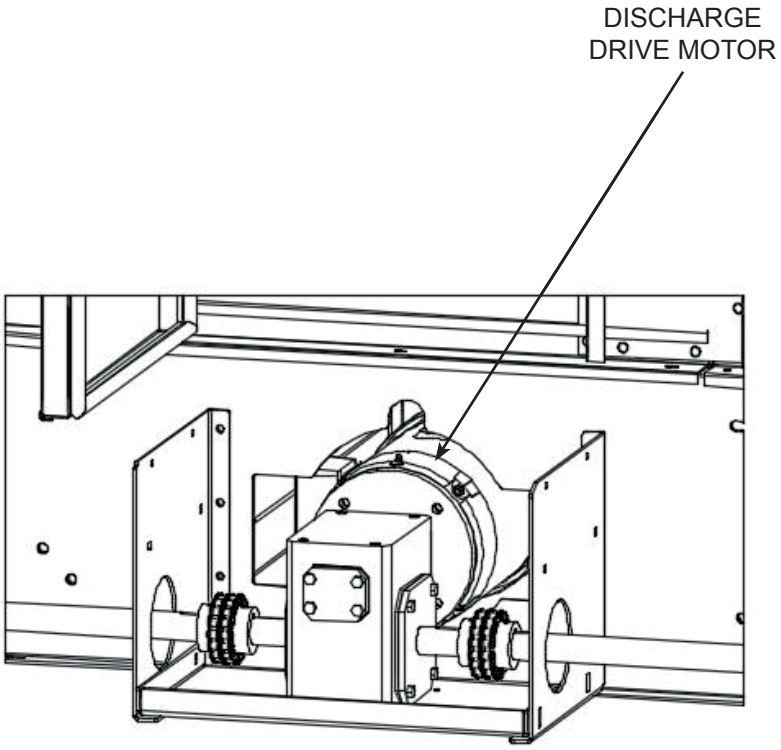
Note

To open the doors, simply reverse the previous steps (excluding the tension adjustment).

Drag Style Discharge

- The discharge motor rotates the two drags positioned along the sides and moves the grain to the rear of the dryer.
- Normally the discharge drive motor has a motor starter, but can be optionally controlled by a variable frequency drive (VFD).

Figure 50. Drive system for drag discharge system (guard removed to show detail)



Note

On both sides of the main drags under the dryer are metering roll clean-out doors. To open, pull out the pin on each of the clamps. See Figure 51 and Figure 52.

Figure 51. Closed clean-out door

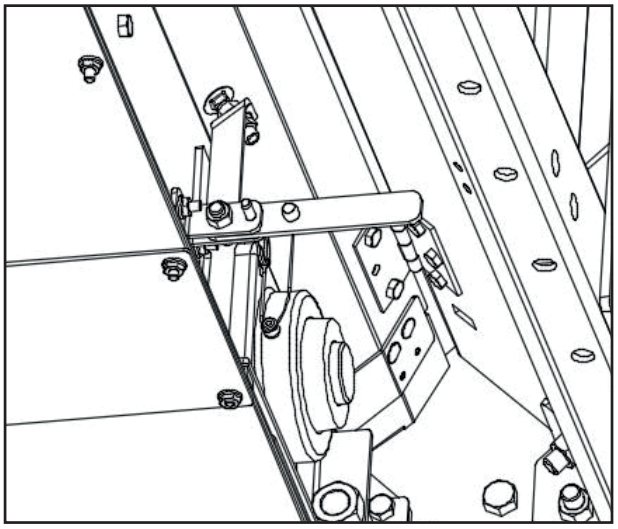
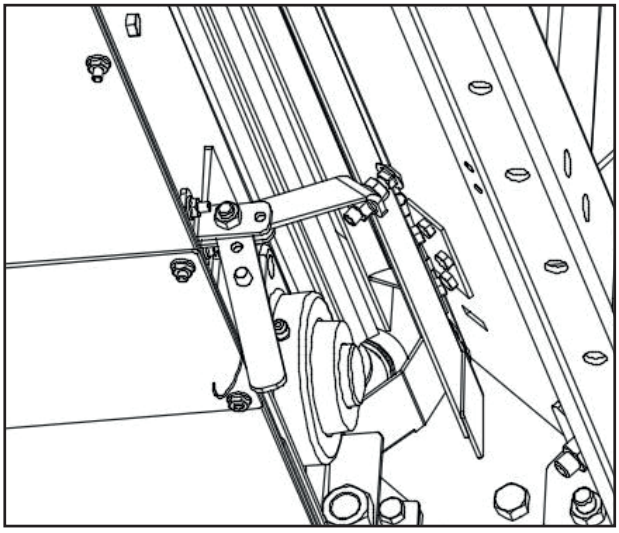


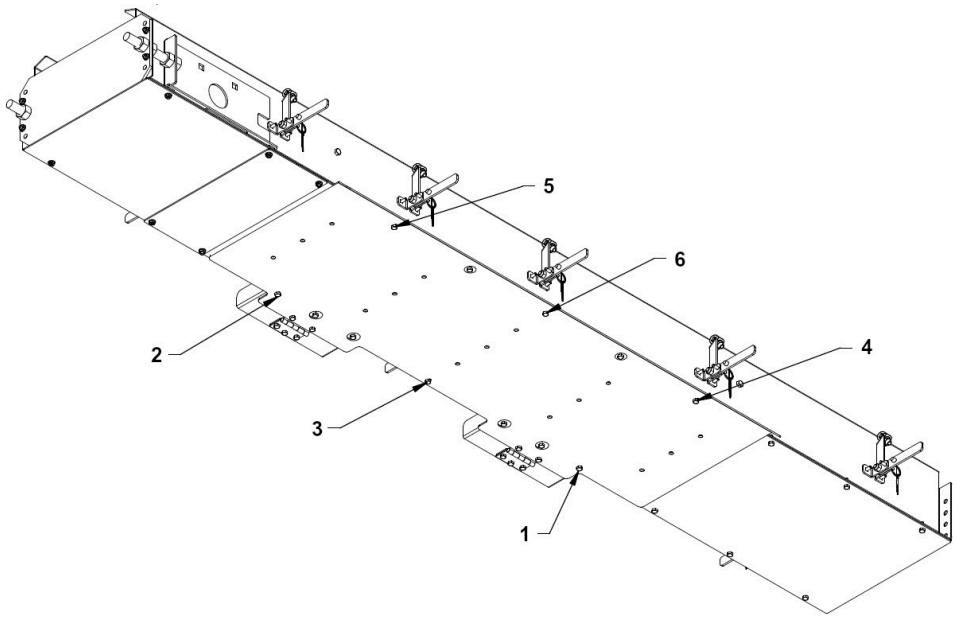
Figure 52. Open clean-out door



Note

To access the drag conveyor itself, open the hinged doors on the bottom of the conveyors. To minimize stress on the bolts, first remove the three nuts on the hinge side of the door, and then remove the three nuts on the opposite side before swinging the door open. Reverse the order when shutting the door. Refer to the figure below.

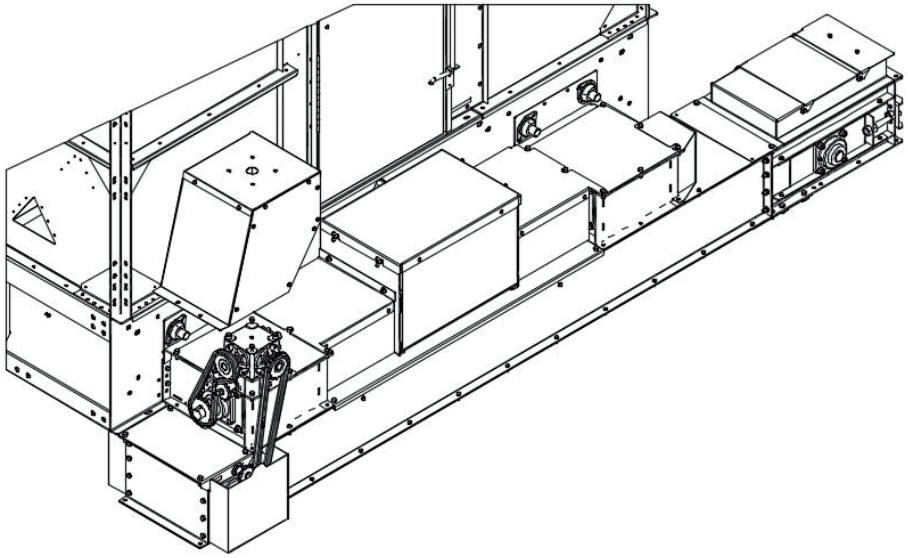
Figure 53. Removing the hinged door



Rear Cross Drag System

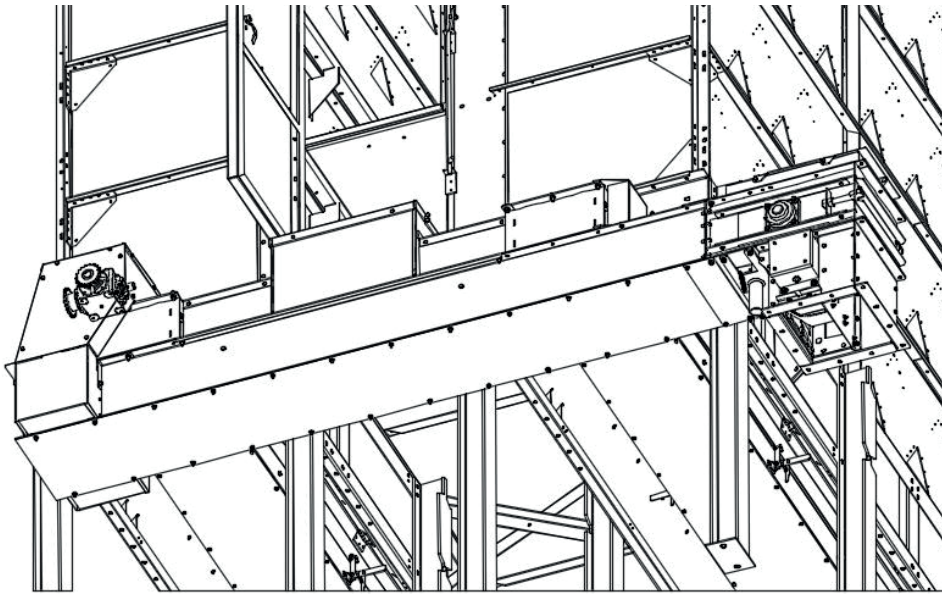
- The cross drag combines the dried grain from the two main drags and transfers it to a single discharge output. This can be supplied with a left-hand or right-hand discharge.

Figure 54. Cross drag (top view)



- If needed, the orientation of the discharge (RHT, LFT) can be changed. Contact your NECO dealer.

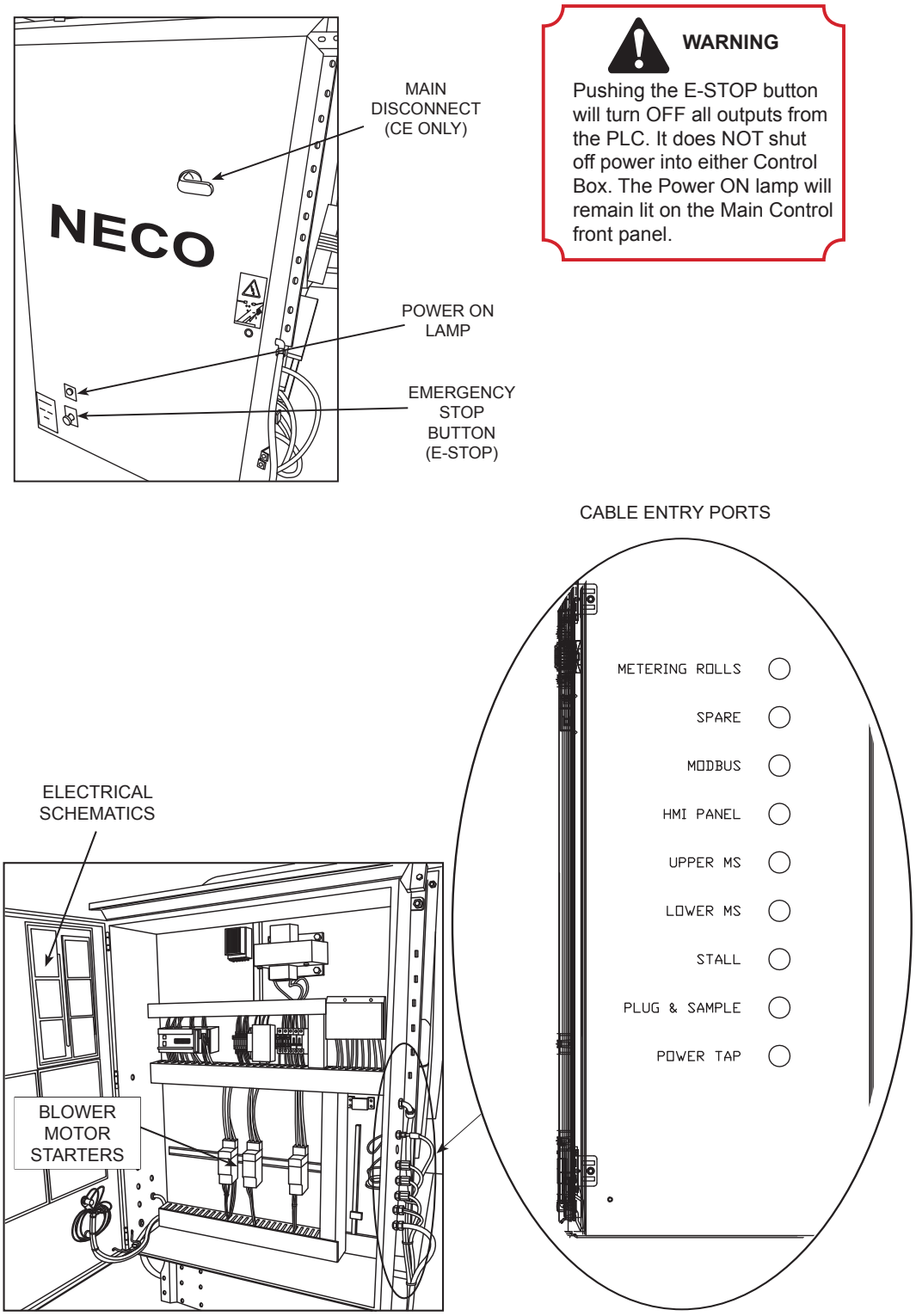
Figure 55. Cross drag (bottom view)



3.9. Commander Control Components

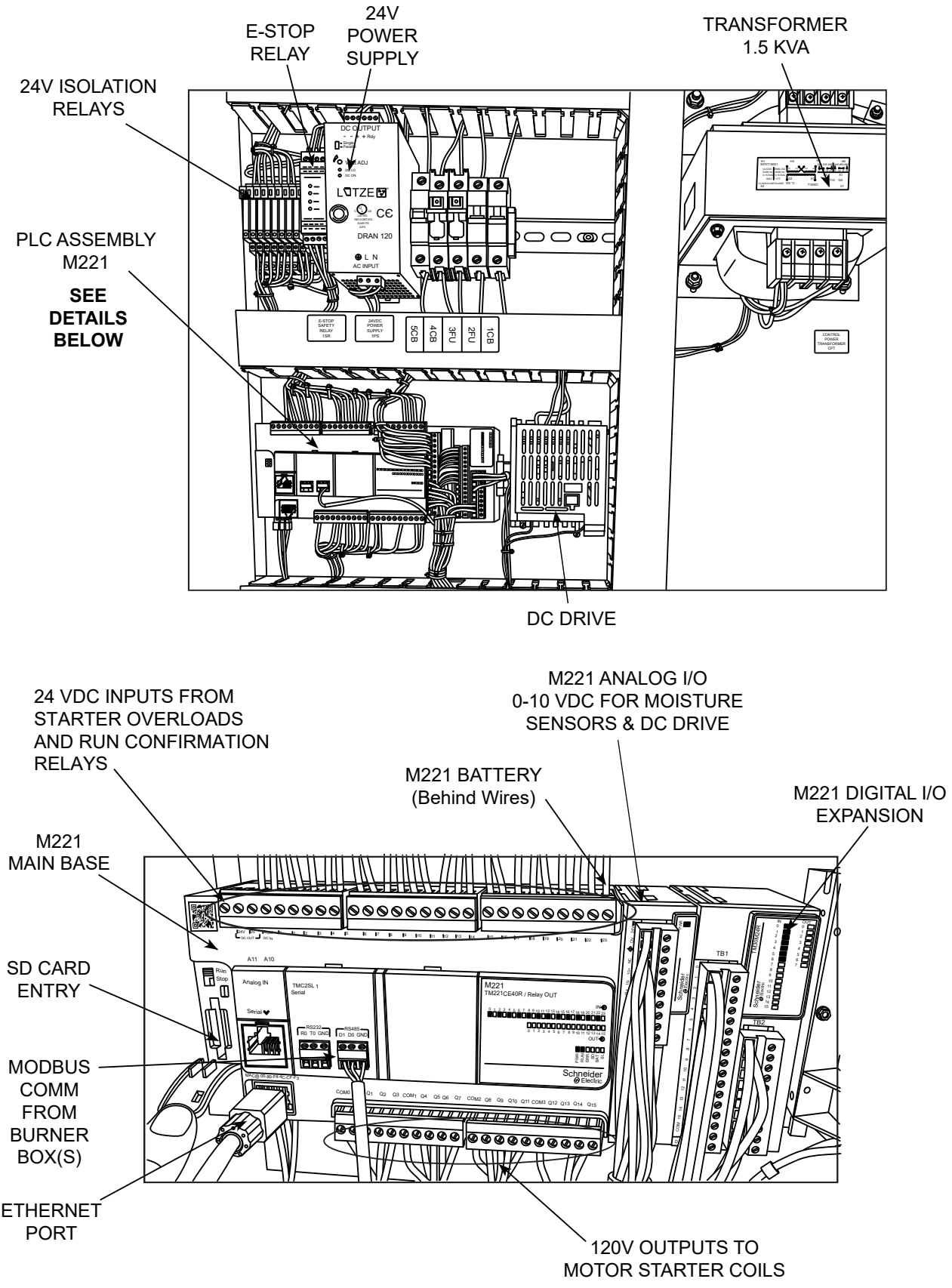
3.9.1 Main Control Box

Figure 56. Main Control Box



PLC Details

Figure 57. PLC Details



3.9.2 HMI Enclosure

Location

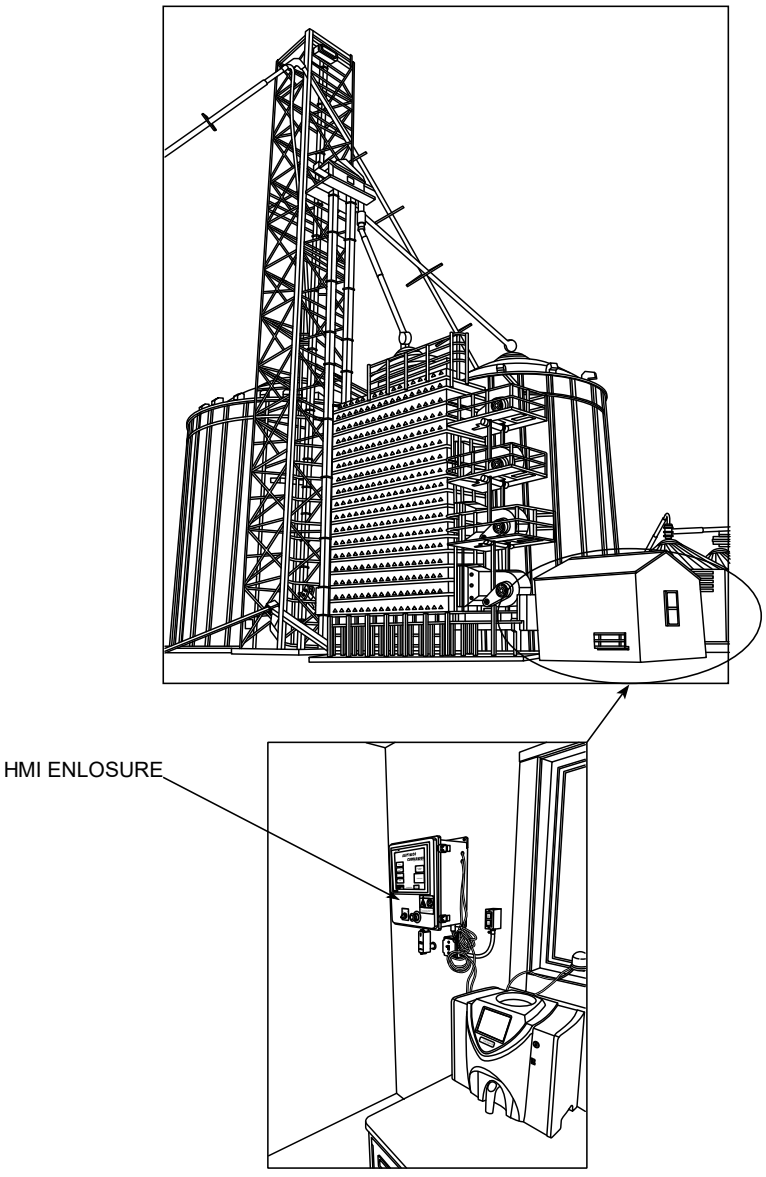
NECO recommends that the HMI enclosure be located indoors, with line-of-sight of the dryer. Maximum distance should be within 300 feet (91.4 m) — the maximum length of the Ethernet cabling.

If it is necessary to place the unit outside, subject to temperature and weather extremes, it must be installed inside another enclosure.

Note

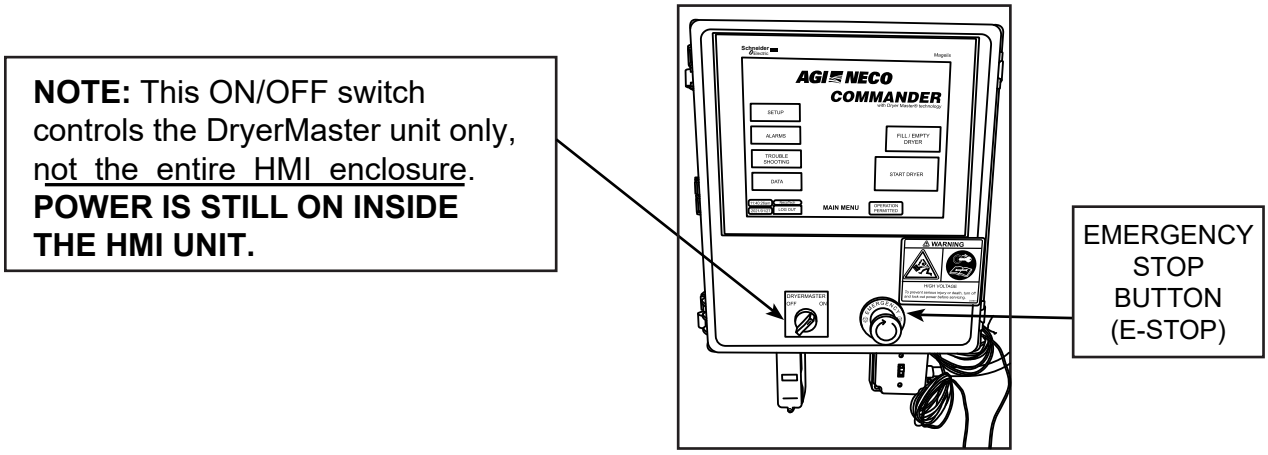
Do not locate the HMI screen in direct sunlight.

Figure 58. Example HMI Location



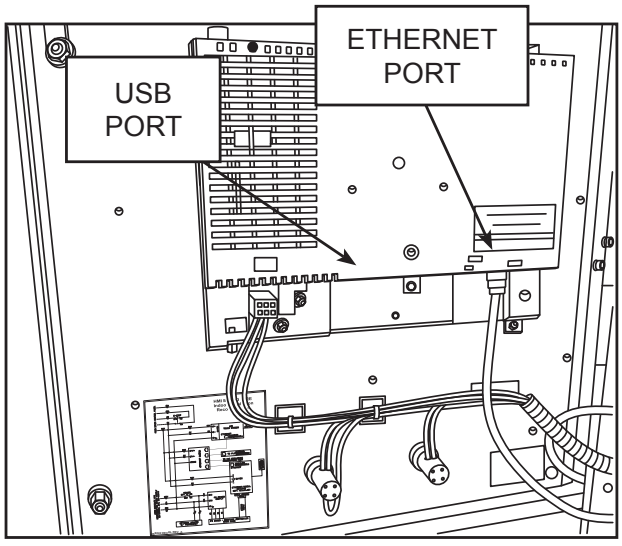
HMI Screen

Figure 59. HMI Screen



⚠ WARNING Pushing the E-STOP button will turn OFF all outputs from the PLC. It does NOT shut off power into the HMI or main control panel. The Power ON lamp will remain lit on the Main Control front panel.

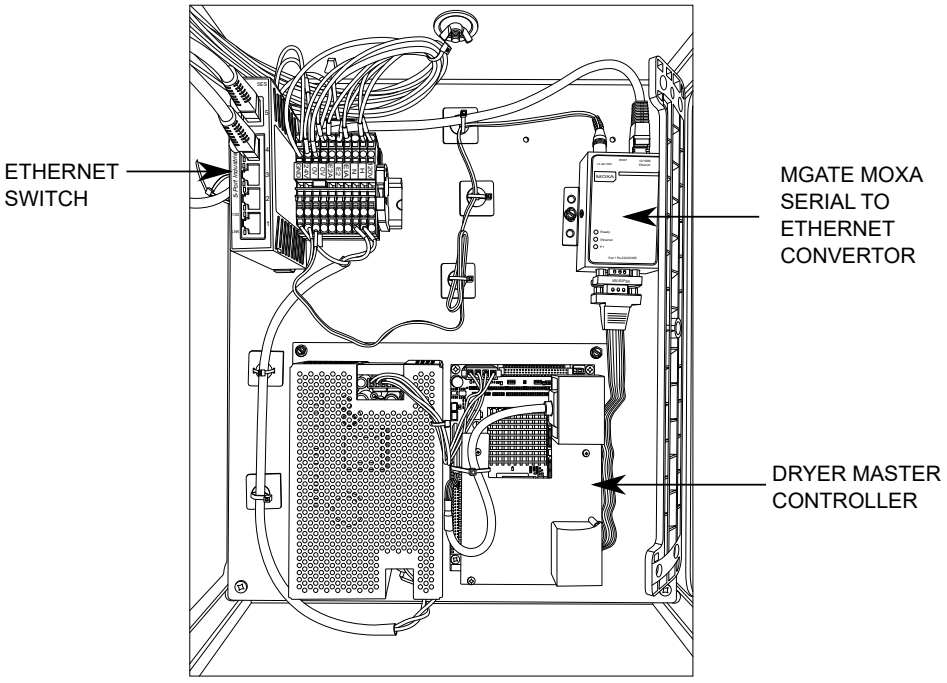
Figure 60. Rear View of HMI Screen



BACKSIDE OF “HMIGTO6310”

Interior

Figure 61. Inside View



3.9.3 Moisture/Temperature Sensor Overview

- The combination moisture/temperature sensing unit (059250W) has a moisture sensing “fin” and a temperature sensing probe directly below it. The sensor provides 0 to 10 VDC signals for both temperature and moisture, which the embedded DryerMaster converts to grain moisture and temperature readings.
- One sensor is located at the top of the dryer for reading INLET grain moisture and temperature.
- One sensor is located at the dryer grain discharge chute for reading OUTLET grain moisture and temperature.

Figure 62. Moisture Sensor

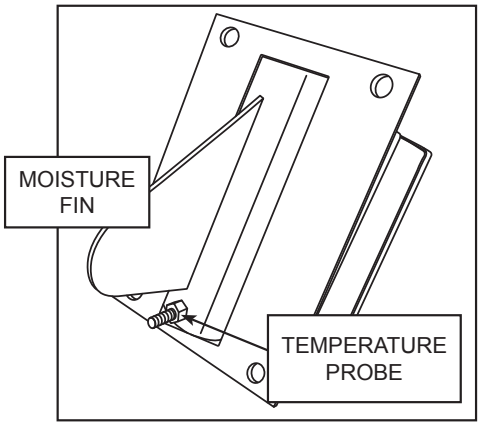
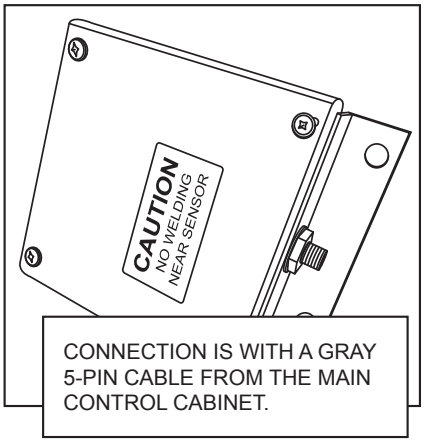


Figure 63. DryerMaster Module

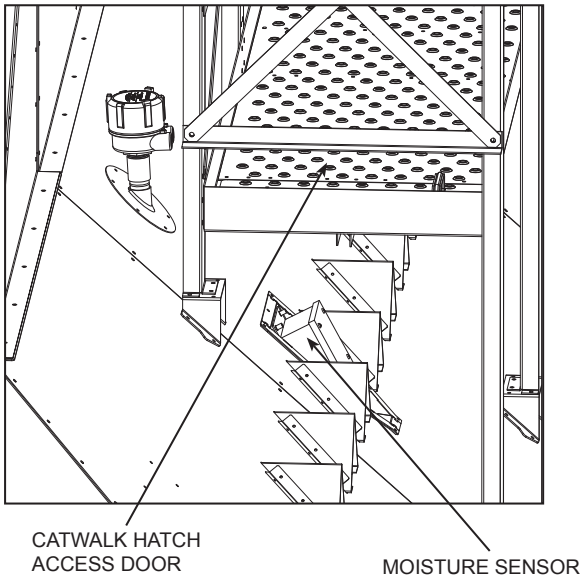


Inlet Moisture/Temperature Sensor

Note

Roof with Gravity Fill AND Level Auger Fill systems locate the inlet sensor on the catwalk side of the roof with a hatch-style door at the end of the catwalk for access.

Figure 64. Inlet sensor location



Outlet Moisture/Temperature Sensor

- The grain is directed past the moisture fin and temperature probe.
- Manual grain samples must be taken for the outlet grain moisture calibration, and also for measuring the grain temperature.

  For auger unloads, pull back the spring-loaded locking pin and tilt the sample chute back into the grain flow to collect a sample. For drag unloads, pull out the spring loaded slide gate and grain will flow out of the sample chute.

Figure 65. Auger style discharge chute

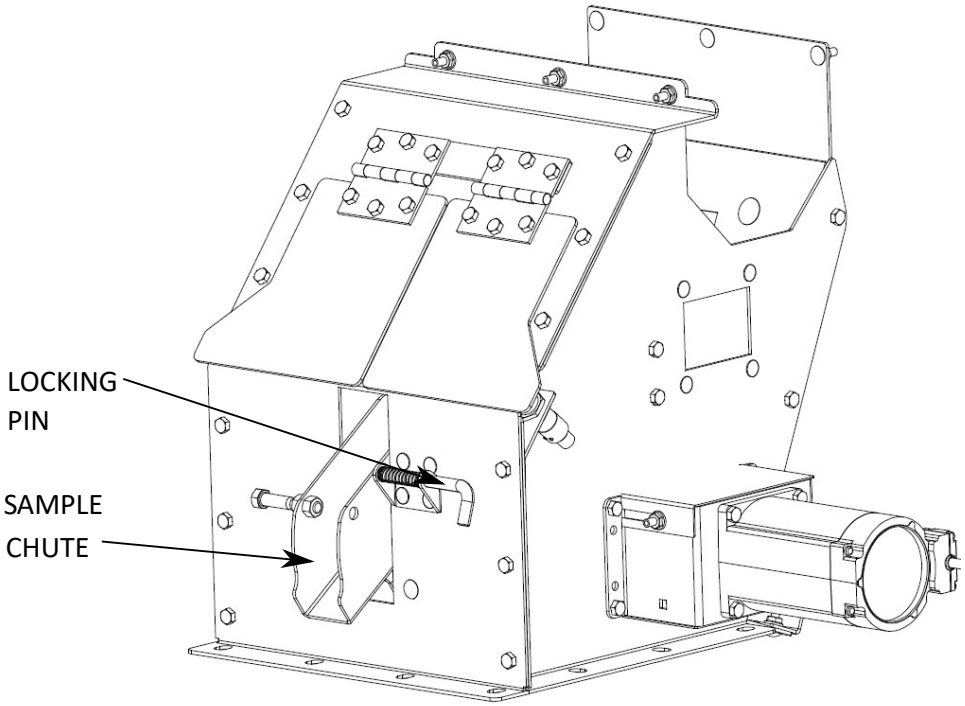
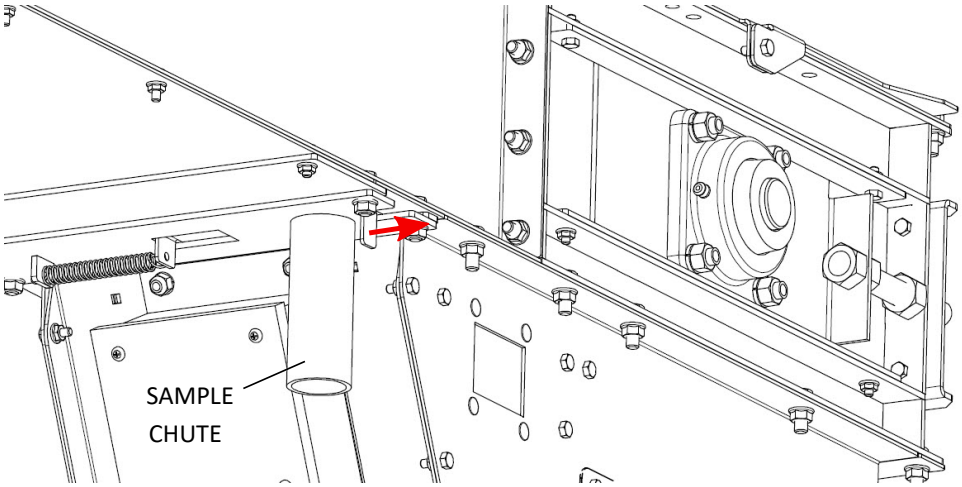


Figure 66. Drag style discharge chute

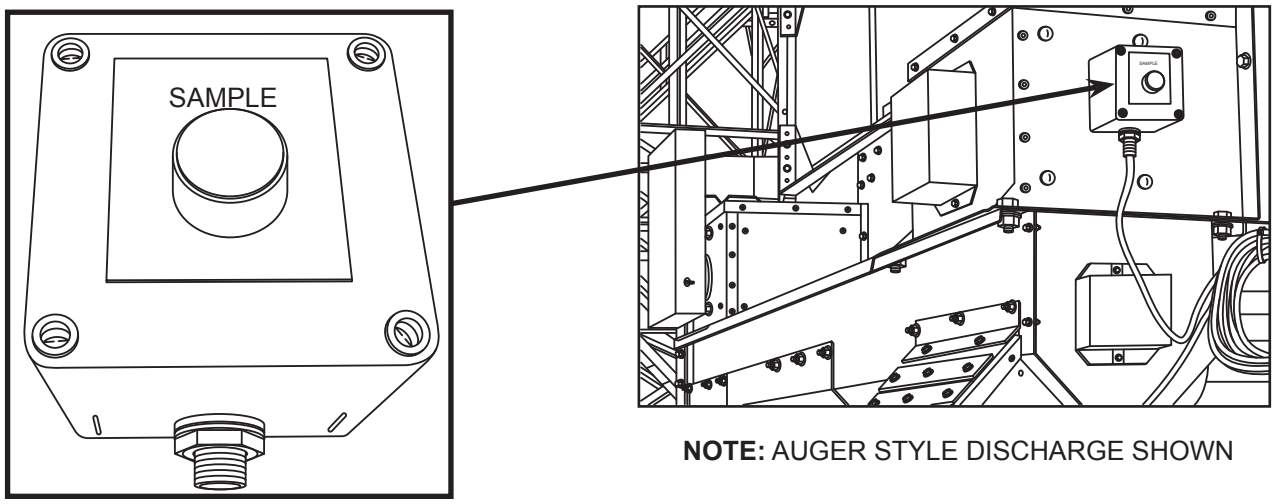


Outlet Moisture/Temperature Sample Button

Note

Pushing the sample button activates the moisture calibration routine, the same as if activated from the HMI in AUTO mode.

Figure 67. Outlet sensor and sample button locations



3.9.4 Discharge Plugged Sensor

- Dryers with auger unloads utilize a proximity switch (059118) to detect a plugged discharge. If the grain encounters a plug and backs up into the discharge chute, the hinged door will lift and when the movement is detected by the proximity switch, the dryer will shut down.
- Dryers with drag unloads utilize a diaphragm switch (059245) to detect plugs. If grain backs up into the discharge chute, the direct contact with the diaphragm switch will cause the dryer to shut down.

Figure 68. Plug Switch Auger

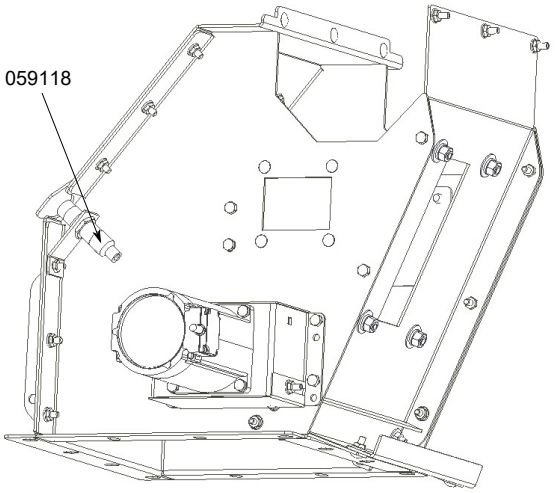
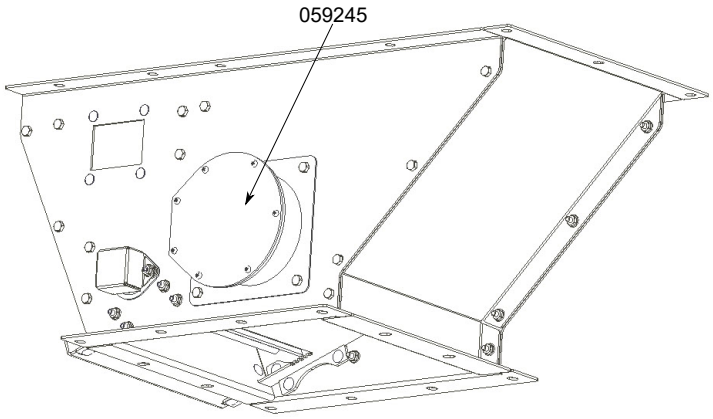


Figure 69. Plug Switch Drag



3.10. External Transport(s)

NECO provides the ability to control any combination up to two transport devices to FILL (wet grain) the dryer and two transport devices to EMPTY (dry grain) the dryer within the Commander Control system. All motor starters, starter coils, and overload contacts required are customer-supplied.

Depending on what type of transport style and configuration, the necessary data inputs must be entered in the Fill/Empty setup routine (see Section 4.3.4 – Dealer or Customer Entered Setup Data on page 73). These data inputs consist of:

Is a motor present that needs to be controlled?	PRESENT
Does that motor need to run continuous?	RUN CONTINUOUS
Does that motor need to stop after drying stops (2 minute delay)?	STOP DRYING AFTER STOPS
Start delay (seconds)?	START DELAY
Stop delay (seconds)?	STOP DELAY

The control integrates the external transport equipment actions depending on the presence of the following switches:

- Wet bin empty switch
- Dry bin full switch
- Low Level switch

See Section 8.2 – Optional External Transport Configurations on page 128

4. Operation

Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

4.1. Operation Safety

WARNING

- Keep away from rotating and moving parts, including the auger/mixer flighting, drive components, shafts, and bearings.
- Lock the grain dryer access points (where equipped) and close all other access doors when not in use.
- Always operate with guards, covers, and shields in place.
- Ensure maintenance has been performed and is up to date.
- Ensure that electrical cords are in good condition; replace if necessary.
- The area around the heater should be kept clear and free from combustible materials and other flammable liquids.
- When heater is not in use, shut off gas valve on heater and at gas source.
- Have another trained person nearby who can shut down any powered loading, unloading, or internal equipment in case of accident.
- Keep the work area clean and free of debris.

4.2. Equipment Pre-Check

After completion of assembly and before each use, inspection of the dryer is mandatory. The dryer should be frequently checked and serviced for a trouble-free operation. Use the checklists shown in Figure 70 and Figure 71.

Figure 70. New dryer start-up checklist

AGI NECO

NEW DRYER START-UP CHECK LIST

SERIAL#	
MODEL#	
CONTROL TYPE: PLC/SWITCHES	
PROGRAM VERSION: PLC: HMI:	

DATE	
CUSTOMER	
ADDRESS	
PHONE #	

	COMMENTS	INITIALS
BELTS-TENSION AND ALIGNMENT		
CHAINS-TENSION AND ALIGNMENT		
OIL LEVEL IN GEARBOX		
METERING ROLLS CLEANED OUT		
UNLOAD DOORS CLOSED PROPERLY		
BLOWER MOTOR ROTATION		
BLOWER MOTOR AMPS	**1. 2. 3. 4. 5. 6.**	
AUGER/DRAG ROTATION		
METERING ROLLS ROTATION		
CROSS AUGER/DRAG ROTATION		
GUARDS & SHIELDS IN PLACE		
ALL GAS UNIONS		
ADDITIONAL GAS LINE LEAKS		
FILL DRYER SWITCH		
LOW DRYER SWITCH		
THERMOCOUPLE/HIGH LIMIT POSITION		
THERMOCOUPLE/HIGH LIMIT CONDITION		
DISCHAGE PLUG SWITCH		
SET GAS PRESSURE		
AIR SWITCH FUNCTIONALITY		
BURNER SETTINGS		
CHECK & CALIBRATE MOISTURE SENSOR		
SET MIN & MAX METERING ROLL SPEEDS		

BELT INFORMATION--# OF BELTS & SIZES					
BLOWER BELT	SIZE:	QUANTITY:	WET 1	SIZE:	QUANTITY:
UNLOAD BELT	SIZE:	QUANTITY:	WET 2	SIZE:	QUANTITY:
LEVEL AUGER	SIZE:	QUANTITY:	DRY 1	SIZE:	QUANTITY:
			DRY 2	SIZE:	QUANTITY:

ADDITIONAL COMMENTS

Figure 71. Pre–season checklist

AGI NECO

Pre-Season Checklist

SERIAL#	
MODEL#	
CONTROL TYPE: PLC/SWITCHES	
PROGRAM VERSION: PLC: HMI:	

DATE	
CUSTOMER	
ADDRESS	
PHONE #	

	COMMENTS	INITIALS
INSPECT FOR GAS LEAKS		
BELTS-CONDITION & TENSION		
DRIVE CHAINS-CONDITION & TENSION		
GEAR BOX OIL LEVEL & CONDITION		
CLEAN METERING ROLLS		
BEARINGS ON METERING ROLLS		
BEARINGS ON BLOWER		
BEARINGS ON AUGERS (UNLOAD AND FIL		
GREASE ALL BEARINGS		
CLEAN BURNER		
CLEAN AIR SWITCH TUBE		
AIRSWITCH ADJUSTMENT (IF NEEDED)		
BACK DOOR SEAL		
THERMOCOUPLE WIRE		
CLEAN VAPORIZER TUBE FINS (LP)		
HIGH LIMIT/THERMOSTAT FUNCTION		
FULL DRYER SWITCH		
LOW DRYER SWITCH		
DISCHARGE PLUGGED SWITCH		
START DRYER AND TEST BURNER		
TEMPERATURE CONTROL		
TEST ALL LIGHTS ON CONTROL PANEL		

BELT INFORMATION--# OF BELTS & SIZES					
BLOWER BELT	SIZE:	QUANTITY:	WET 1	SIZE:	QUANTITY:
UNLOAD BELT	SIZE:	QUANTITY:	WET 2	SIZE:	QUANTITY:
LEVEL AUGER	SIZE:	QUANTITY:	DRY 1	SIZE:	QUANTITY:
			DRY 2	SIZE:	QUANTITY:

ADDITIONAL COMMENTS

4.3. Commander Control Setup

4.3.1 Log In

Prior to Logging In

Note

On-screen controls (buttons, icons, tabs, etc.) that are unavailable (are not currently functional) appear with a "hatched" background pattern. This pattern switches to solid when the control becomes available. Some on-screen items are informational only, while others call up screens, sub-screens or menus.

Figure 72. Unavailable screen control

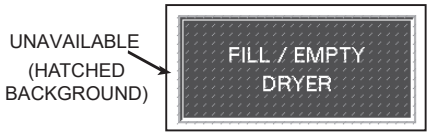
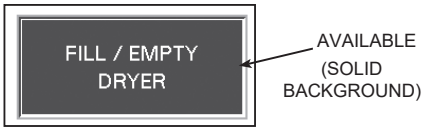


Figure 73. Available screen control

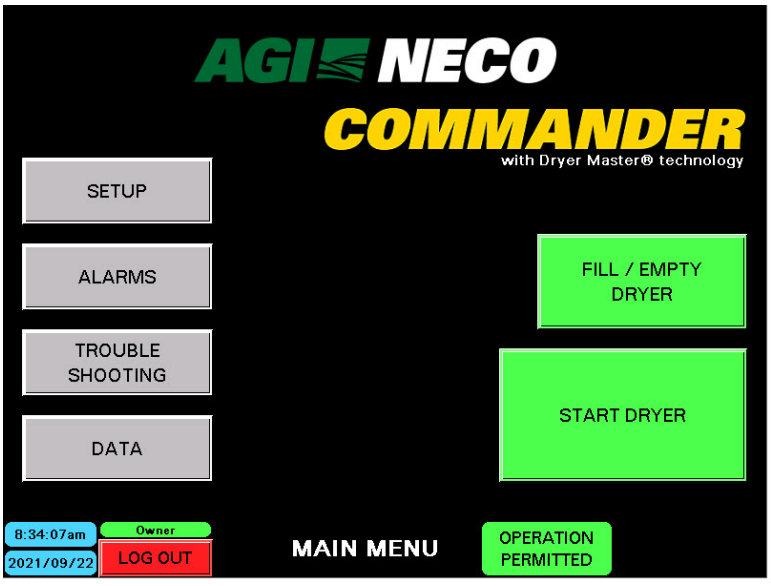


When the power is turned ON, if the *The USB device is connected.* message appears:

Figure 74. Main menu screen

1. Tap X to clear the message. The MAIN MENU appears, with the time/date and LOG IN button near the middle-bottom of the screen.

Figure 75. Main menu screen



Prior to logging in, the following controls are available:

SETUP

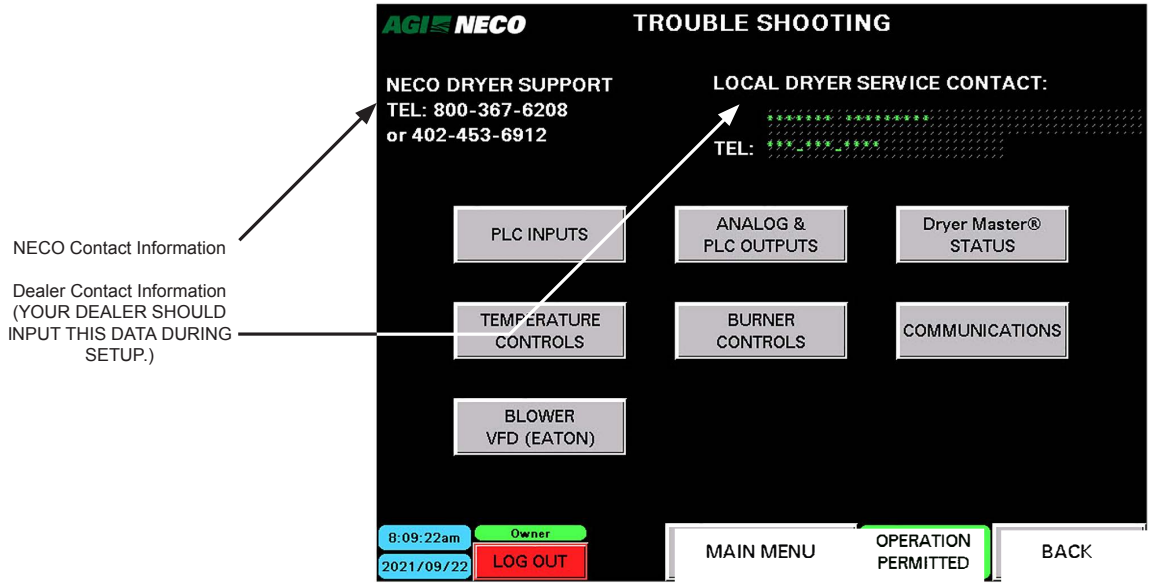
- Tapping the SETUP button opens the SETUP screen. However, none of the controls on the SETUP screen are available until logging in is complete. Tapping the MAIN MENU button on the SETUP screen returns you to the MAIN MENU screen.
- The HMI and PLC software version numbers appear in the upper-right corner of the SETUP screen. These numbers must be compatible.

Figure 76. Versions compatible (SETUP Screen)

TROUBLESHOOTING

- Tapping the TROUBLESHOOTING button opens the TROUBLESHOOTING screen. NECO and dealer contact information appears on the TROUBLESHOOTING screen.
- None of the controls on the TROUBLESHOOTING screen are available until logging in is complete. Tap the MAIN MENU button to return to the MAIN MENU screen.

Figure 77. Main menu screen



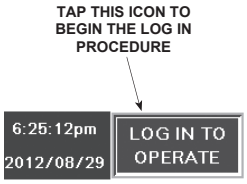
Prior to logging in, the following controls are NOT available:

- ALARMS
- DATA
- FILL/EMPTY DRYER
- GO TO START DRYER

Logging In

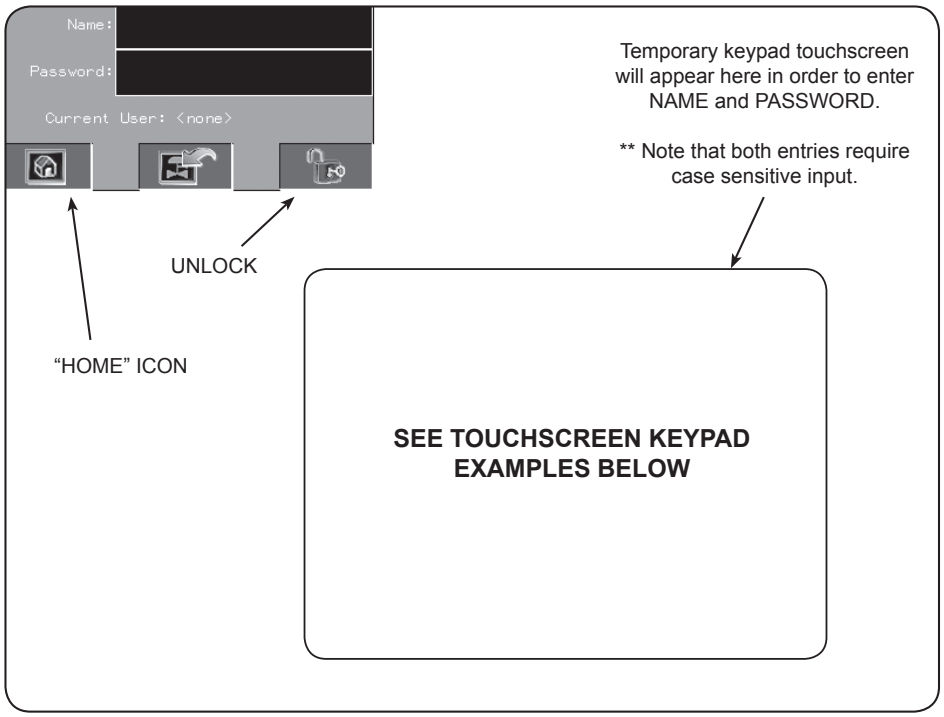
1. Tap the LOG IN TO OPERATE button.

Figure 78. LOG IN TO OPERATE



The LOG IN screen appears with the NAME and PASSWORD fields in the upper-left corner.

Figure 79. LOG IN screen



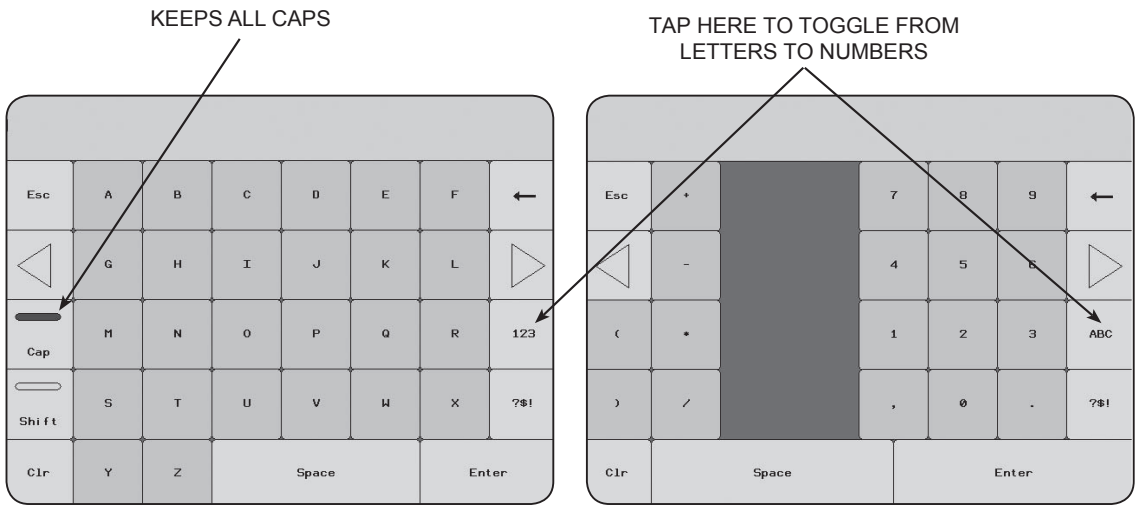
Note

All entries for both the NAME and PASSWORD are case-sensitive.

Enter NAME

1. Tap the NAME field box. The alpha-numeric keypad appears.

Figure 80. The alpha-numeric keypad



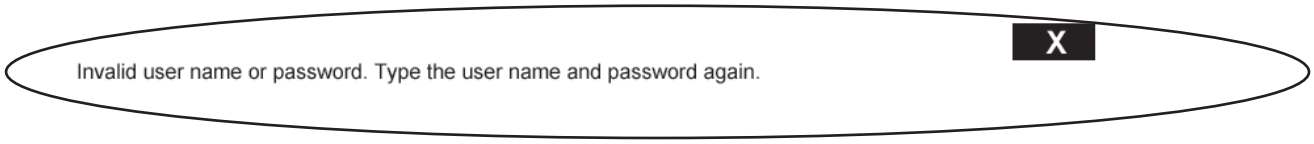
2. Type one of the following into the NAME field:
   - For basic operation, enter: **USER** (case-sensitive)
   - To access SETUP configuration, enter: **Owner** (case-sensitive)
3. Tap ENTER.

Enter PASSWORD

1. Tap the PASSWORD field box. The alpha-numeric keypad appears.
2. Type one of the following into the PASSWORD field:
   - For USER (basic operation), enter: **123** (case-sensitive)
   - For Owner (setup), enter: **MyDryer** (case-sensitive)
3. Tap ENTER.

If an incorrect NAME or PASSWORD was entered (including if the incorrect case was used), the following message is displayed:

Figure 81.



- Tap X to acknowledge/dismiss the message and re-start the LOG IN process.

Complete the LOG in Procedure

1. Tap UNLOCK. The Current User field displays the NAME of the logged in user.
2. Tap HOME. The MAIN MENU screen appears with the following changes:
   - The LOG OUT button is available in the lower-left corner of the screen.
   - The user NAME appears directly above the LOG OUT button.
   - Depending on the login security level, additional buttons are now available (button is solid rather than hatched pattern), including the OPERATION PERMITTED indicator.

MAIN MENU — After LOG IN

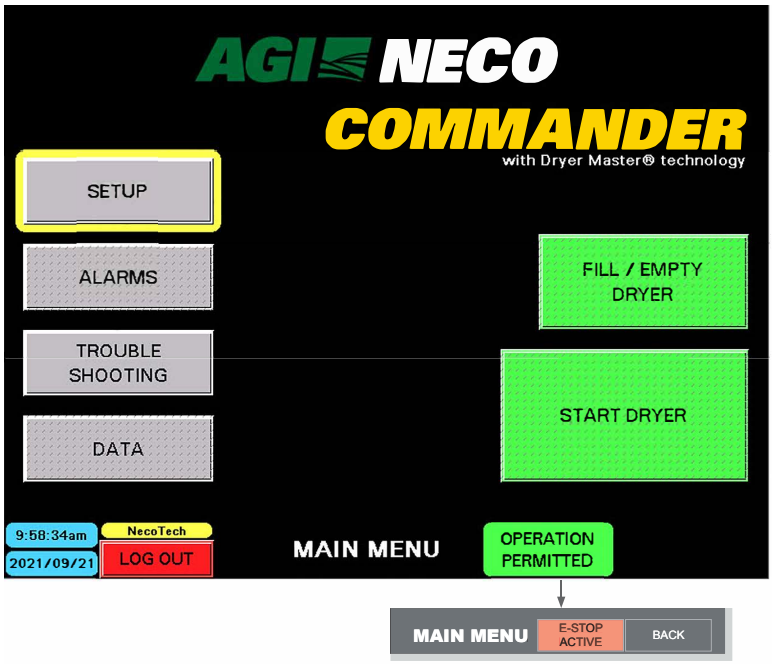
Note

A flashing SETUP button indicates the system configuration data must be restored. This could occur after installing new software, or replacing the PLC battery.

Depending on which screen is currently active, buttons and indicators may appear, or change status:

- The OPERATION PERMITTED indicator may change to a flashing E-STOP ACTIVE indicator.
- Tapping the MAIN MENU button displays the MAIN MENU screen. Touching the BACK button displays the previous screen.

Figure 82. MAIN MENU displaying E-STOP ACTIVE



After LOG IN, the following buttons are available, and the following screens are accessible:

- **SETUP** — Verify or enter various setup parameters related to the dryer and auxiliary equipment.
- **ALARMS** — View any current ALARM status
- **TROUBLESHOOTING** — Contact information for NECO or the local dealer is available for viewing.
- **GRAPHS** — Graphs can be charted for grain moisture, grain temperature, or grain discharge rate. Data values such as volume throughput are shown.
- **FILL/EMPTY DRYER** — Used for production filling or emptying of the dryer.
- **GO TO START DRYER SCREEN** — Used for setting up START DRYER parameters such as which blowers and burners are enabled, etc.

Prior to startup or operation, all SETUP information must either be verified or entered.

- Some information has been input at the NECO factory in order to do system testing prior to shipment of the equipment. Additional information, such as auxiliary equipment, can only be entered after all equipment has been installed.
- Logged in as Owner, go to SETUP and complete the FILL & EMPTY SETUP and TIMERS SETUP requirements.

Note

After this SETUP data has been entered and verified these screens would generally only need to be accessed if there are changes made to the physical dryer configuration, motors replaced, or the status of any auxiliary equipment has changed.

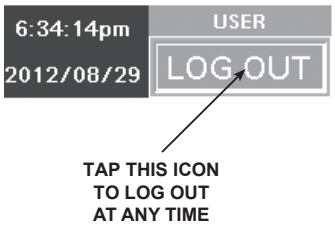
If all SETUP information has been entered and verified:

- Use the New Dryer Checklist or Pre-Season Checklist as required.
- Otherwise, go to the Operation section to determine how best to fill, start, and run the dryer.

LOG OUT

- The LOG OUT button can be activated at any time during the drying process.

Figure 83. LOG OUT button



- Upon LOG OUT the existing process will continue. NECO recommends not leaving the dryer system completely unattended for an extended period of time, even with the DryerMaster in AUTO mode. The moisture content should be regularly checked and calibrated.

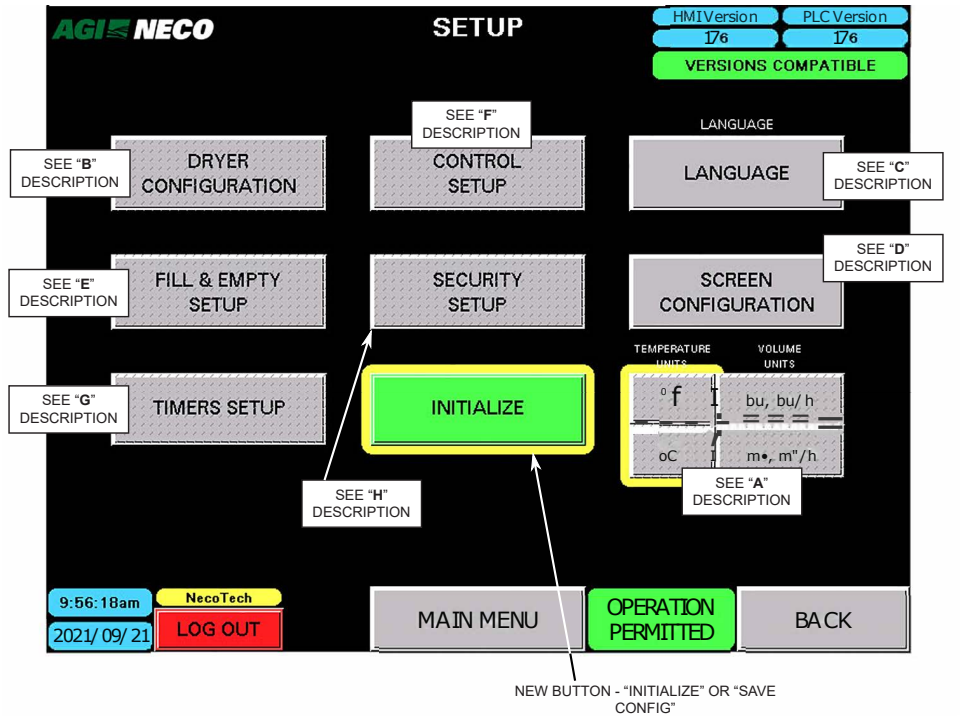
4.3.2 SETUP Main Screen

- The current version of PLC and HMI software is shown at the top-right corner of this main SETUP screen. The two version numbers MUST ALWAYS MATCH. If they match the *Versions Compatible* indicator appears. If they do not match, contact your dealer.
- Some information has been entered and verified at the NECO factory and can NOT be edited or changed unless the user is logged in as an Owner.

Note

The SECURITY SETUP button (H) will not be available if you are logged in as *User*. To have the button available, and be able to setup the quick login procedure, log in as *Owner* or Necotech.

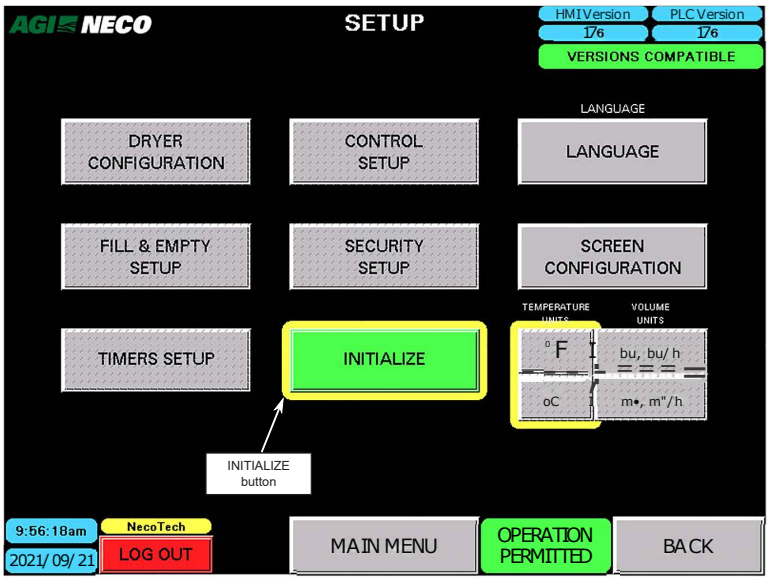
Figure 84. SETUP Main Screen



INITIALIZE or SAVE CONFIGURATION Button

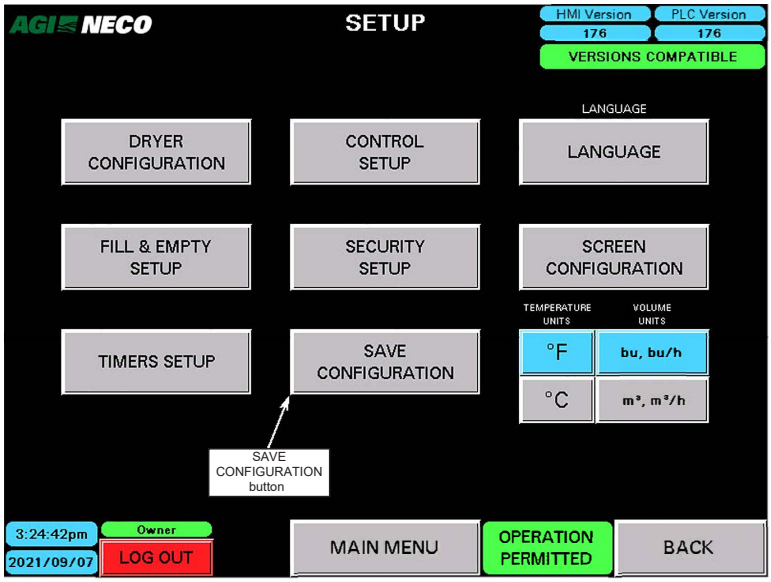
- Starting with the Version 50 installation, the various configuration data is periodically saved to the HMI's USB data port.
- In the event of a battery failure, the configuration and settings can be restored by tapping the INITIALIZE button.

Figure 85. SETUP — INITIALIZE



- Use the SAVE CONFIGURATION button to save data after making setup changes and at the end of the season before turning power off.

Figure 86. SETUP — SAVE CONFIGURATION

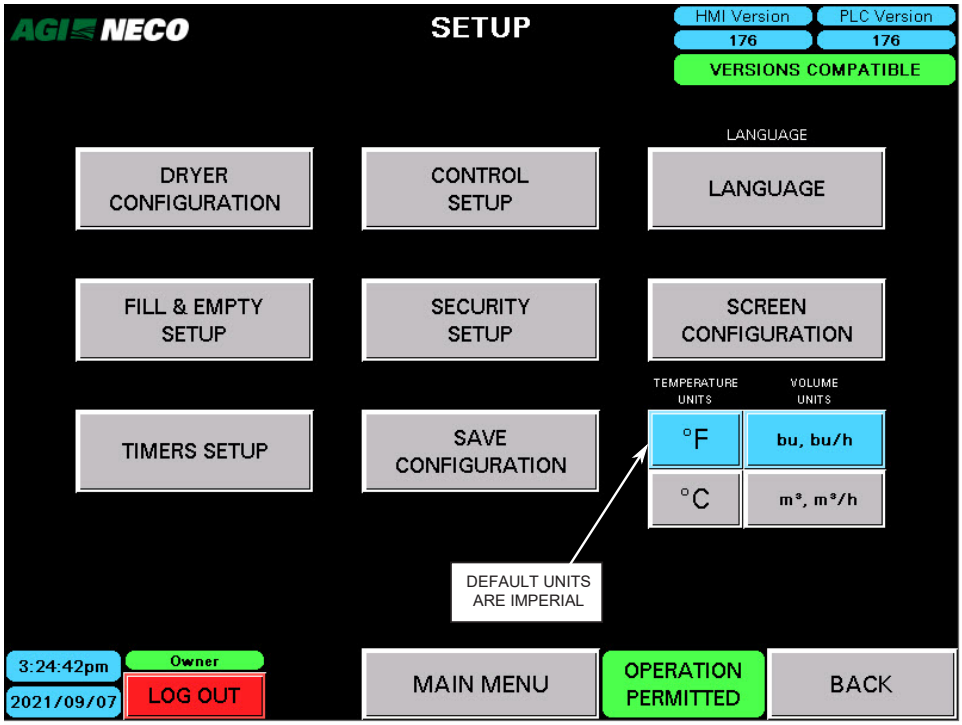


4.3.3 NECO Entered Setup Data

A. Select Desired Units of Measurement

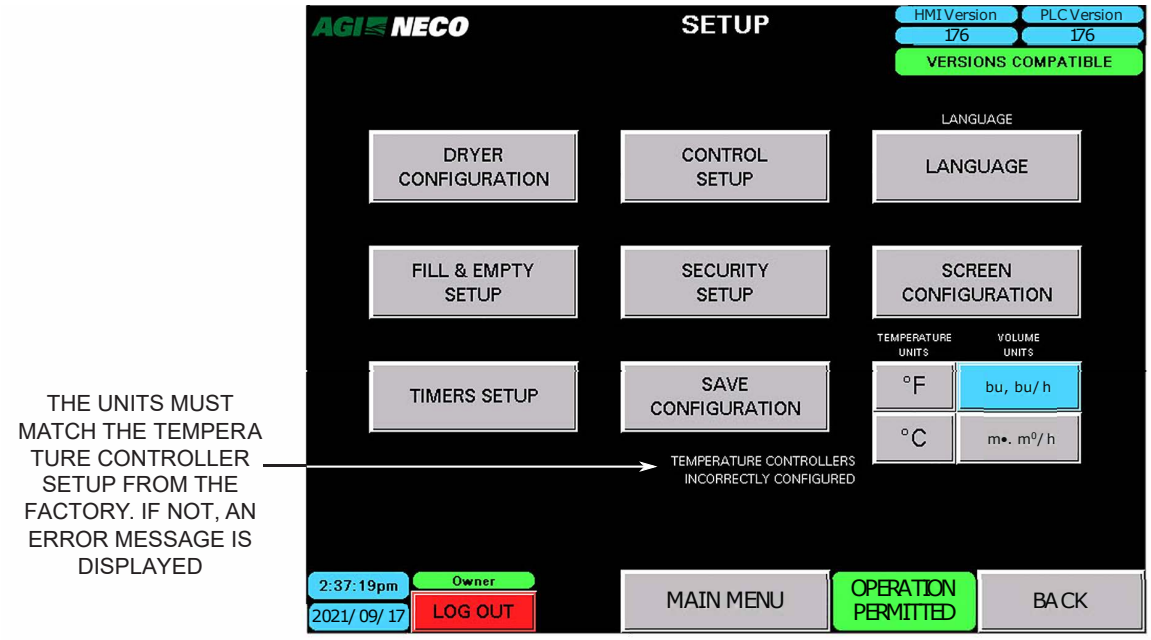
- IMPERIAL — Temperature: Fahrenheit (°F); Volume: bushels per hour (BPH)
- METRIC — Temperature: Celsius (°C); Volume: cubic meters per hour (CMH)
- If no units of measurement is chosen, the default is IMPERIAL.

Figure 87. Units of measurement



- If, during initialization or setup, the units designation does not match the temperature controller configuration, a warning message appears, and the correct units must be chosen. It may be necessary to change temperature units to C then back to F to clear this message.

Figure 88. Units of measurement



Note

The system can switch between unit modes. Tap the desired mode button. It will take approximately 45 seconds for the control to change over.

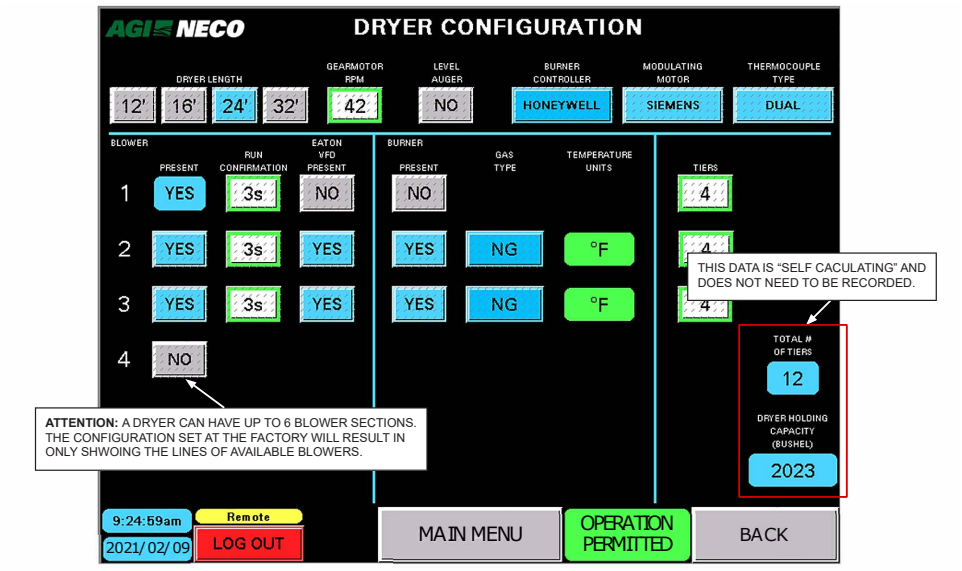
B. Dryer Configuration

- Dryer configuration information is entered at the NECO factory and provides the software with the “as-built” dryer configuration.
- The screen can be viewed by any login status, but only **NecoTech** login status can make changes. For example, if the configuration needs to change due to dryer upgrade, etc.

Note

The example screen shown below is a “mock” 24–ft dryer that has three blowers and burners, with each pair feeding four tiers. Units = Imperial (F); fuel system is liquid propane (LP). Since the example is a three blower system, and the dryer has no #4 blower present, the remaining buttons for line #4, as well as #5 and #6 are row inputs, are not visible.

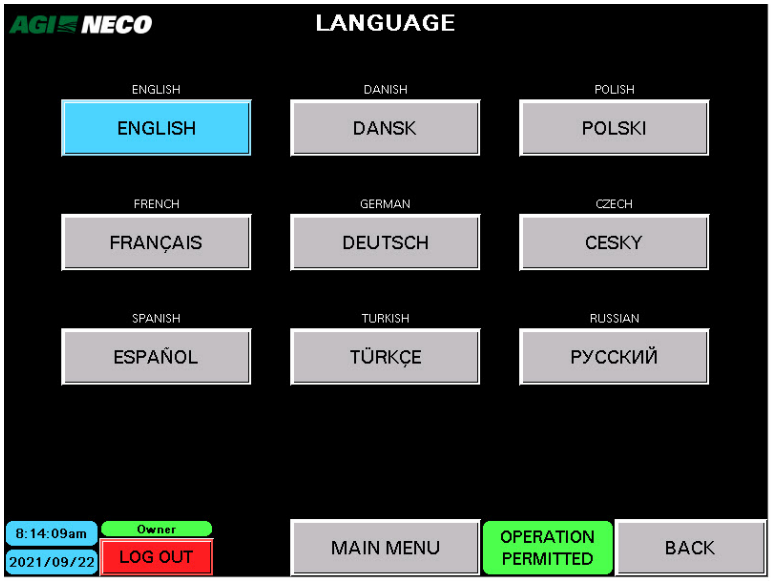
Figure 89. Dryer Configuration screen



C. User Language

- User language information is entered at the NECO factory.
- The screen can be viewed by any login status, but only **Owner** login status can make changes.
- User language choices reflect NECO written programming screens only.

Figure 90. User Language screen



D. Screen Configuration

- User language information is entered at the NECO factory.
- The following items can be changed with **Owner** login status:
  - Brightness
  - Date/Time

– Language (changes within the Schneider software screens only)

Figure 91. Screen Configuration screen

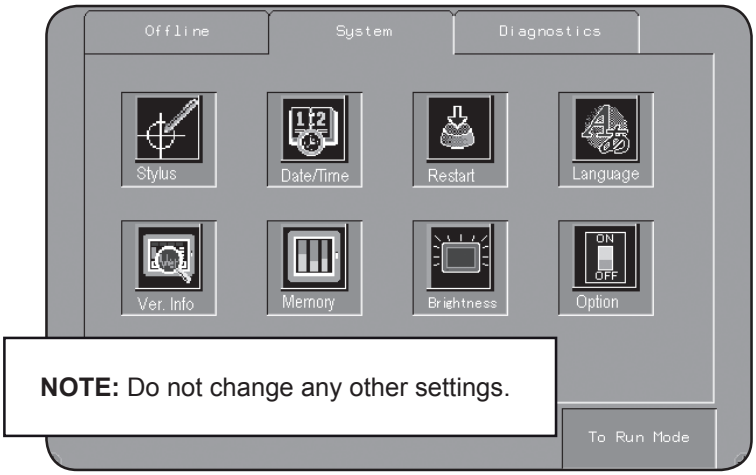


Table 6. Schneider Language Choices

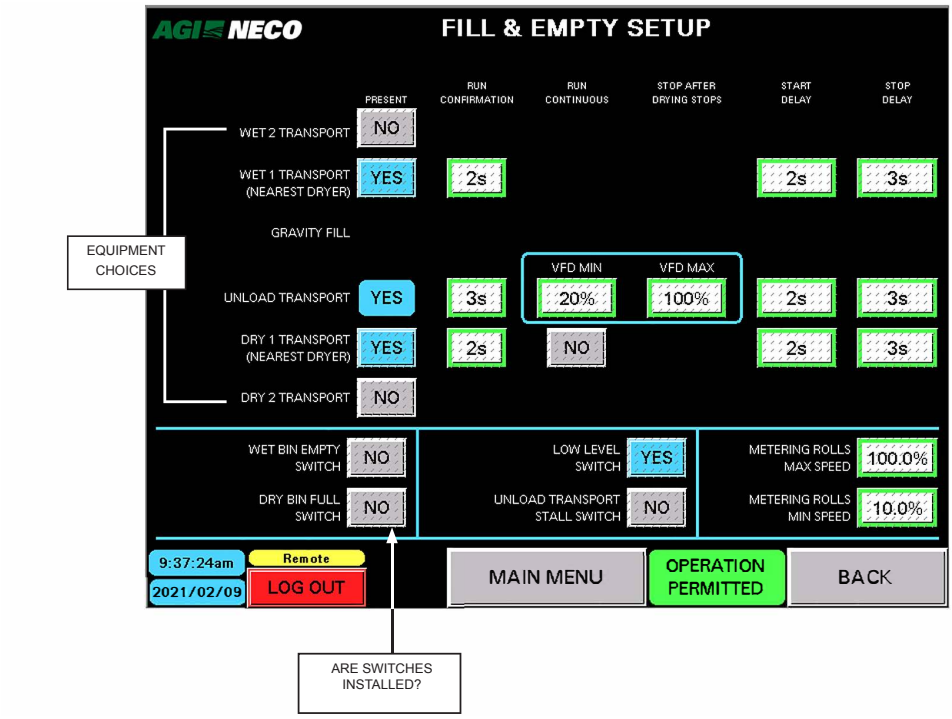
Enter #	Language
0	English
2	French
3	German
4	Italian
5	Spanish
6	Chinese
7	Portuguese

4.3.4 Dealer or Customer Entered Setup Data

E. Fill/Empty Setup

- See Section 8.2 – Optional External Transport Configurations on page 128 for example layouts and related data.
- This information is entered by your dealer. It provides the software with “as-built” dryer and auxiliary equipment information required for filling and emptying the dryer.
- The screen can be viewed by any login status, but only **Owner** login status can enter data or make changes.

Figure 92. Fill/Empty setup screen



The following criteria are possible options available for the equipment choices.

Note

If "Motor Present" is set to "No," no further options are displayed for that piece of equipment.

Based on the data entered, further options for that piece of equipment are available:

- For each piece of equipment, is a “MOTOR PRESENT”? YES or NO
- If a motor is present, does it “RUN CONTINUOUS” ? YES or NO
- If the motor runs continuous, should it stop after drying stops ? YES or NO
- START or STOP DELAY values can be entered as required. (See Section 8.2 – Optional External Transport Configurations on page 128 for details.)

Equipment To Be Controlled

- WET 2 TRANSPORT (farthest from dryer)
- WET 1 TRANSPORT (closest to dryer)
- LEVEL AUGER (optional part of dryer)
- UNLOAD TRANSPORT (part of the dryer)
- DRY 1 TRANSPORT (closest to dryer)
- DRY 2 TRANSPORT (farthest from dryer)

Switches To Be Monitored

- WET BIN EMPTY SWITCH INSTALLED? Yes or No
- DRY BIN FULL SWITCH INSTALLED? Yes or No
- LOW LEVEL SWITCH INSTALLED? Yes or No

- UNLOAD TRANSPORT STALL SWITCH INSTALLED? Yes or No

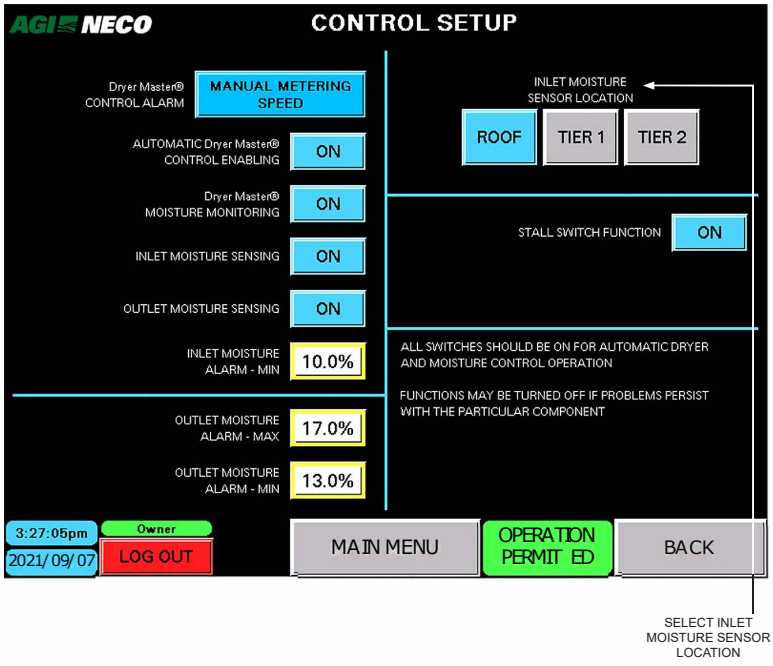
Metering Rolls Minimum and Maximum Speed

- The minimum speed default value is 10. This may need to be increased to ensure the moisture sensor remains covered with grain.
- The maximum speed value should reflect the unload system capabilities:
  - If the value is set too high, excessive plugged discharge alarms will occur.
  - If the value is set too low, production will not be maximized.

Control Setup (overrides)

- This section allows the operator or technician to “override” switches, etc.
- For fully automatic dryer and moisture control operation, all switches should be “ON”. This will cause the control to automatically proceed to the next stage, without pausing to wait for a screen control to be activated.
- If the DryerMaster system has an alarm, the default control status to proceed is to STOP DRYING. If the screen control is toggled, the dryer will continue running at MANUAL METERING ROLL SPEED.

Figure 93. Control Setup screen



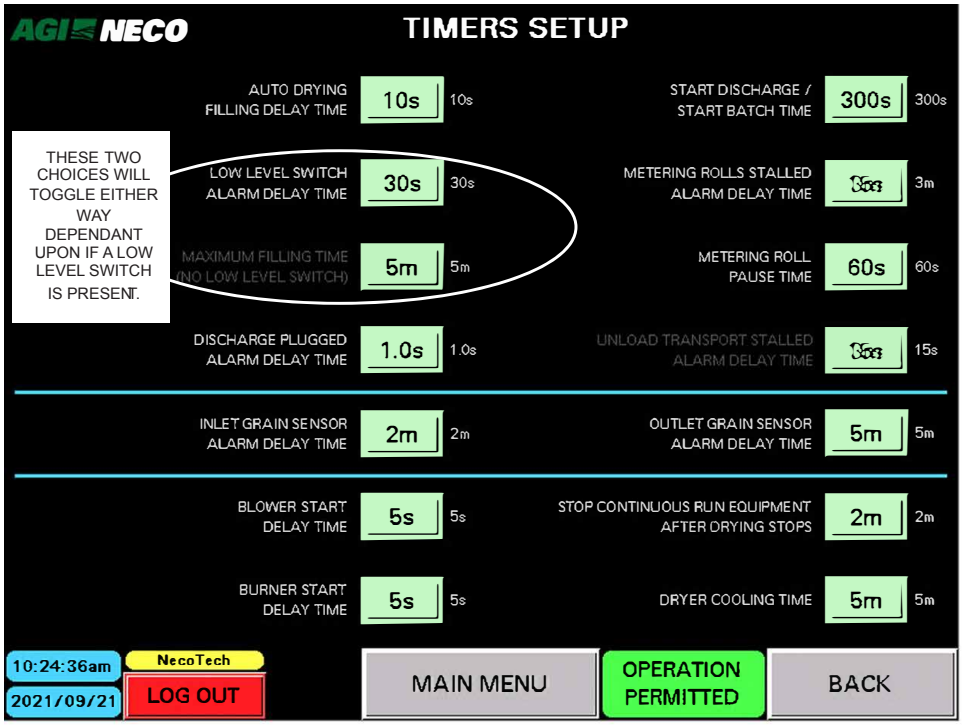
Outlet Moisture Maximum and Minimum Alarm Setpoints

- Outlet moisture readings outside of these limits will trigger an alarm and shut down the dryer.
- These setpoints are also visible and editable when changing the target moisture. They can be set as close as 0.5% above and below target moisture. Keep in mind the narrower this window the more likely the dryer will shut down.

Timers Setup

- Default timer values are set within the NECO program. These are to be considered a starting point only. The default data may require fine tuning for your specific equipment configuration. Your dealer will assist with this during startup, etc.
- Depending on the equipment configuration, some timer functions may not be used. These are unavailable and cannot be selected.
- Use the Section 8.5 – PLC and HMI Recorded Data Sheet on page 134 to record this information.

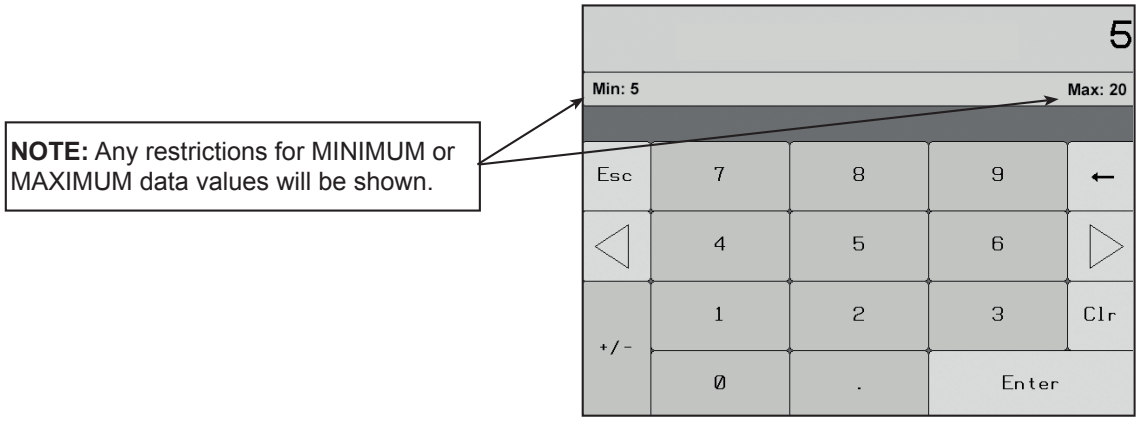
Figure 94. Timers Setup screen



To enter or edit Timer data:

1. Tap the field (box) for the data to be changed. The on-screen numeric keypad appears.

Figure 95. On—screen numeric keypad



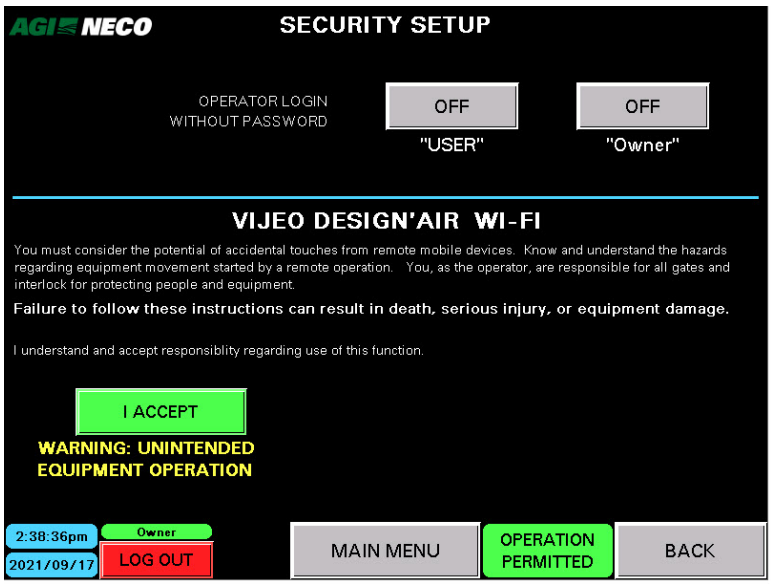
2. Enter the required data.

3. Tap the ENTER button on the keypad. The Timer field displays the new data.
4. Edit additional timers or navigate to the MAIN MENU, or BACK the SETUP screen using the buttons at the bottom of the screen.

Security Setup

By default, a user name and a password are required to log in and gain access to the dryer operations. The log in security can be disabled for the USER or Owner level access, if needed. Only one of the two is permitted to be active. Once activated and no one is logged in, a quick "login" button will be visible in the middle of the main screen.

Figure 96. Security Setup screen



Vijeo Design'Air Wi-fi

This is optional wi-fi access to the dryer HMI control. An application can be downloaded and installed on a tablet or cell phone to gain access to the dryer HMI when within wi-fi range. The addition of a wi-fi router, cabling, antenna are required for this access. Refer to the Commander Wi-Fi access section in the Appendix.

4.4. Operation Overview

The NECO continuous dryer system can be optimized using various setups and styles of operation. For instance, the steps of operation for a setup that allows for output grain to be directed back into the wet bin can start and operate differently than a setup where the output grain goes directly into a storage bin. Your dealer can help with auxiliary equipment utilization.

The following examples show two of the most popular equipment configuration and operation situation:

- Example A: Output grain is directed to dry bin grain storage.
- Example B: Output grain is directed back to the wet bin to be recycled through the dryer.

Both examples start by filling the dryer with wet grain using the Fill/Empty routine. Once the dryer is filled above the low level switch and any continuous equipment is running, the Start Auto Dryer button is available.

At this point the crop type can be verified or edited, cooling tiers can be designated, burner temperatures can be set, and a choice can be made to begin drying using either the BATCH (all heat) mode or AUTOMATIC mode.

Fuel Delivery

In both examples it is important to first verify that fuel is being delivered to the dryers:

- Before opening the fuel line to full OPEN, make sure that the plenum is heating up correctly.
- For LP units: The 3/4” return line from the vaporizer MUST be warm to the touch.
- Open the fuel line completely and verify the pressure settings on each of the system regulators:.
  - LP systems = 4.0 to 6.0 PSI
  - NG systems = 3.0 to 5.0 PSI

4.4.1 Example A: Batch Drying

In this example output grain is directed to dry bin grain storage.

- After the dryer has been filled with wet grain, BATCH mode is used to begin the drying process
- After BATCH drying for approximately 30 minutes, use the FILL/EMPTY BYPASS option to move some grain through the dryer. This short bypass (5 minutes) moves the cooler, higher moisture corn to the heat ducts, increasing the uniformity of grain drying. This also prevents over-temperature exposure to the drier corn kernel.
- Moisture can be monitored on the DryerMaster STATUS screen. (Navigate from the MAIN MENU screen to the TROUBLESHOOTING screen, to the DryerMaster STATUS screen)
- Once the output grain is within acceptable range for storage conditions, AUTO DRYING mode can be used with the DryerMaster Moisture controller once adequate data has been collected.

4.4.2 Example B: Auto Drying

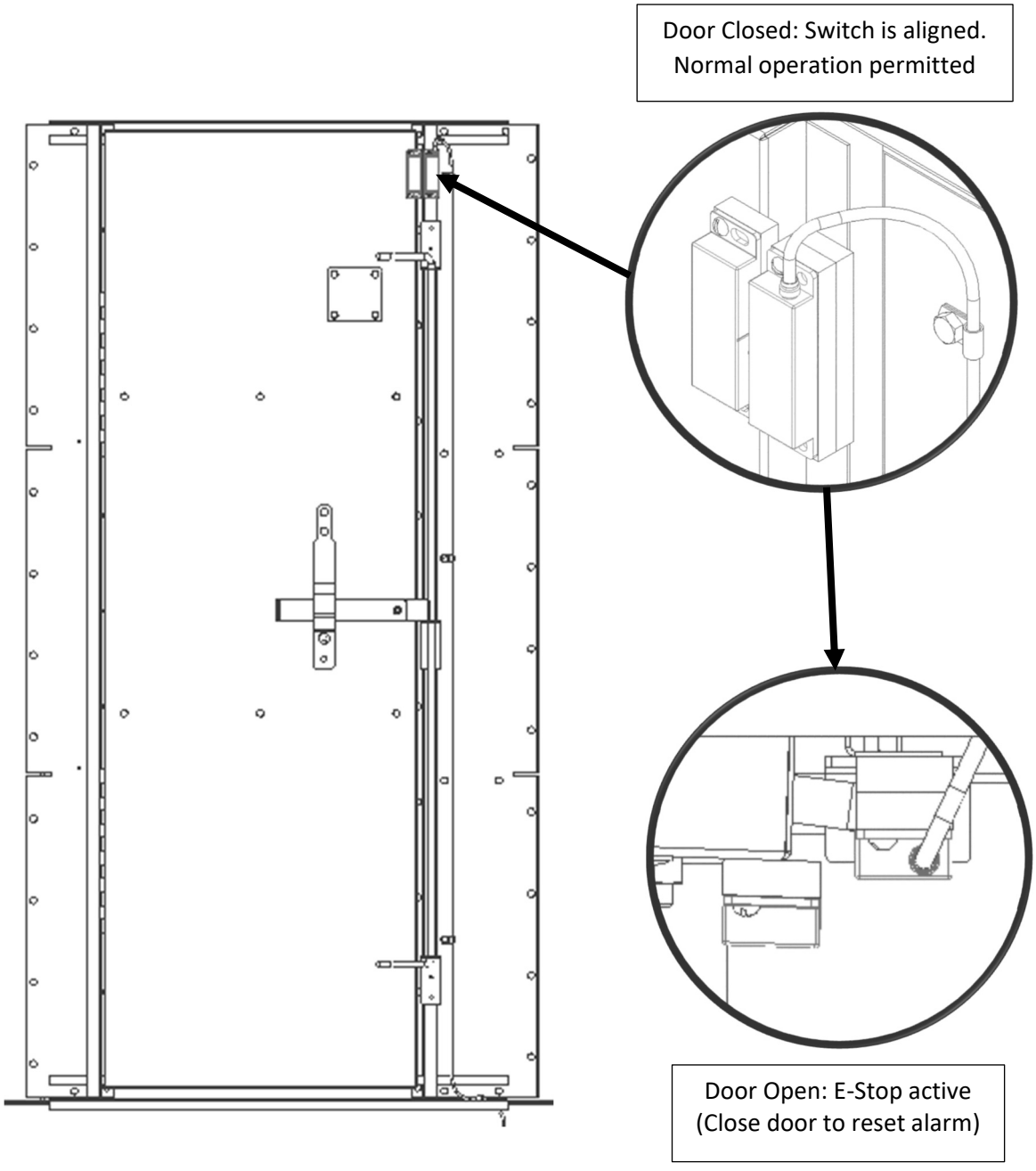
- After the dryer has been filled past the low dryer switch, set the discharge equipment so that the grain output from the rear of the dryer is directed back into the wet bin.
- Starting on the START DRYER screen, set the temperatures so that the hottest temperature is set on to the highest burner (#1) and the temperatures decrease in each section going down through the dryer.
- For example: a three-burner dryer drying 28% moisture #2 Yellow Corn would have the highest temperature of 220 °F in the top burner #1 and the temperature would decrease in 20°F - 40°F increments moving down through the dryer. Burner #2 at 180°F - 200°F and burner #3 at 160°F - 180°F.
- If cooling floors are present on the dryer, run in the all heat configuration until the moisture has reached an acceptable level for storage limitations in the dry bin.
- Go to the START DRYER screen.
- The grain moving through the dryer at this point should be discharged back to the wet bin.
- After the moisture has been brought down to an acceptable level, divert the grain to the dry bin and make sure that some cooling is applied to the grain. Ideally, the grain should be as close to ambient temperature as possible upon exit of the dryer assuming limited aeration capabilities of the dry bin.

4.4.3 Plenum Door Safety Switch

The plenum door safety switch is mounted on the top right-hand corner of the plenum entry door.

Note

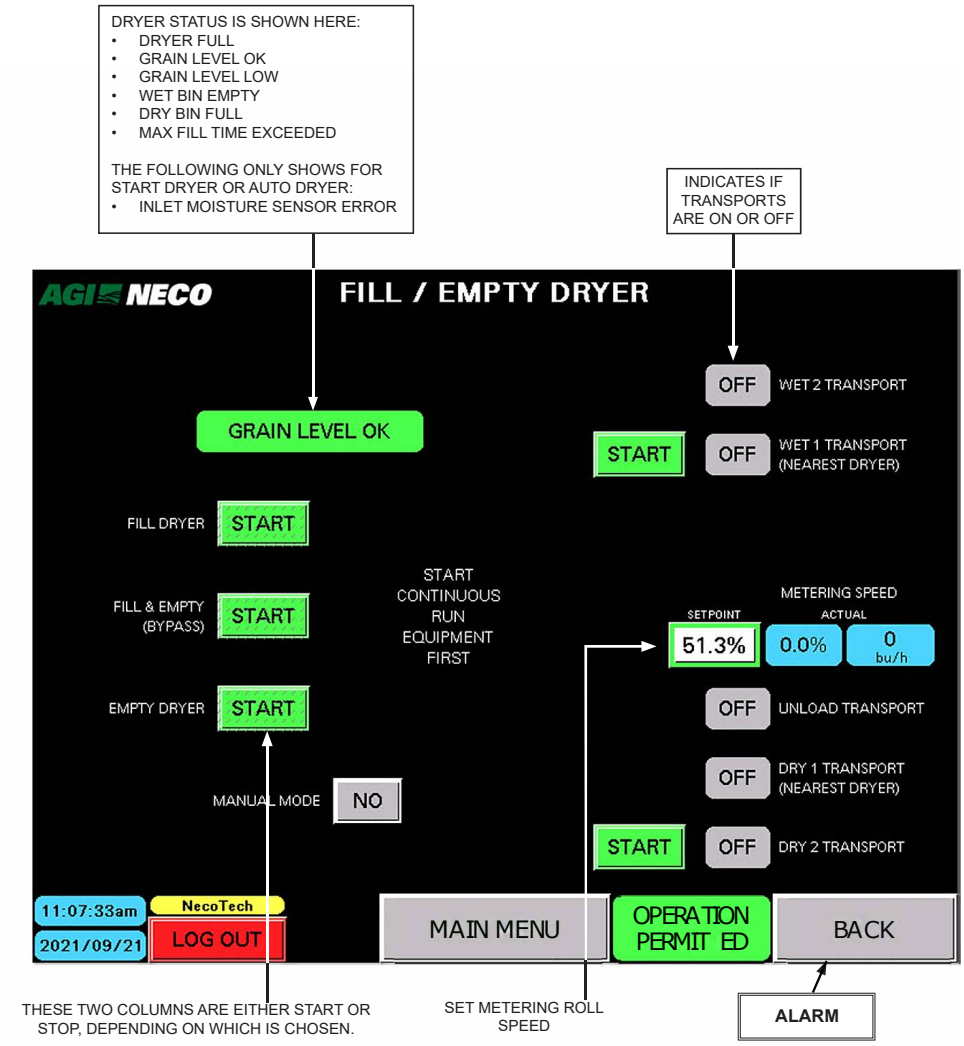
When the door is open, the emergency stop alarm will appear on the HMI screen. This will turn OFF all outputs from the PLC. It does NOT shut off power into either Control Panel. The Power ON lamp will remain lit on the main Control Panel. Close plenum door for dryer operation.



⚠ WARNING Be sure to follow proper lockout/tagout procedures prior to entering the dryer.

4.5. Fill/Empty Dryer

Figure 97. Fill/Empty Dryer



Note

If an error occurs, a flashing ALARM indicator/button appears in place of the BACK button. Tap this button to open the ALARMS screen to view and reset the alarm after the condition has been resolved.

Set Manual Metering Roll Speed

- See Section 8.1 – Manual Dryer Speed on page 127 for recommended metering roll speed starting point.
- This speed will be used as the manual setpoint for Batch Mode drying and for initial Automatic Drying Mode until the DryerMaster gathers enough moisture data to take full automatic control.

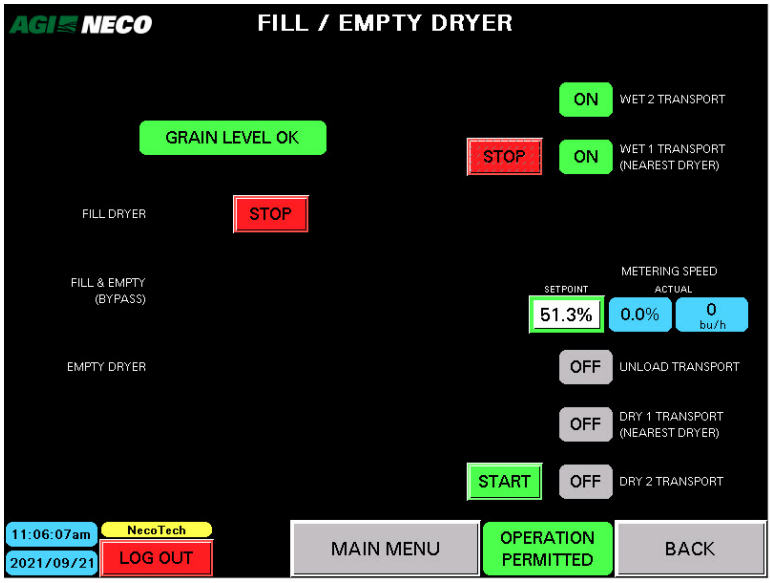
Note

Only the equipment identified in SETUP — FILL/EMPTY will show up in this list. Status indicator is ON or OFF. If the equipment fails to run or a motor overload trips, a fault indicator appears. Once the problem is solved, the alarm indicator goes out. If OFF, push START or if ON, push OFF to start the delay timer for that piece of equipment?

- Wet Transport 2 (farthest from dryer)
- Wet Transport 1 (nearest to dryer)
- Level Auger
- Unload Auger
- Dry Transport 1 (nearest to dryer)
- Dry Transport 2 (farthest from dryer)

Fill Dryer

- Used to initially fill the dryer with grain.
- Tap START to start filling; tap STOP to stop filling. Filling will stop automatically when the Fill switch is activated.

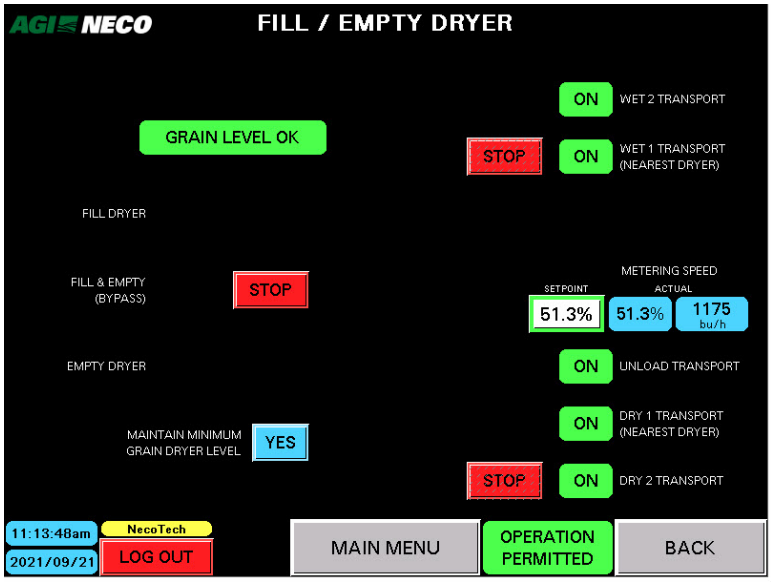


Fill & Empty (Bypass)

- Used if the grain must pass through the dryer, but not actually be dried.
- Tap START to start; tap STOP to stop.

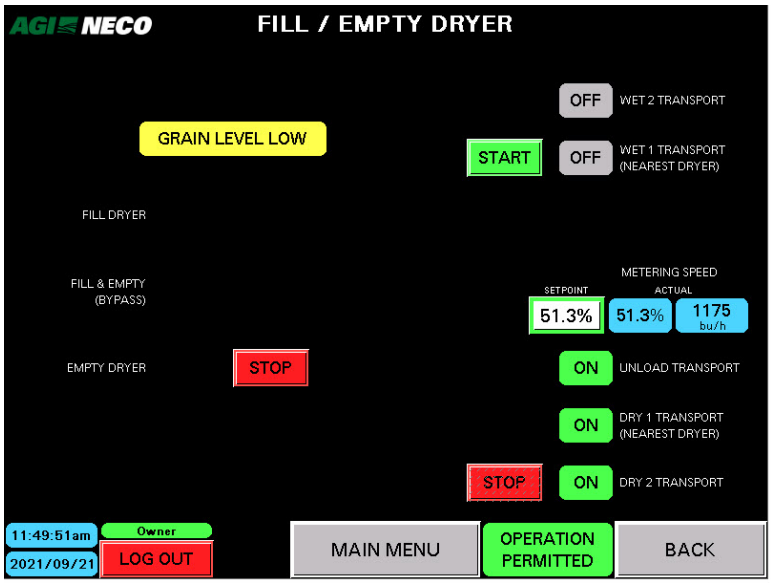
Note

Turn on the Maintain Minimum Grain Dryer Level to prevent grain from bouncing out of the dryer ducts.



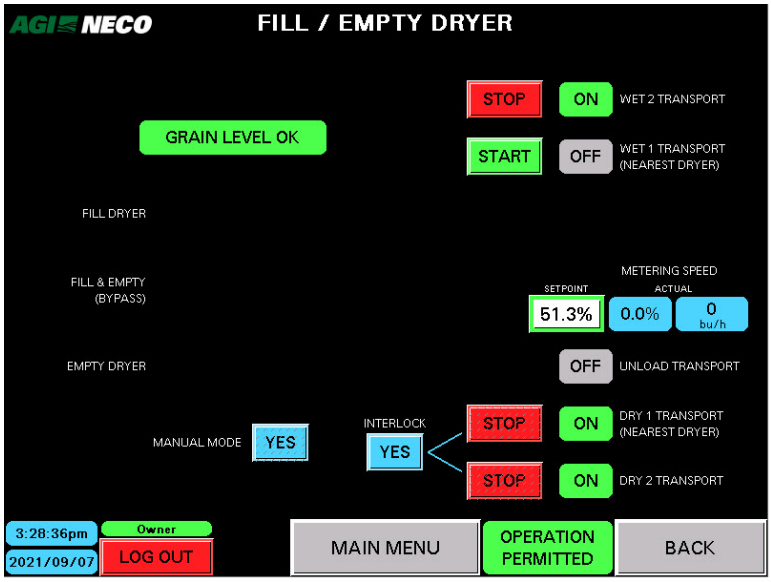
Empty Dryer

- Used when no further filling of wet grain is to occur and the remaining grain must be discharged.
- Tap START to start; tap STOP to stop.



Manual Mode

- Press the Manual Mode button to allow manual operation of the Wet 1, Wet 2 and Dry 1, Dry 2 transports when not drying.
- The external transports can be run manually without the need for additional external local/auto switches.
- Both the Wet 1 & Wet 2 transports as well as Dry 1 & Dry 2 transports can be interlocked so that if one faults out the other will stop.



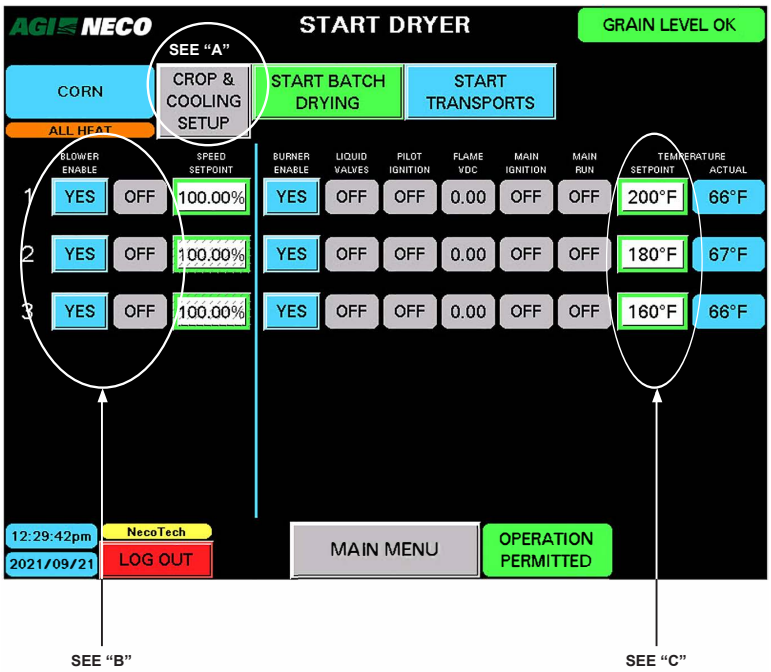
4.6. Start Dryer - Main

4.6.1 Start Dryer Overview

The Start Dryer main screen is used for:

- Setting necessary drying parameters and then activating either BATCH or AUTO mode.
- Refer to the following sections (designated A, B and C) to correctly set parameters for the required drying mode:
  - Section – A. Crop and Cooling Setup on page 84: Change, add, or edit crops and setup cooling tiers. The current crop and cooling tier layout are shown in the upper-left area of the screen, below the NECO logo.
  - Section – B. Enable or Disable Blowers and Burners on page 87: Set enable or disable for blower(s) and burner(s) for either BATCH MODE or AUTO MODE.
  - Section – C. Set Burner Temperature on page 88: Set burner temperature setpoints for either BATCH MODE or AUTO MODE.

Figure 98. Start Dryer – Main

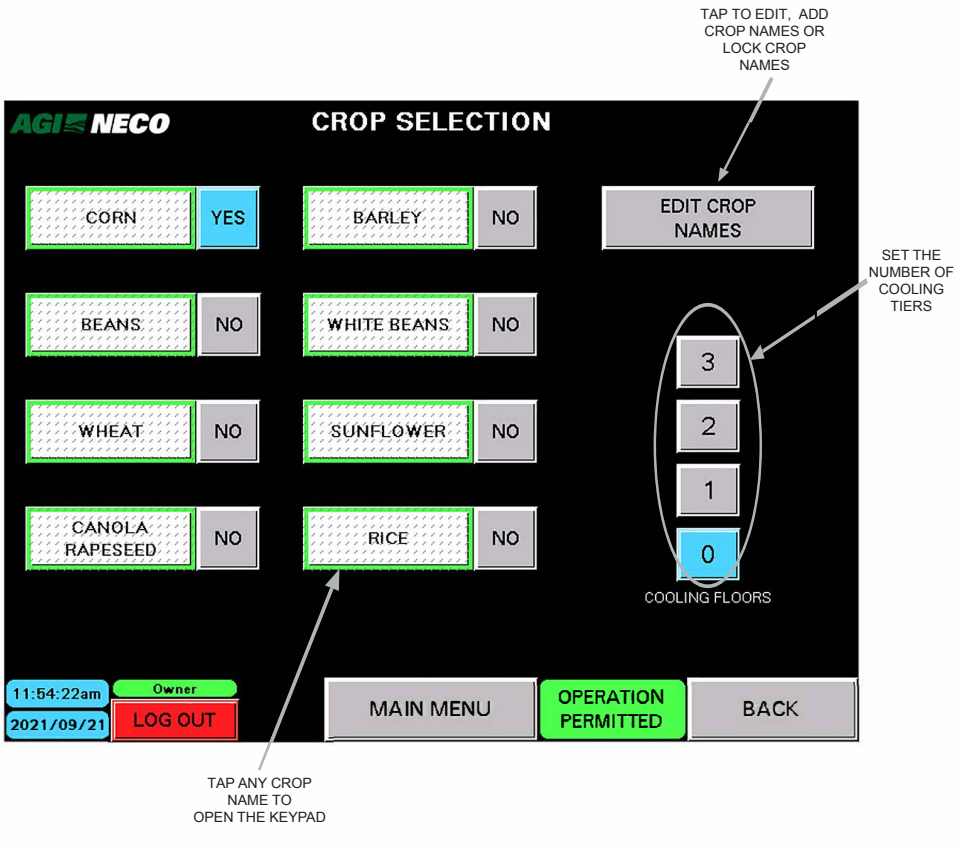


A. Crop and Cooling Setup

This CROP/TIER screen appears when CROP AND COOLING SETUP is selected. This screen displays YES beside the current crop selection. The operator can:

- Select a different crop
- Set cooling tiers
- Edit or enter a crop name or description

Figure 99. Selecting crops and tiers



To select a different crop:

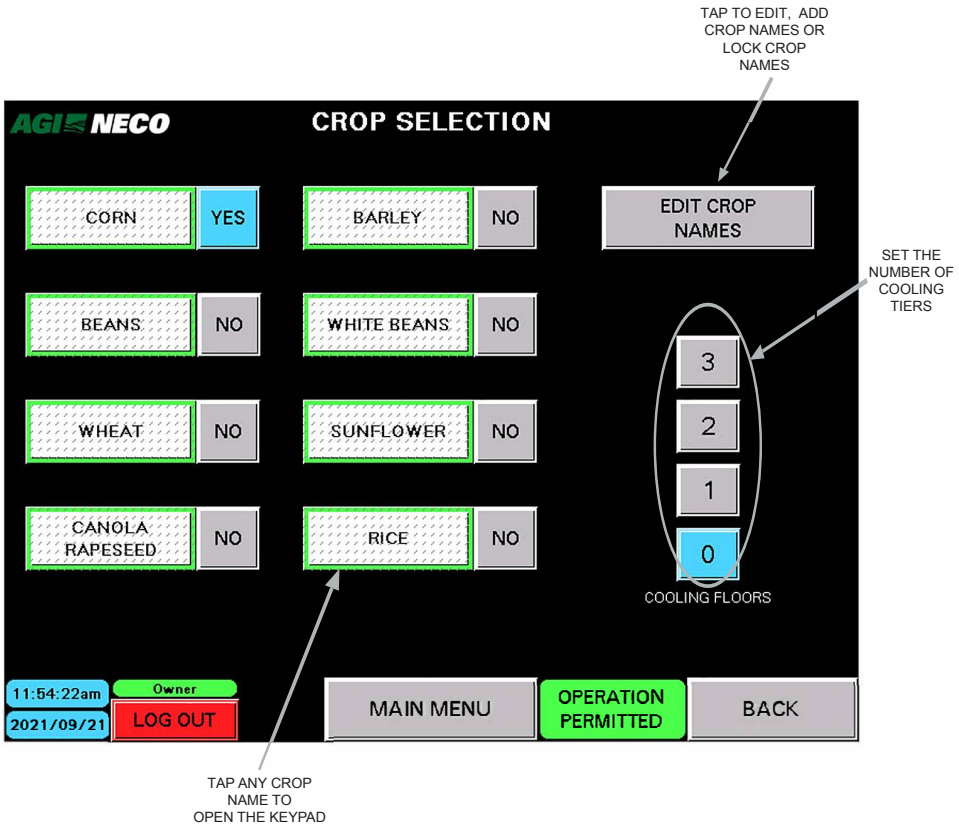
- Tap the NO button beside indicator for the new crop desired.
- YES will appear, and the screen automatically switches to the START DRYER - MAIN screen
- Verify the current crop indication at the upper-left corner of the screen has changed to display the newly selected crop.

To set cooling tiers (floors):

- Tap the button representing the correct number of cooling tiers.

Edit or Add Crop Names

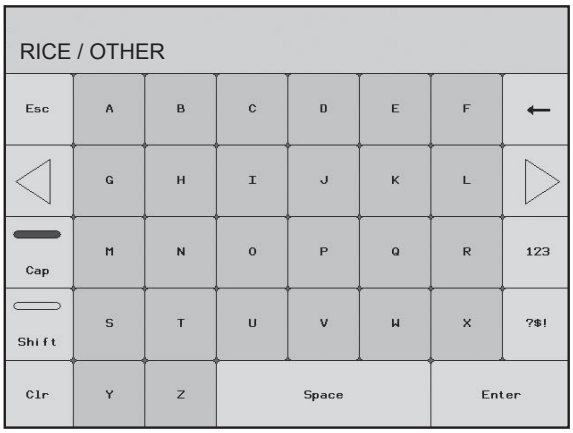
Figure 100. Editing Crop Names



To edit or a add a crop name or description:

- Tap the Edit Crop Names button. The Edit Crop Names button changes to display Lock Crop Names. The existing crop name buttons become available, allowing them to be selected.
- Tap any crop name button to be changed. The alpha-numeric keypad appears. The current crop selection is shown at the top of the keypad .

Figure 101. Alpha-numeric keypad



- Make the required changes, using a maximum of 26 characters.

- Tap ENTER.
- Tap the LOCK CROP NAMES button to lock in the changes. The button changes to display EDIT CROP NAMES as before.
- Tap the BACK icon to return to the START DRYER - MAIN screen.
- Verify that the current crop icon at upper-left corner has changed to the newly selected crop.

B. Enable or Disable Blowers and Burners

Overview

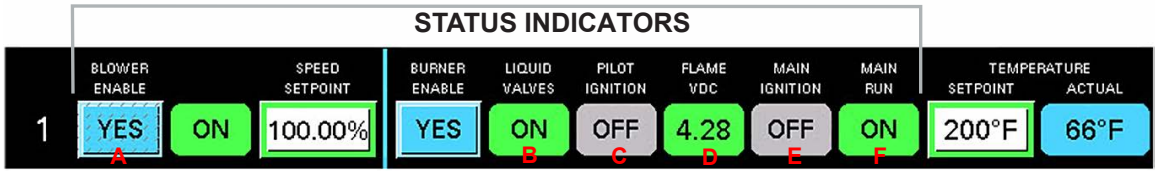
- Dryer configuration is set at the factory. The screen will display ONLY the actual blower/burner rows (number 1 to number 6) that are in this particular dryer configuration.
- The SETUP - MAIN and BATCH DRYING screens utilize this layout and can show from 1 to 6 blower rows.
- On multiple blower dryers, the blower start time is staggered, starting with the upper-most section (number 1). The BLOWER START DELAY TIMER is factory set for a five second delay.

  Note

  Increase the default delay time on dryers that have blower soft-starters or VFDs to allow each blower motor to ramp up to full speed before starting the next motor.

- The ON or OFF status indicators show the current status as either OFF or ON. When the indicator is ON, it appears to be illuminated.

Figure 102. Status indications (at the end of the startup operation sequence)



Startup Operation Sequence

(A, B, C, D, and E, in the following steps refer to reference letters in Figure 102.)

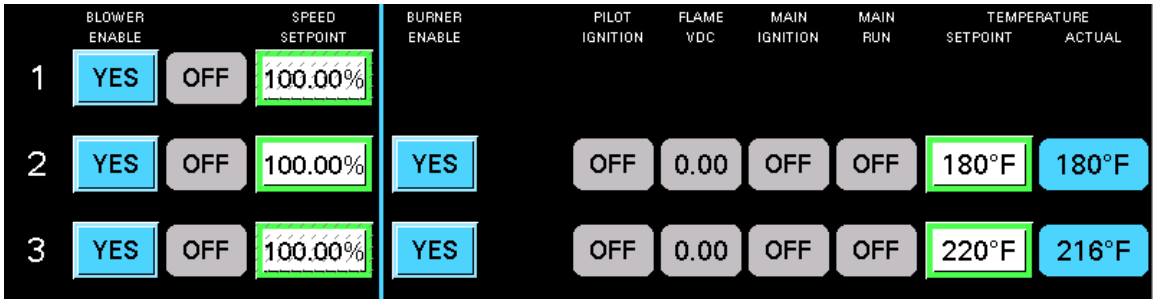
1. The blower turns ON and the BLOWER indicator changes from OFF to ON (A).
2. The BURNER START DELAY TIMER is factory set for a five second delay. Upon blower ON, the delay timer starts. When the timer is complete the LP liquid valve opens and the LIQUID VALVE indicator changes from OFF to ON (B).
3. When LIQUID VALVE goes ON, the valve remains open and purges for a set time of 30 seconds. During this time the BLOWER is ON, but the pilot valve and main valve (M1) remain closed.
4. At the end of the purge period, the pilot valve and M1 valve opens. The spark generator energizes to light the pilot. The PILOT IGNITION indicator changes from OFF to ON (C)
5. When the spark generator creates a pilot flame, the flame sensor voltage appears in the FLAME VDC indicator field (D). If the voltage is 1.25 volts or less the pilot flame is not recognized and an error occurs.
6. After a factory set 10-second period to verify pilot flame, the M2 valve opens.
7. Upon M2 valve opening, a factory set 10–second delay begins.
8. If the air switch does NOT detect blower operation, OR the UV sensor does NOT verify the presence of burner flame, an error occurs. When the UV sensor does detect the burner flame, the main ignition indicator changes from OFF to ON (E).

9. Upon correct blower and burner detection the pilot valve closes and the main run indicator changes from OFF to ON (F).

Possible Burner Settings

Depending on whether BATCH or AUTO mode is selected, the blower/burner settings shown in (BLOWER NUMBER) rows 1, 2, 3, and 4 of the following screenshot are possible:

Figure 103. Blower and burner indicators



- Row 1: Both blower and burner are enabled for use, so all of the remaining status indicators are visible.
- Row 2: The blower is enable, but the burner is disabled, so the status indicators are NOT visible.
- Row 3: The blower is disabled, so none of the following status indicators (including the burner status) are visible.
- Row 4: The blower is enabled, and this section is operating WITHOUT a burner, so the blower status is visible but the burner and related status indicators (including temperature indications) are NOT visible.

C. Set Burner Temperature

- For each burner setpoint value, once a temperature has been entered, that value stays current until changed. Even if a dryer section burner is disabled, the setpoint value remains effective.
- Tap the setpoint field for the temperature to be entered or changed to open the numeric keypad.
- Enter a temperature setpoint value between a minimum value of 32°F and a maximum of 250°F (0°C - 121° C).
- Tap ENTER to lock in the value.

Figure 104. Setting burner temperature

Note

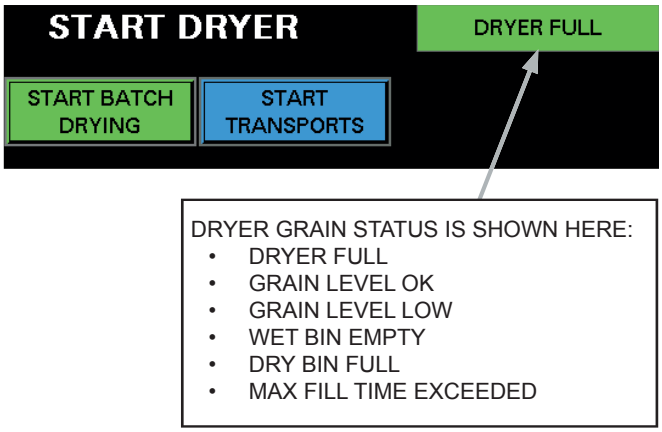
The temperature setpoints can be modified at any time during the drying process.

4.6.2 Completion of Dryer Setup

Upon completion of the preceding steps (A, B and C), and prior to starting either BATCH or AUTO drying modes:

- Current dryer status is displayed in the upper-right corner of the screen.
- The START BATCH DRYING or START AUTO DRYING buttons appear when all required conditions are met.

Figure 105. Current dryer status



4.6.3 To Start Batch Drying

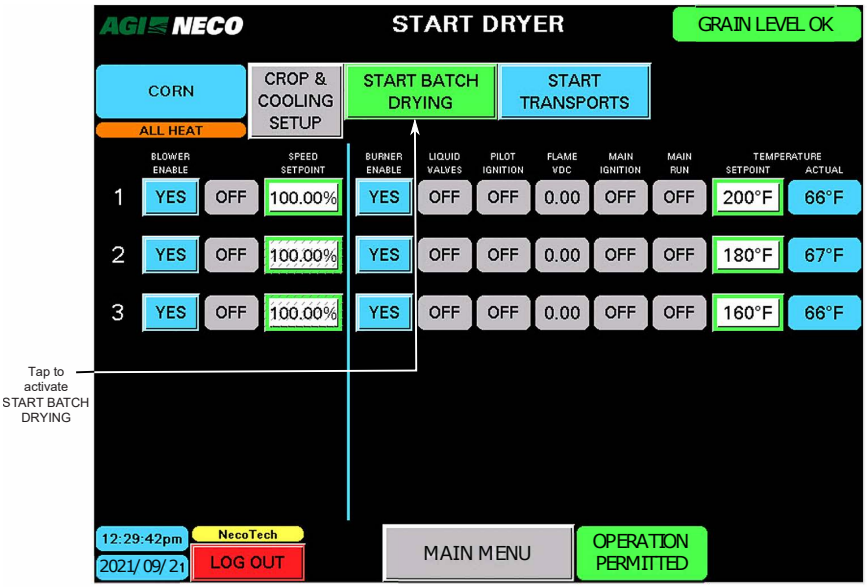
- Batch drying CAN be activated with any of the grain level status indicators.

  Note

  Batch drying can begin when grain is at any level within the dryer. If grain is below the top-most set of tier ducts, be aware that the drying heat from that section is wasted.

- Tap the START BATCH DRYING button to proceed. Immediately, the blower and burner starting sequence begins.

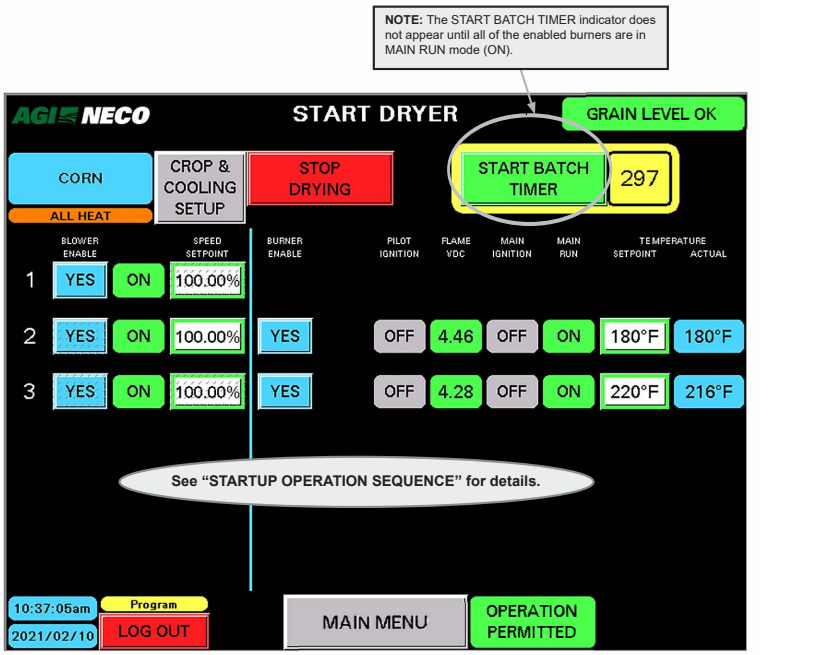
Figure 106. Starting batch drying



Start the Batch Timer

- The START BATCH TIMER indicator only appears after all enabled burners are ON as shown in the MAIN RUN status column.
- As soon as the START BATCH TIMER indicator appears, the control allows 30 seconds of the operator to tap/activate it. If this does not occur in the time allotted the system will change to COOLING mode.

Figure 107.



4.7. Batch Drying Mode

4.7.1 Batch Drying Overview

Batch operations are generally used to start or end a drying cycle and can utilize all or some of the system blowers and burners.

- Refer to the following sections (designated A, B and C) to set up and operate in Batch Drying Mode:
  - Section – A. Set Drying Time on page 91

    Note

    If you switch from BATCH DRYING MODE directly into AUTO DRYING MODE , steps B and C are skipped. However, before AUTO DRYING MODE can start, two conditions must be met. For details, see Section 4.8 – Auto Drying Mode on page 94
  - Section – B. Cooling on page 93
  - Section – C. Restart on page 93

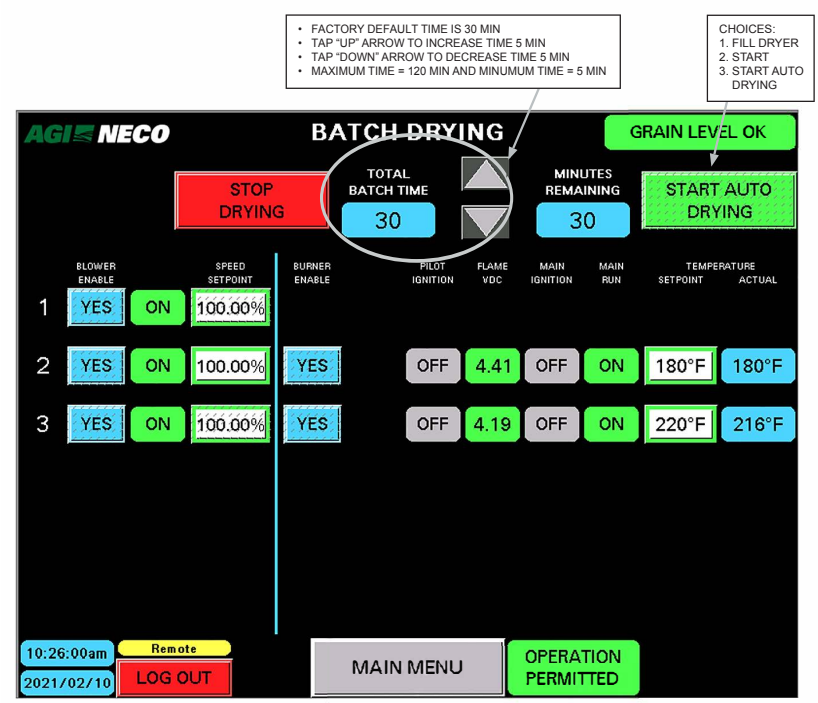
General batch drying notes:

- The operation run time is manually set and can be up to 120 minutes.
- Temperature setpoints can be changed at any time during the process. The actual temperature data per dryer section is shown in the final column.

- The status indicators ON or OFF indicate the progression of startup or shutdown for the various equipment items such as blower, burner, liquid valves, pilot, main ignition, and main run. See Startup Operation Sequence on page 87 for a complete description of this sequence.

A. Set Drying Time

Figure 108. Setting drying time

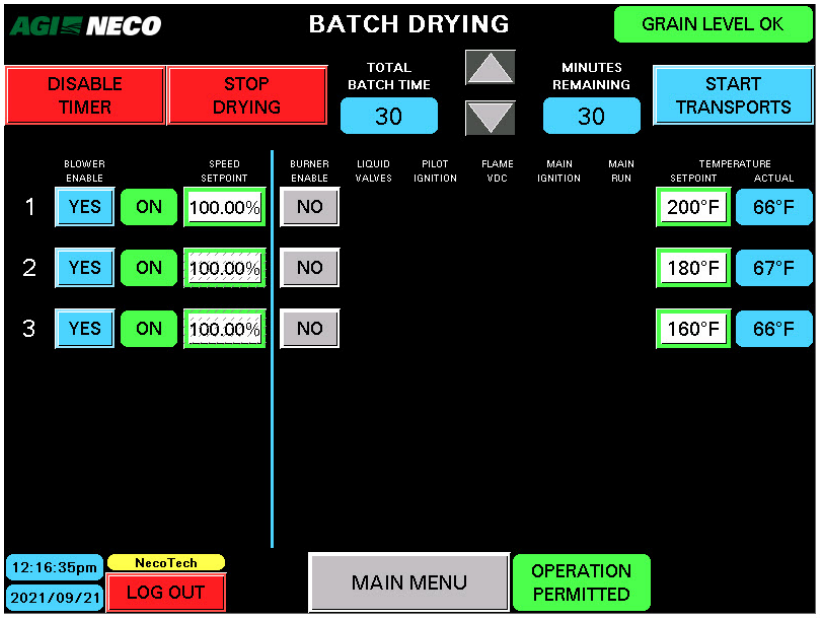


Total Batch Time

- Default total time = 30 minutes
- Tapping the UP button (▲) increases the total time by 5 minutes (to a maximum run time of 120 minutes).
- Tapping the DOWN button (▼) decreases the total time by 5 minutes (to a minimum run time of 5 minutes).
- The total run time can be changed at any time prior to the time remaining value reaching zero. When the total run time is modified, the time remaining changes accordingly.

Minutes Remaining

- Shows the number of minutes remaining to operate in Batch Drying — Heated mode.
- At a value of 0 the dryer proceeds to Batch Drying — Cooling mode



Note

The Batch Timer can be disabled when all the burners are off. In this mode, the blowers are allowed to run continuously without heat being applied to the grain.

To switch directly to AUTO DRYING MODE:

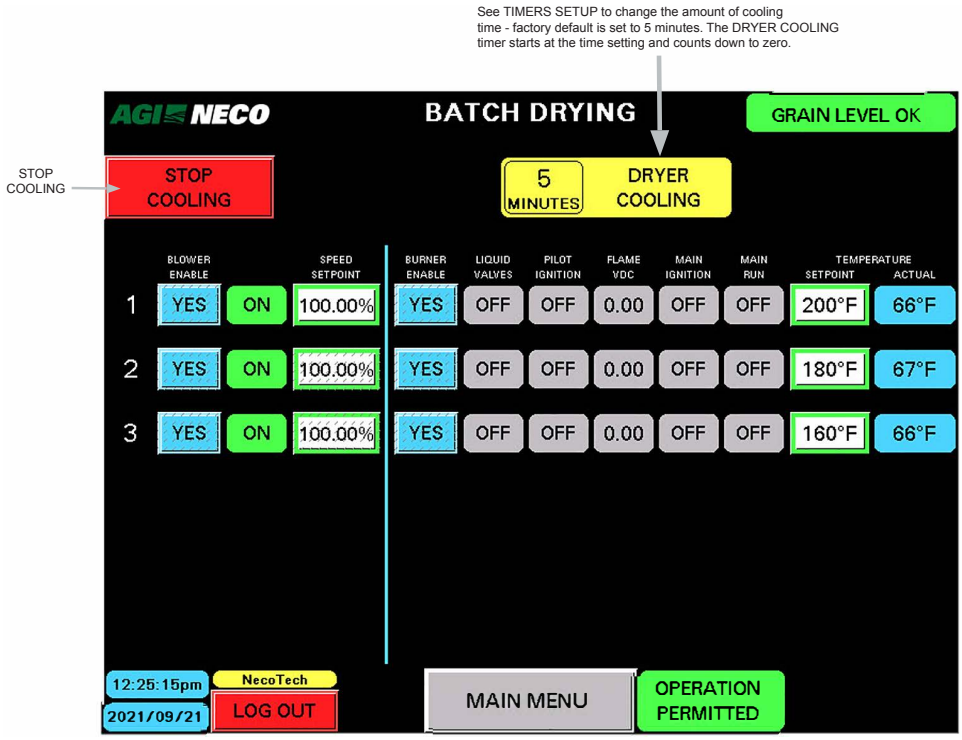
- Skip the Batch Drying – Cooling mode, or RESTART mode.
- One of the following appears in the upper-right button (see Figure 108 on page 91):
  - FILL DRYER
  - START
  - START AUTO DRYING
- Tapping the button selects the pre-level of auto drying displayed by the button.

Stop Drying

- Tapping STOP DRYING stops the batch drying process and initiates COOLING mode.

B. Cooling

Figure 109. Cooling



Minutes

- This field displays the cooling mode time remaining

Stop Cooling

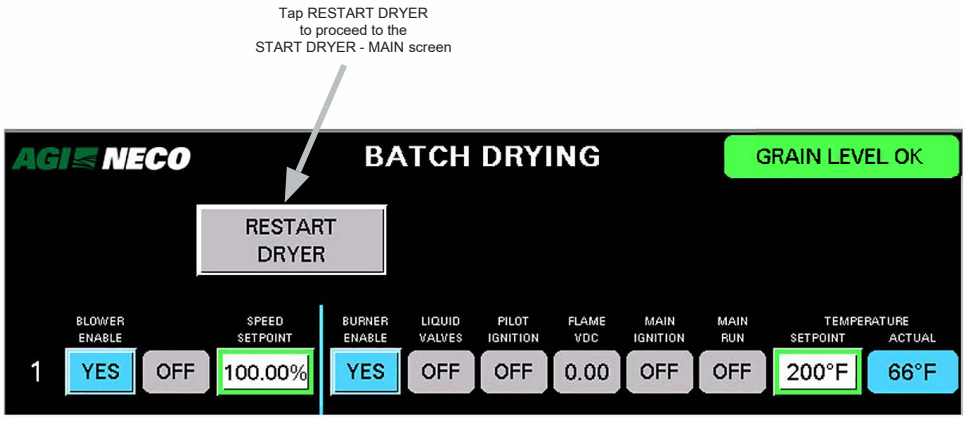
- Tapping STOP COOLING shuts down all blowers. The RESTART DRYER button appears.

Start Batch Drying

- Tapping START BATCH DRYING restarts the process without stopping the blowers. The START DRYER screen appears and displays the blower starting process.

C. Restart

Figure 110. Restart



- Tap RESTART DRYER to go to the START DRYER – MAIN screen. This enables the operator to continue drying using either BATCH or AUTO mode.

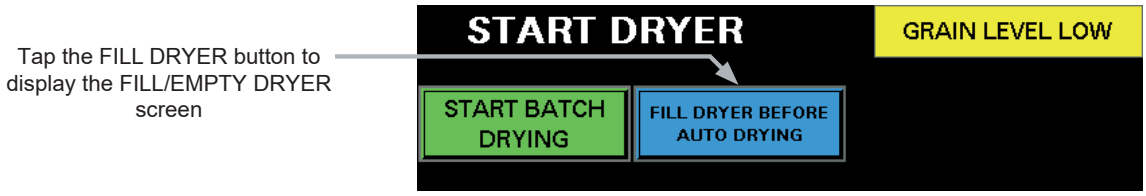
4.8. Auto Drying Mode

4.8.1 Auto Drying Pre-Conditions

For the START AUTO DRYING button to be available, the following two conditions must be met:

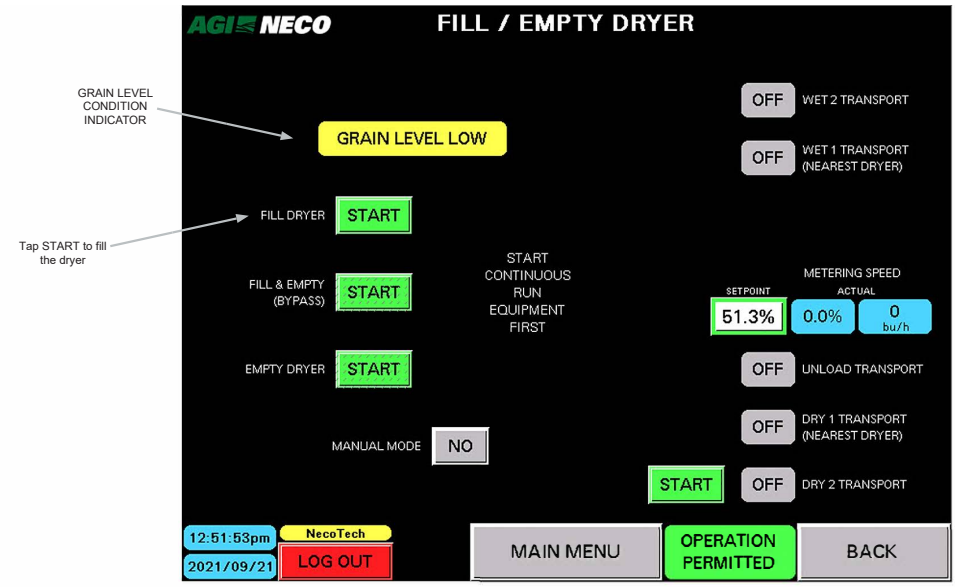
1. The dryer status must display DRYER FULL or DRYER LEVEL OK. If neither of these are displayed:
   a. Tap the FILL DRYER button.

Figure 111. Tap the FILL DRYER button



The FILL/EMPTY DRYER screen appears.

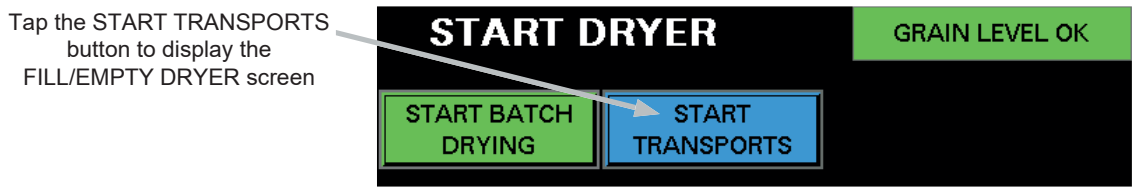
Figure 112. The FILL/EMPTY DRYER screen



   b. Tap the START button to fill the dryer. The dryer must fill past the level of the LOW LEVEL sensor. When it does, the dryer status indicator displays DRYER LEVEL OK or DRYER FULL.

2. All required transports must be started prior to initiating AUTO DRYING MODE. If transports are enabled, but not running, the START TRANSPORTS indicator will appear.

Figure 113. The START TRANSPORTS indicator/button



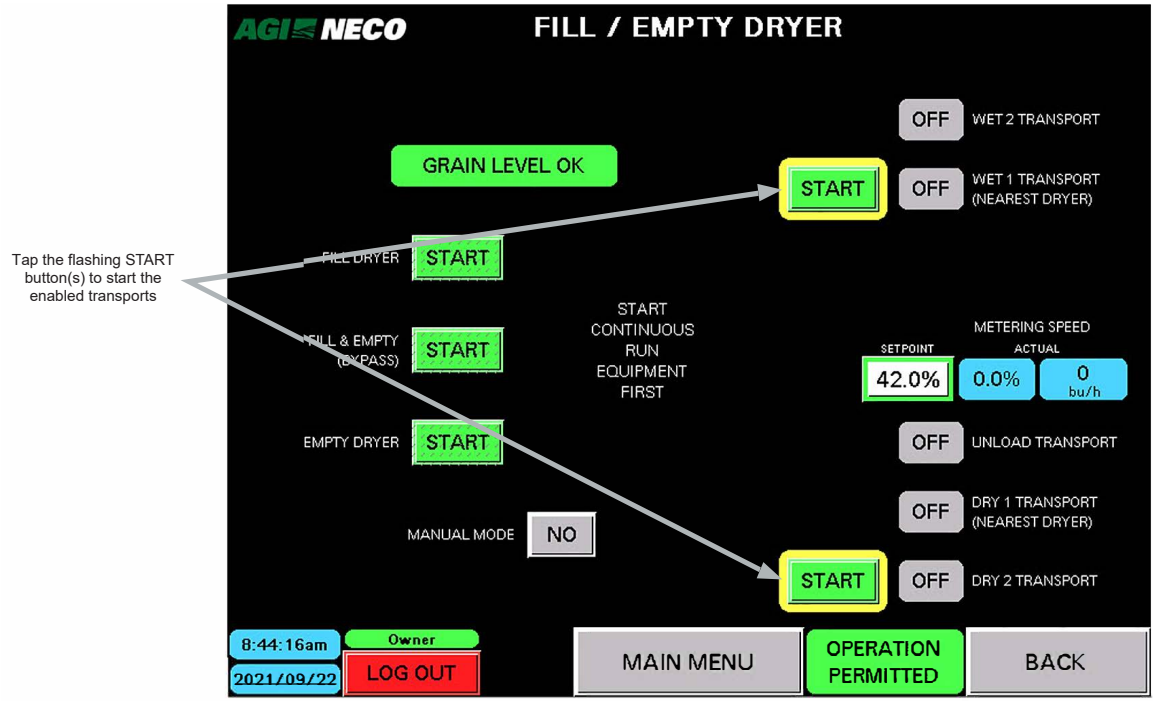
The FILL/EMPTY DRYER screen appears.

a. Tap the START button to fill the dryer.

b. Allow the dryer to fill past the top level indicator.

c. When ready, the dryer status indicator displays DRYER LEVEL OK or DRYER FULL.

Figure 114. Transports START buttons



4.8.2 Auto Drying Overview

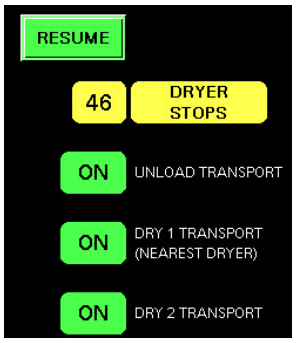
- Refer to the following sections (designated A, B, C, etc.) to set up and operate in Auto Drying Mode:
  - Section – A. Manual Speed on page 98: (DryerMaster collecting data) Burner setup is available
  - Section – B. Auto First Load on page 99 : Burner setup is available
  - Section – C. DryerMaster Controlling on page 100: Burner setup is available
  - Section – D. Cooling on page 100
  - Section – E. Restart on page 101

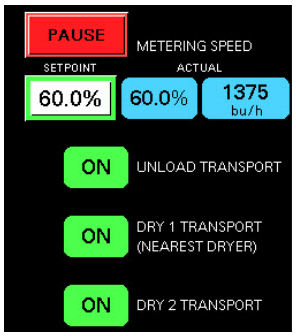
Note

When drying in AUTO mode, use small increments of change when making adjustments to either the burner temperatures or target moisture percentage. For example, to change a burner temperature from 180 to 220, adjust to 200 for five to ten minutes, then increase to 220. Use a similar approach to making moisture percentage changes.

Metering Roll Pause/Resume

- Pause the metering rolls to temporarily stop the discharge of grain from the dryer. This is typically used when switching between drying bins. When paused, the grain stops discharging from the dryer. The unload and dry transports keep running and empty out. Once empty, the grain is re-directed to a new dry bin location. If the Resume button is not pushed before the timer reaches zero, the dryer will shut down.

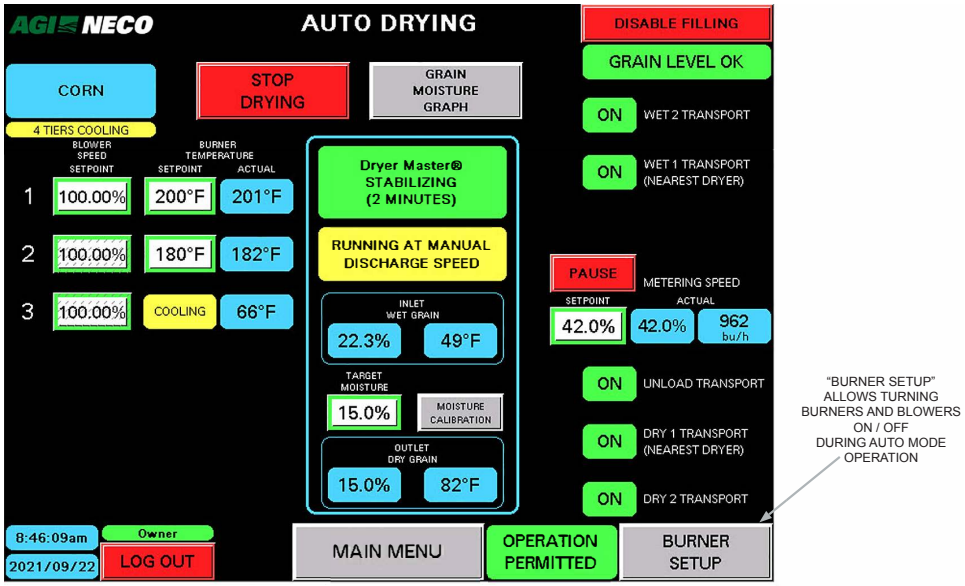




Note

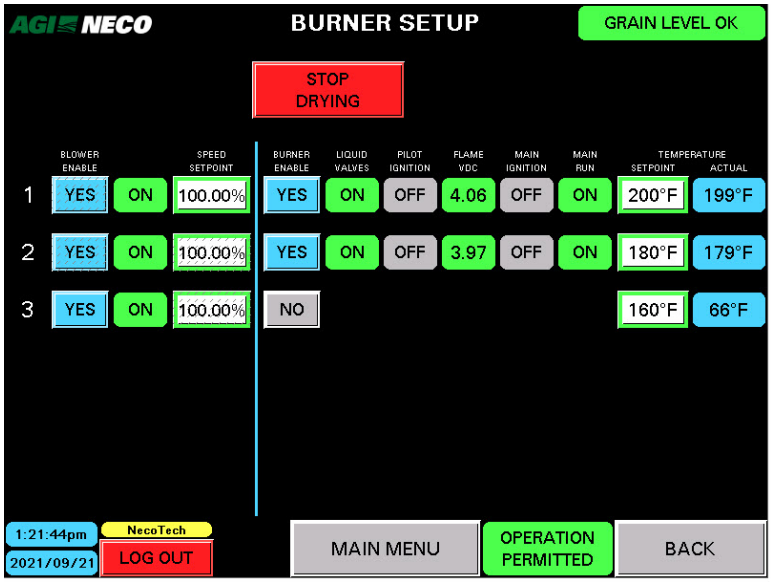
As the various operation stages occur, the display screen center panel area provides the operator with important status information. See the following example:

Figure 115. The BURNER SETUP button on the AUTO DRYING screen



- The BURNER SETUP screen appears. Initially it shows the current status.

Figure 116. The BURNER SETUP screen



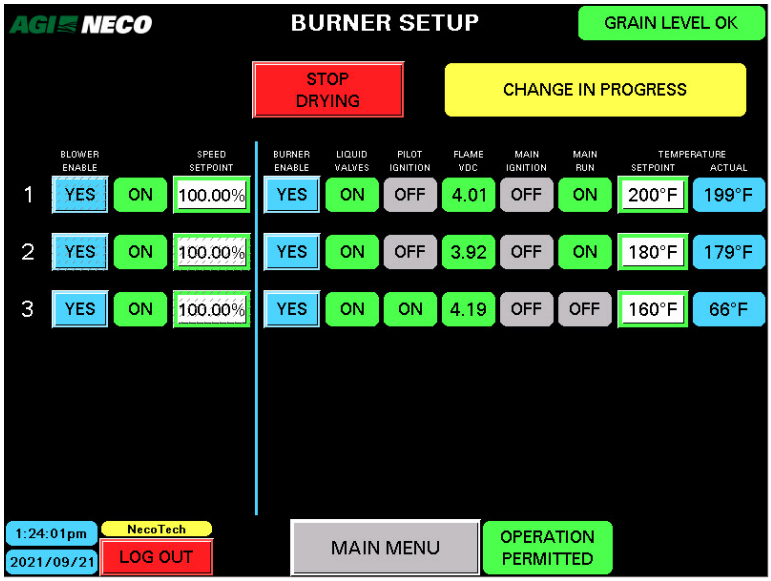
- In the following examples the screen shows that burner number 4 has been ENABLED.

  Note

  The CHANGE IN PROGRESS indicator appears until changes are completed.

- As burner number 4 is going through the process of turning ON, the screen does not allow additional changes, or return to the previous stage, until that change is completed. Note that the MAIN MENU button is unavailable, but the STOP DRYING button is available.

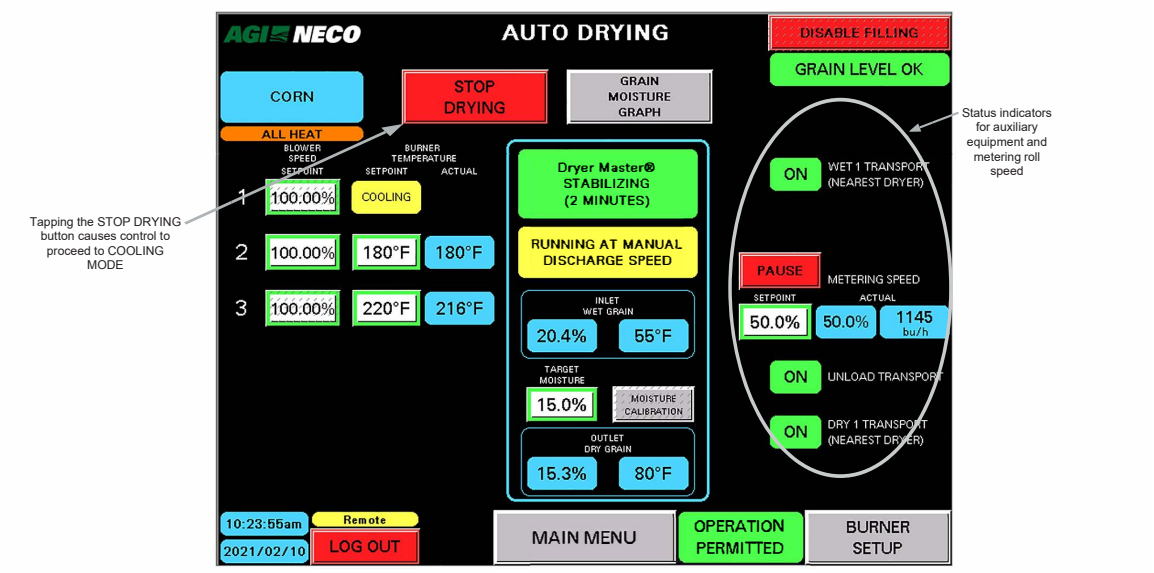
Figure 117. Example of CHANGE IN PROGRESS



- After changes are completed, the screen shows the current status.
- Options to proceed include return to MAIN MENU, BACK, or STOP DRYING.

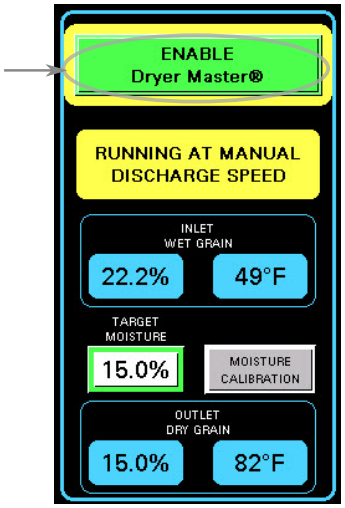
A. Manual Speed

Figure 118. Manual speed control



- The dryer runs at the manual metering roll speed entered until the DryerMaster gathers sufficient data. The manual speed can be “dialed in” and changed to come closer to target moisture.

Figure 119. CONTROL SETUP screen



- If AUTOMATIC DRYERMASTER CONTROL ENABLING is set to OFF, as soon as the DryerMaster has gathered enough data, the ENABLE AUTOMATIC MOISTURE CONTROL button (located with the main center panel) appears.
- Tap ENABLE AUTOMATIC MOISTURE CONTROL to proceed to AUTO FIRST LOAD.

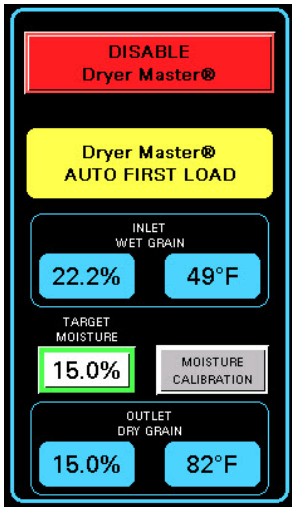
Note

By default, AUTOMATIC DRYERMASTER CONTROL ENABLING is set to ON, the control will proceed into AUTO FIRST LOAD automatically.

B. Auto First Load

The DryerMaster control uses previous history to assist in building a current model, if possible. During AUTO FIRST LOAD, grain cycles through the dryer for enough time to gather completed current data. This time period varies, but can be up to one complete grain cycle. Once a current computer model of correct operation that will meet the target moisture setpoint is obtained, the control proceeds to full DryerMaster automatic operation.

Figure 120. Auto First Load



C. DryerMaster Controlling

- In DryerMaster Controlling mode the DryerMaster is controlling the process and runs until STOP DRYING is activated, or a low level sensor is activated.
- The operator should regularly check the grain moisture graph for abnormalities.
- MOISTURE CALIBRATION for the lower moisture sensor should be done a least every 2-3 hours.
- When changing the TARGET MOISTURE a pop-up window will appear that will also show the Minimum and Maximum alarm setpoints for the outlet grain.

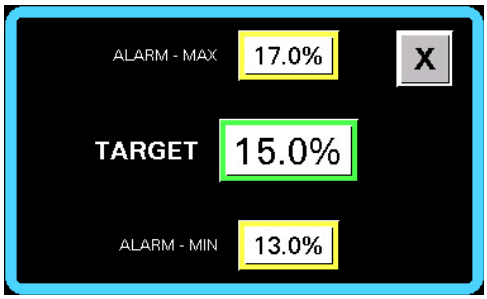
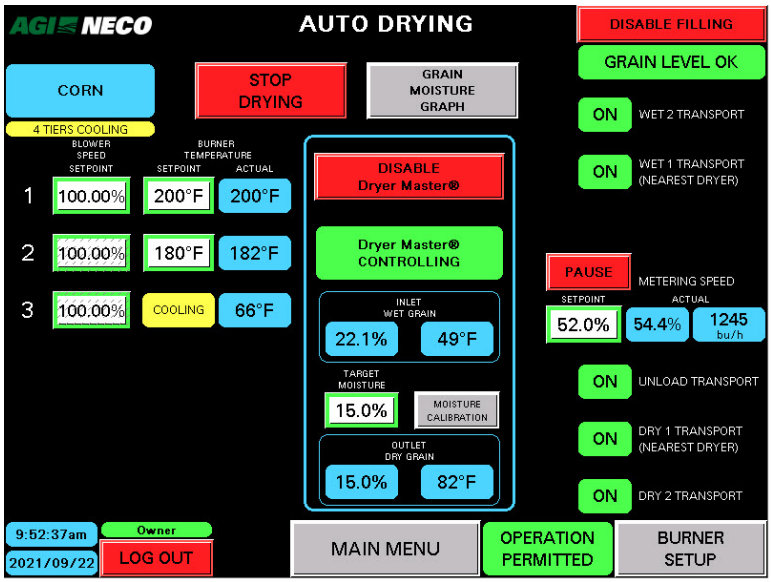


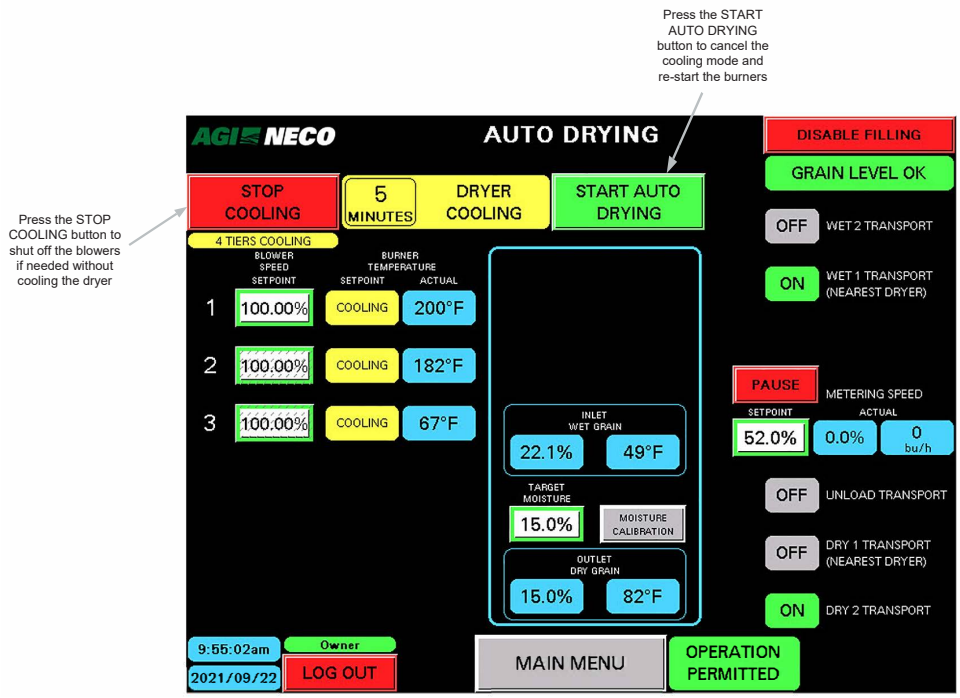
Figure 121. DryerMaster controlling



D. Cooling

- The COOLING mode default timer setting is five minutes. See SETUP - TIMERS, to modify.
- Blowers continue to run and the burners turn OFF.
- When the timer runs out OR if the STOP COOLING button is activated, ALL blowers shut down immediately and the RESTART DRYER button appears.

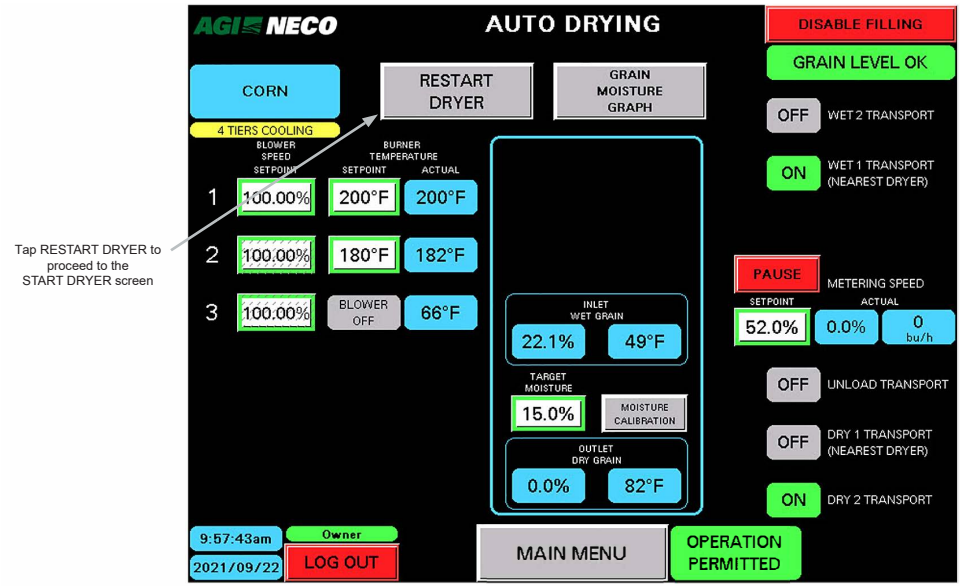
Figure 122. Cooling



E. Restart

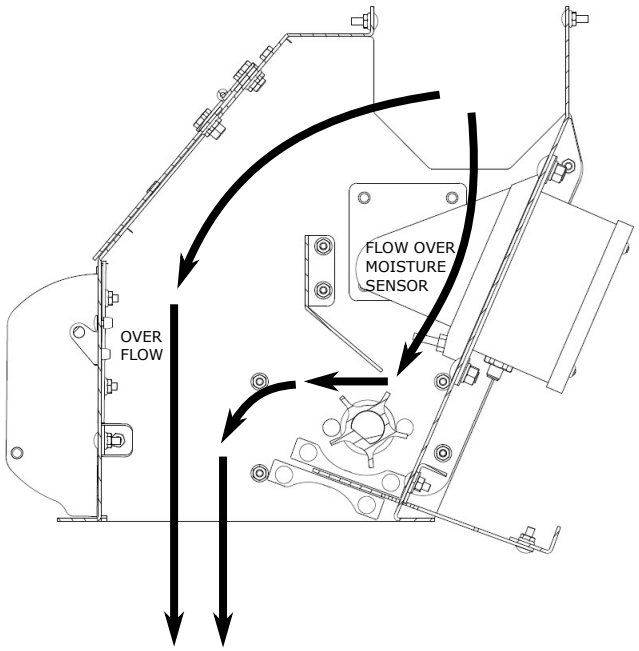
Tap RESTART DRYER to go to the START DRYER – MAIN screen. This enables continuation of drying using either BATCH or AUTO modes.

Figure 123.

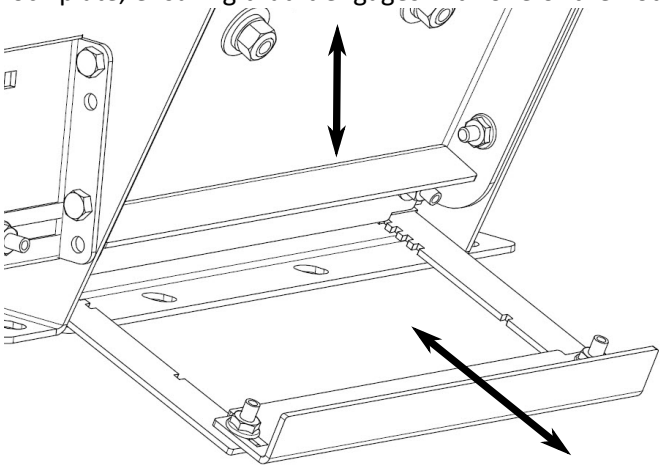


4.8.3 Slide Gate Adjustment

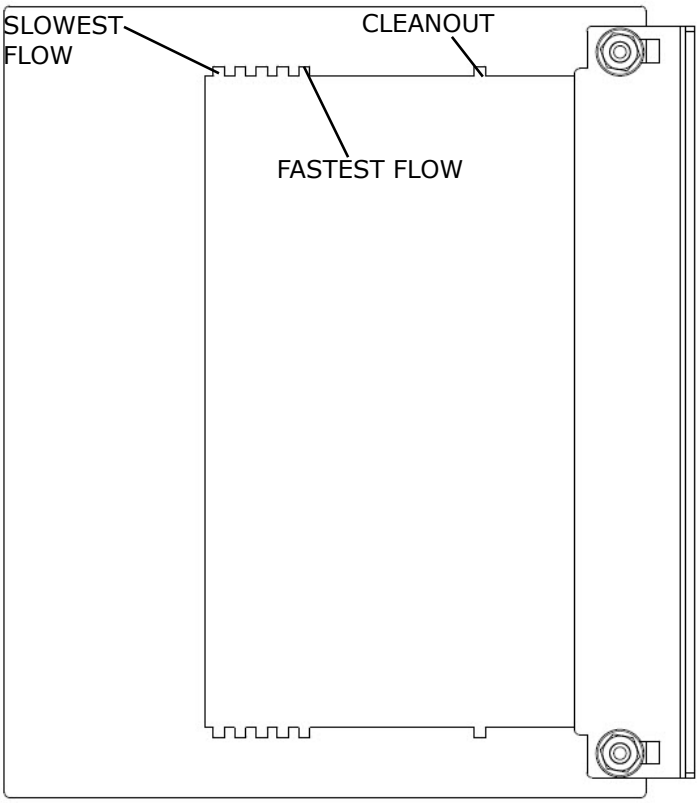
For either auger or drag unload systems, grain passes through a discharge chute, and a portion of the grain is directed over the outlet moisture sensor. The flow of the grain over the moisture sensor is controlled by a metering roll, which rotates at a constant speed whenever the unload system is operating



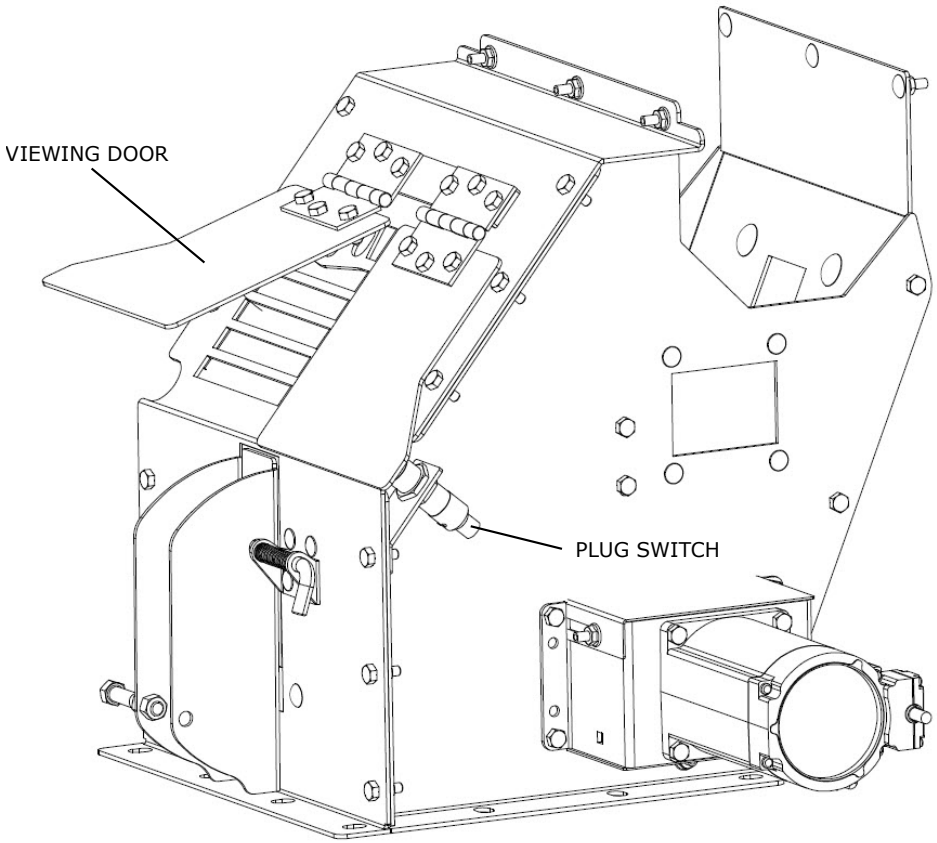
Although it is not the primary means of controlling the flow, a slide gate is available to make small adjustments. Typically, the slide gate will not need to be adjusted during normal operation. To adjust the slide gate position, lift up on the sliding lock plate, push or pull the slide gate to the desired location, and then lower the sliding lock plate, ensuring that it engages with one of the notch sets on the slide gate.

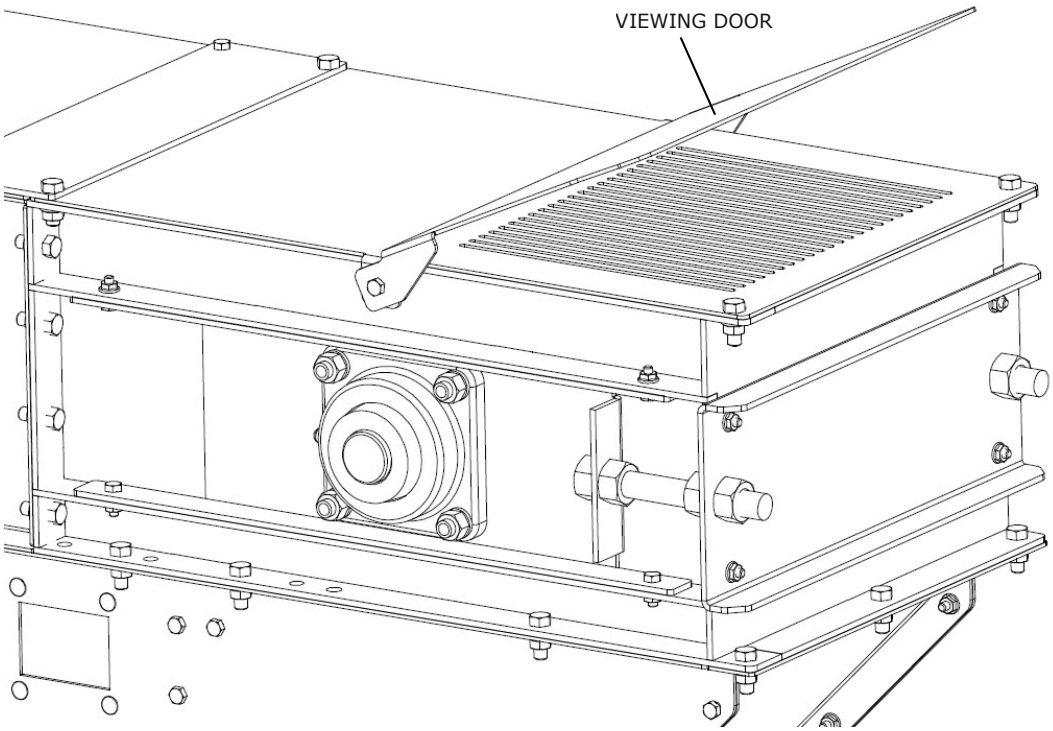


During normal operation, grain should cover the fin of the outlet moisture sensor at all times, and a steady flow of grain should be observed through the viewing window on the side of the discharge chute. If the drying rate is low enough that grain does not consistently keep the chute full enough to cover the moisture sensor, try pulling the slide gate out of the chute one notch at a time until the flow is backing up sufficiently. If grain is backing up too much in the chute, try pushing the slide gate further into the chute one notch at a time. Note that the notch furthest out from the chute and closest to the slide gate handle is used to position the slide gate for cleanout, and is not intended for normal operation. Refer to the figure below.



Viewing doors are available for both auger and drag unloads. For auger systems, the viewing door is located on the discharge chute itself. Note that there are two identical doors on the discharge chute. The viewing door is on the opposite side of the chute as the plug switch. If the other door is opened, the switch will indicate a plugged discharge, and the dryer will shut down. For drag unloads, the viewing door is located on top of the cross drag and is not tied into the plugged discharge switch.


VIEWING DOOR
PLUG SWITCH


VIEWING DOOR

4.8.4 Moisture Calibration

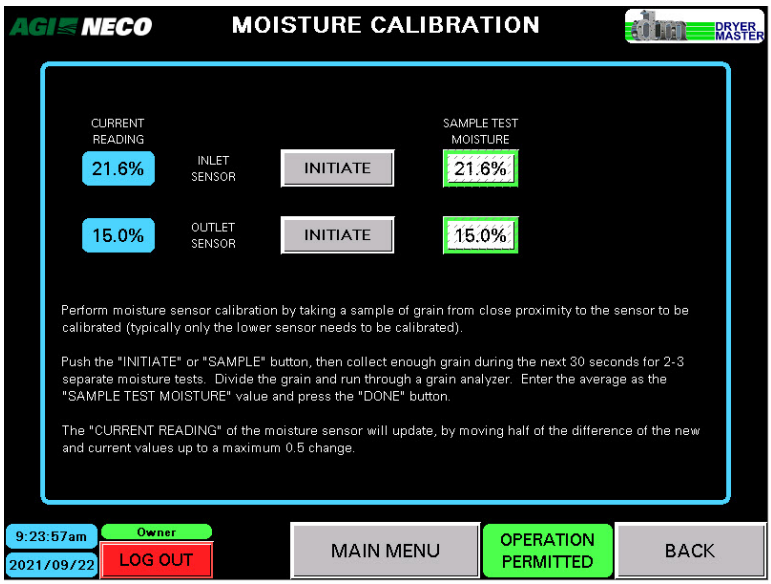
Note

For grains requiring lower range moisture sensing (e.g. 8% for rape seed) contact your dealer for instructions on how to re-calibrate the moisture sensor, or order the low range moisture sensor #059250WLR

On the MOISTURE CALIBRATION screen:

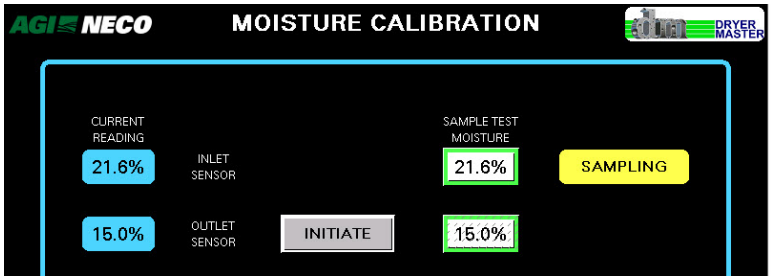
- Start the INLET SENSOR calibration routine by tapping its associated INITIATE button.
- Start the OUTLET SENSOR calibration routine by tapping its associated INITIATE button, or by pressing the SAMPLE button located at the rear of the dryer, near the grain exit chute.

Figure 124. The MOISTURE CALIBRATION screen



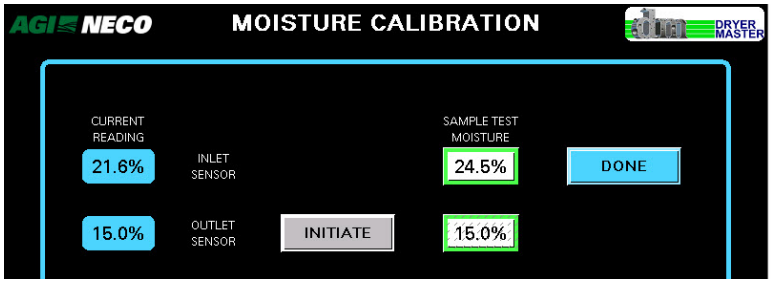
- Upon starting the calibration routine for either sensor, the SAMPLING indicator will be displayed.

Figure 125. SAMPLING in progress



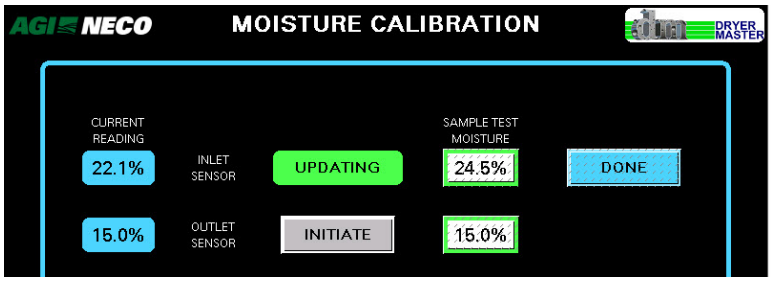
- The DryerMaster obtains an average of moisture readings for the next 30 seconds.
- During this same time period, collect several grain samples near the sensor being calibrated.
- When the automated sampling period ends, the DONE indicator appears.

Figure 126. SAMPLING is DONE



- Have the samples tested for ACTUAL grain moisture content.
- Average the values for the ACTUAL grain moisture content.
- Enter the calculated average for the actual grain moisture content using the SAMPLE TEST MOISTURE button.
- Tap the DONE button.
- A new CURRENT READING is calculated and displayed. The new value will move closer to the TEST MOISTURE value at a maximum of 0.5 per calibration when the difference is greater than 1.0. If the difference is less than 1.0 the value will move half way closer (difference 0.8 then moves 0.4).
  - E.g. In the example shown, the CURRENT READING value was originally 21.6
  - The SAMPLE TEST MOISTURE average of measured values was 24.5
  - Since 24.5 — 21.6 is more than 1.0, the new CURRENT READING moved closer to the SAMPLE TEST MOISTURE value by 0.5 (from 21.6 to 22.1

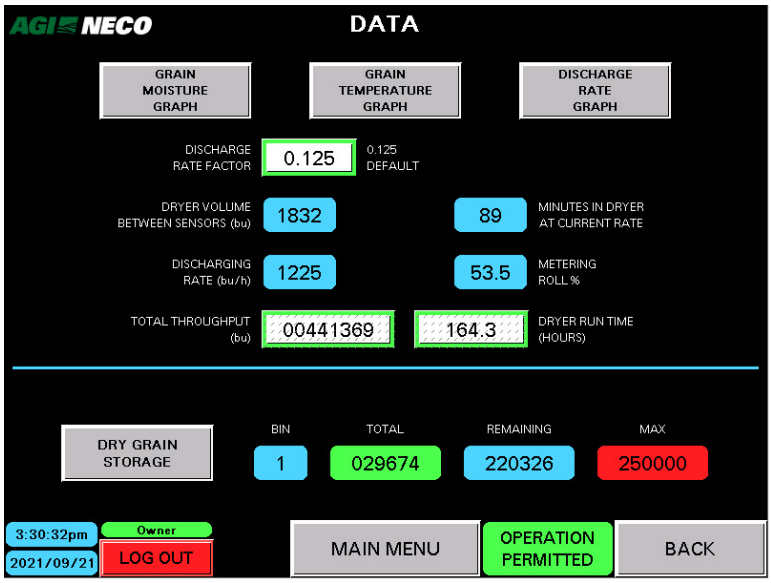
Figure 127. CURRENT READING updated after entering SAMPLE TEST MOISTURE averge



4.9. Data and Graphs Screens

4.9.1 Data Screen

Figure 128. Data screen



The DATA screen displays the following information:

Dryer Volume Between Sensors

- Bushels or cubic meters

Minutes in Dryer at Current Rate

- Minutes required for grain to move from the inlet sensor to the outlet sensor at the current discharging rate.

Discharge Rate Factor

- The value used to calculate the throughput bushels or cubic meters value.
- Initial adjustment may be necessary to obtain correct throughput value. Also, the discharge rate factor will likely need to be adjusted for different grains.

Discharging Rate (bu/h or m^3/h)

- Current discharging rate of the dryer

Metering Roll Percent

- Meter speed percent, maximum

Total Throughput (bu or m^3)

- Volume of grain run through the dryer. Note this value increases with or without grain when the metering rolls are running.

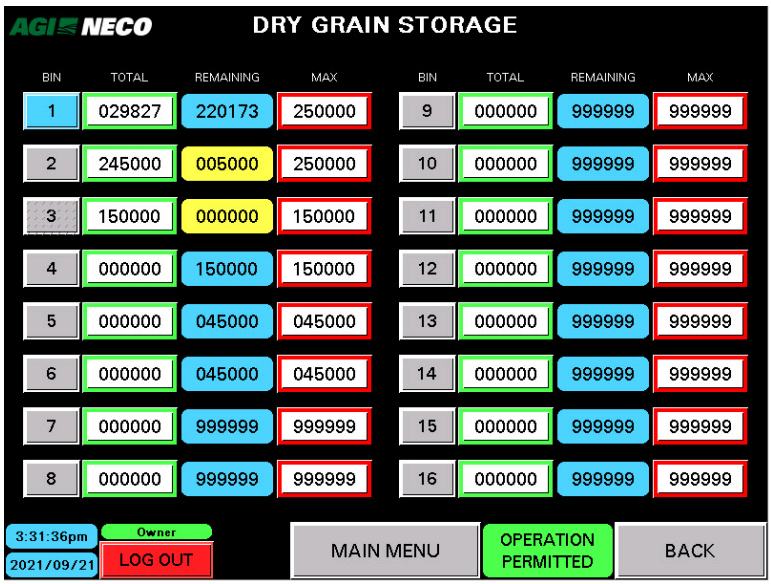
Dryer Run Time

- Running hours of the dryer

Dry Grain Storage

- Grain Bin volume counters
- Select the desired grain bin counter.

Figure 129. Dry Grain Storage Screen



4.9.2 Performance Data Graphs

Figure 130. Grain Moisture

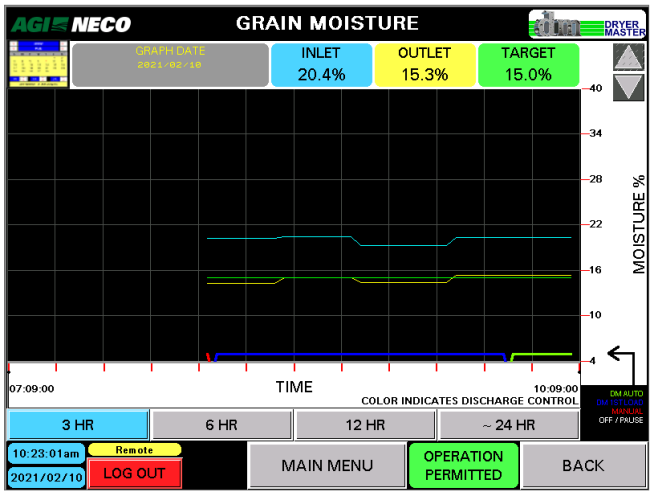


Figure 131. Temperature

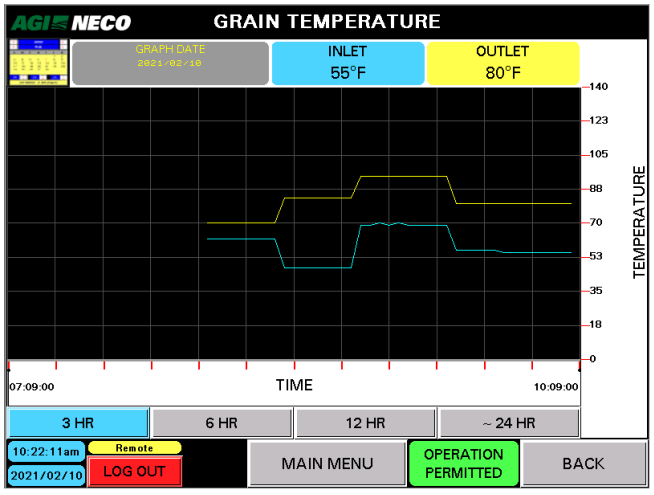
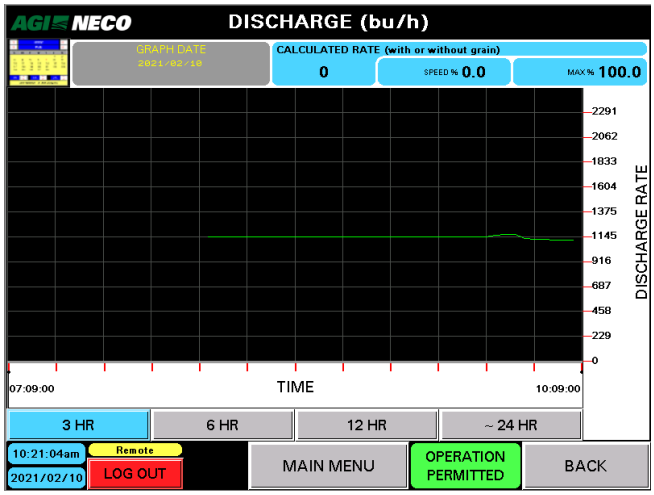


Figure 132. Discharge Rate



NOTE

All graphs capture a data point every 3 minutes

- The graph is represented using the current mode of units, showing BPH (bushels per hour) or m^3/ hr (cubic meters per hour).
- The graph time period can be switched at any time and can be represented for 3, 6, 12, or 24 hour periods.
- Graphs also give current readings for applicable sensors. For instance, the moisture graph shows target moisture, current actual inlet moisture, and current outlet moisture rates. The temperature graph shows current inlet and outlet temperature. The discharge graph toggles, showing either current metering roll speed (%) or volumetric throughput.
- Press the up or down arrow on the Grain Moisture Graph to increase or decrease the moisture range displayed.

4.10. Emergency Shutdown Procedure

1. Push the E-STOP button.

   ⚠ WARNING Pushing the E-STOP button will turn OFF all outputs from the PLC. It does NOT shut off power into either Control Panel. The Power ON lamp will remain lit on the main Control Panel

2. Turn OFF the electrical power at the main electrical disconnect.
3. Turn OFF the fuel supply at the main ball valve in the bottom dryer section and then at the main fuel source.
4. If the emergency requires grain to be removed from the dryer more quickly than the unload system can operate, there are several alternative routes to clear the grain. With power shut off and locked out, the following methods can be used:

   - Open up one or more of the emergency unload doors around the perimeter of the frame. To open, pull the pin on the clamp assembly. Use caution as the doors can swing open with great force.

Figure 133. Emergency Door — Close

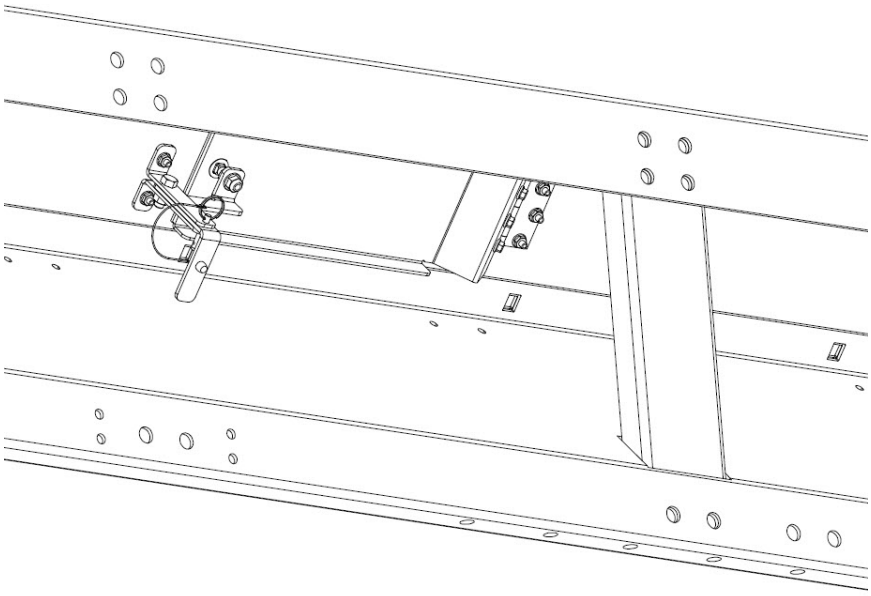
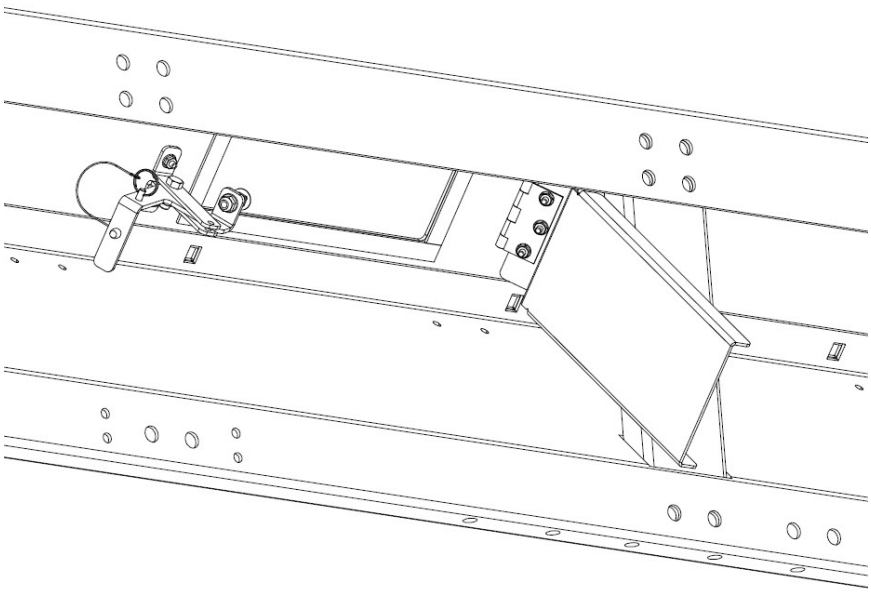


Figure 134. Emergency Door — Open



- For auger unloads, the cleanout doors can be opened to allow grain to flow by the metering rolls and augers. (See Section 3.8 – Discharge Equipment on page 42.)
- For drag unloads, both the metering roll doors on the sides of the drag conveyors and the cleanout doors on the drag conveyors themselves can be opened to let grain flow out. (See Section 3.8 – Discharge Equipment on page 42.)

5. Maintenance

Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

5.1. Maintenance Safety

WARNING

- Keep components in good condition. Follow the maintenance procedures.
- Ensure the service area is clean, dry, and has sufficient lighting.
- Do not modify any components without written authorization from the manufacturer. Modification can be dangerous and result in serious injuries.
- Lock out power source and shut off gas valves.
- All gas components, connections, and appliances are to be serviced or maintained by a qualified gas technician.
- After maintenance is complete, replace all guards, service doors, and/or covers.
- Use only genuine NECO replacement parts or equivalent. Use of unauthorized parts will void warranty. If in doubt, contact NECO or your local dealer.

5.2. Maintenance Overview

NECO takes pride in choosing quality vendors and products in association with the design and manufacture of our products:

- OEM products have a service life related to operating conditions and usage.
- Vendor supplied products consist of motors, gear reducers, bearings, valves, switches, etc.
- This information is to assist you in keeping the equipment in operating condition and to help obtain correct OEM data for proper maintenance.

Prior to each season or usage:

- Complete the Section 4.2 – Equipment Pre-Check on page 60 section and verify completion for each step.

During regular usage, based on overall conditions and amount of usage:

- Check for debris buildup within the plenum and throughout the system.
- Check all pipe fittings and fuel train components with a qualified detection method.
- Check the burner ports for blockage. See Section 5.3 – Burner Gas Ports on page 113.
- Check all fan and discharge auger belts tension and alignment monthly. Be careful NOT to over tension.
- Check metering roll chain tension monthly.
- Clean air switch line monthly.

- Perform lubrication checks when needed.

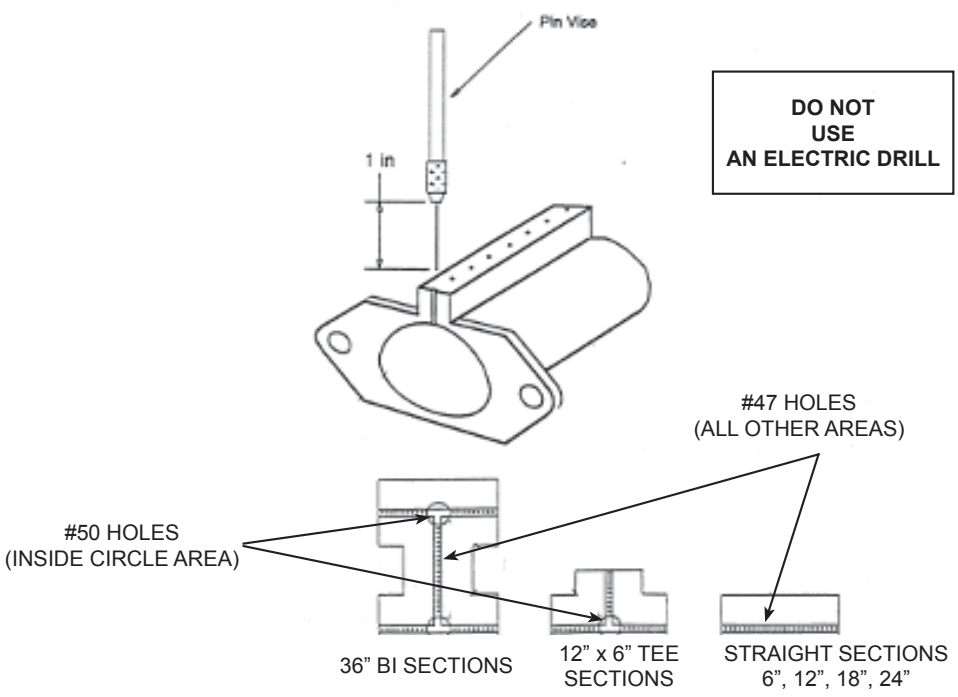
End-of-season equipment shutdown:

- Open the clean-out doors on both sides and let any grain fall through. If needed, the discharge augers can be run briefly to ensure no grain is left on the topside of a stationary auger system.
- Clean out the rear cross auger.
- For storage, the cleanout doors should be left open so that rain may fall through.
- The belts should be loosened and removed, then stored in a dark place.
- The chains should be removed and lubricated, then stored in an air tight container.

5.3. Burner Gas Ports

Conduct initial inspection within the first month after commissioning. Visually check the gas ports of the new burner assemblies for any piping scale or debris. Us a pin vise with drill sizes as shown below:

Figure 135. Burner gas port checking/cleaning



Annual inspections are normally adequate once the initial piping debris is removed. Heavy usage of the burner may require checking and cleaning monthly or more.

5.4. Solenoid Valves

All solenoid valves should be cleaned annually. The time between cleanings will vary depending on the service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise, or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close.

Cleaning instructions and rebuild kits for valves can be obtained online from vendors such as ASCO, etc.

5.5. Lubrication

On greaseable sealed bearings, apply grease ONLY until a thin bead of new grease is visible along the seal edge. Applying excessive grease may force out the seals, causing contamination and rapid bearing wear.

Table 7. Lubrication Data

PART DESCRIPTION	LUBRICATION PRODUCT	PER TIME PERIOD OF USAGE
Blower Drive Motor	Mfg Recommendation	Mfg Recommendation
Cross Auger Gearbox	80/90 Gear Oil 1/2 Full	Check Weekly
Fan Shaft Bearings	Mfg Recommendation	80 Hours
Cross Auger Bearings	Mfg Recommendation	100 Hours
Roller Chains	Le 451/452 Almasol	Annually

5.6. Motors

The OEM drive motors can vary in size and manufacturer, depending on the dryer size and usage requirements. In order to properly maintain the various drive motors within your system, record the manufacturer, model number, etc. from the motors ID tag. Follow manufacturers instructions for proper maintenance, including possible lubrication of shaft bearings.

6. Troubleshooting

6.1. Solutions Table

In the following section, we have listed some causes and solutions to some of the problems you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this section, please contact your local dealer or distributor. Before you contact them, please have this operation manual and the serial number from your machine ready.

Temperature Controller

Problem	Check	Cause	Solution
Temperature control communication error	If other temperature controls are visible	Incorrect address of the temperature controller	Re-address temperature controller
	If other temperature controllers are not visible	Damaged Modbus communication wires	Starting at the front of the PLC, trace Modbus communication cables to the lowest burner box
		Loose connection at gray communication tee connector	Tighten connection
		If problem persists contact dealer	
Temperature displays_***	Front of KS45 inside burner box displays FAIL on top display	Damaged thermocouple	Repair twisted end of thermocouple or replace whole wire
Unable to reach set point temperature	MAIN MENU-> TROUBLESHOOTING-> TEMPERATURE CONTROLS	If mod motor position is at 100% there is a fuel delivery problem	Turn fuel regulated pressure at individual burner up.
			CAUTION: DO NOT EXCEED 6 PSI for NG .10 PSI for LP
Actual temperature exceeds set point	MAIN MENU-> TROUBLESHOOTING-> TEMPERATURE CONTROLS	If mod motor position is at 0% there is a fuel delivery problem	Turn fuel regulated pressure down, trouble lighting may occur if operating pressures are turned below 1 PSI
Unsteady temperature control (high and low)	MAIN MENU-> TROUBLESHOOTING-> TEMPERATURE CONTROLS	Unsteady mod motor position	Turn fuel regulated pressure down, trouble lighting may occur if operating pressures are turned below 1 PSI
	Thermocouple location and condition	Location inside the dryer too close or too far away from burner	Thermocouple should be located three tiers from the floor and five air ducts back from the burner unless otherwise instructed by NECO
		Thermocouple corrosion	Cut and strip and tightly re-twist 3/4" of thermocouple wire
	Natural gas applications	Too high of a ramp rate	Troubleshooting–> temperature controls set ramp rate to 125

Problem	Check	Cause	Solution
Limits exceeded before plenum temperature is reached	Check set point of high limit switch	High limit switch set too low	High limit switch to be set 20-30 degrees F above operating temp of individual section. NOTE: V42 is changed to be Max temp on switch
	Check location of thermocouple in relation to the high limit bulb	Thermocouple and high limit switch bulb are too far apart	Thermocouple twisted pair should be within inches of high limit bulb without touching anything conductive

Honeywell Burner Control

Problem	Check	Cause	Solution
Will not remote reset	Check to see if a manual reset button on Honeywell works	If manual reset works, failure of 24VDC reset relay	Repair or replace 24VDC reset relay or resolve wiring problem
		If manual reset does NOT work, read blink code and repair	Correct Honeywell fault
	Check to make sure connector is firmly plugged into top of controller	Poor connection of reset signal	Tighten wires in connector and ensure that connector is firmly plugged in.
Honeywell communication error	If other Honeywells are visible	Incorrect address of the Honeywell	Re-address Honeywell
		Baud rate jumper installed in the bottom of the Modbus module	Remove the baud rate jumper (NOTE: all new Modbus modules come with jumper installed)
		Incorrect wiring on plug attached to Honeywell	Correct wiring error
	If other Honeywells are not visible	Damaged Modbus communication wires	Starting at the front of the PLC, trace Modbus communication cables to the lowest burner box
		Loose connection at gray communication tee connector	Tighten connection
		If problem persists contact dealer	

Moisture Controls

Problem	Check	Cause	Solution
Moisture drift on outlet sensor	Blockage in discharge chute	Debris bridging over outlet sensor blocking grain flow	Clean out discharge chute around sensor
	Can sensor be seen through flow of grain	Insufficient grain flow over sensor	Adjust gate in discharge chute to restrict flow of grain
INLET MOISTURE SENSOR ERROR	Make sure that the Inlet Sensor is completely covered in grain	Incorrect timer settings on filling equipment allowing sensor to become uncovered	Adjust timer settings on the filling equipment to ensure sensor coverage.

Starting the Dryer in AUTO

Problem	Check	Cause	Solution
Dryer will not light and goes directly into COOLING	If the ALARM screen has any errors in red…	Wet or Dry trans- port failure	Correct problem and reset the alarm
Dryer will not light	Fan is running but no flame present	Honeywell fault	MAIN MENU-> TROUBLESHOOTING-> BURNER CONTROLS, Identify and resolve issue
		Spark plug failure	Clean/replace plug
		Fuel delivery	Identify if to much fuel or not enough and resolve issue
	Fan is running and there is pilot light igniting, but not main ignition	Low or no VDC on UV sensor	Clean/replace sensor -Ensure that wires are tight behind the Honeywell

General Operation

Problem	Check	Cause	Solution
CHANGE BATTERY	Battery in PLC is low, if not replaced DRYER CONFIGURATION can be lost	Battery in PLC should be replaced approx. every 3 years	Replace 1/2 AA battery in the bottom of the PLC in the main control panel
DRYER CONFIGURATION is lost.	CHANGE BATTERY displayed in lower right corner of HMI screen when powered up	Battery died in PLC during time of non use	Contact dealer to replace battery and re-configure dryer
E-STOP ACTIVE	Both E-STOP switches must be released	One switch is active	Activate and release each switch
	E-STOP Relay inside main control panel normally	If E-STOP button activated the relay displays	Repair or replace the E-STOP button or repair circuit
	Supply–green	Supply–green	If only one K1 or K2 on check wiring of switch
	K1 –green	K1 –off	
	K2 –green	K2 –off	
	Reset –off	Reset –off	
Unable to get Wet or Dry motors to start	MAIN MENU-> SET UP-> FILL & EMPTY SETUP	Review FILL & EMPTY SETUP page	Turn on necessary options
	MAIN MENU-> TROUBLESHOOTING-> PLC INPUTS	Review PLC INPUT STATUS, blinking icons indicate configuration/wiring errors	Ensure that overloads are on for installed starters. If off, ensure that starters are not overloaded. If not overloaded and still off wiring error present
	MAIN MENU-> ALARMS	Alarm Present	Address any alarm problem in RED
Unable to get Wet Transport motors to start	Grain level in dryer	Wet Transports will not start with dryer full	Lower grain level below fill switch
	MAIN MENU-> SET-UP-> FILL & EMPTY SETUP	WET BIN EMPTY SWITCH enabled	Wet bin is empty

Problem	Check	Cause	Solution
	Check Fill rotary switch operation	PLC thinks that dryer is full	Repair/replace faulty rotary switch
	MAIN MENU-> ALARMS	Alarm Present	Address any alarm problem in RED
Unable to get Dry Transport motors to start	MAIN MENU-> SET-UP-> FILL & EMPTY SETUP	DRY BIN FULL SWITCH enabled	Dry bin is full
	Presence of active alarm	DISCHARGE PLUGGED	Clear plugged discharge and reset alarm

6.2. HMI Troubleshooting Screens

The following screens are used primarily for troubleshooting:

- ALARMS and ALARM LOG
- TROUBLESHOOTING
- PLC INPUTS STATUS
- PLC OUTPUTS STATUS
- DryerMaster STATUS and DryerMaster VALUES
- TEMP CONTROL STATUS
- BURNER CONTROL STATUS

Figure 136. ALARMS and ALARM LOG screens

The Alarm Log shows alarm history. Both screens show time alarm went active and time alarm was reset (RTN).

Figure 137. TROUBLESHOOTING screen

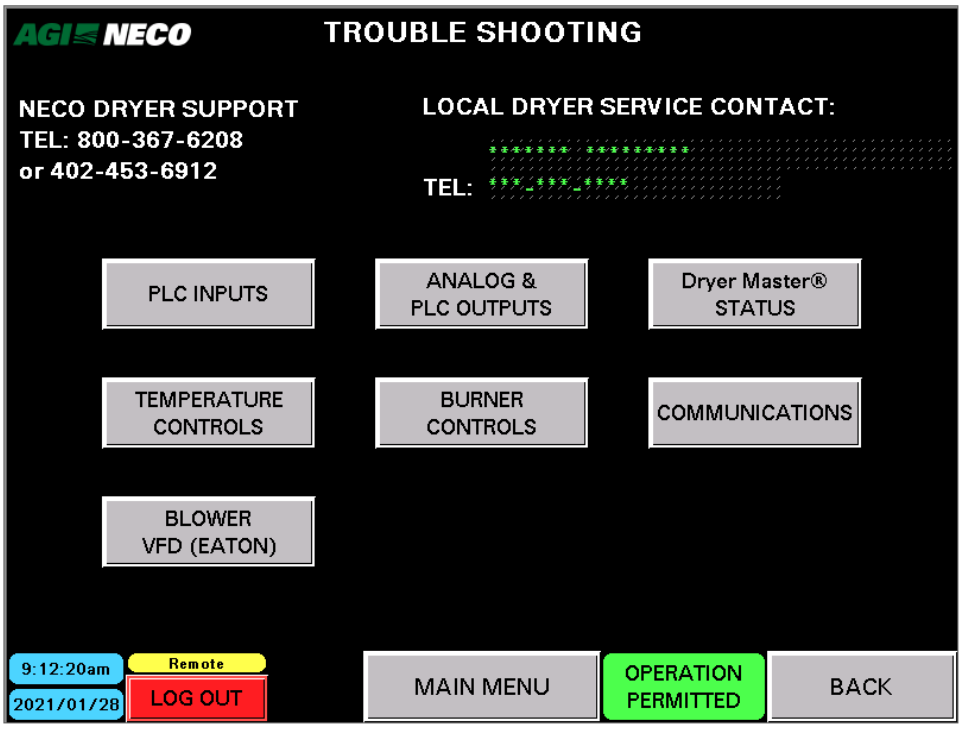


Figure 138. PLC INPUTS STATUS screen

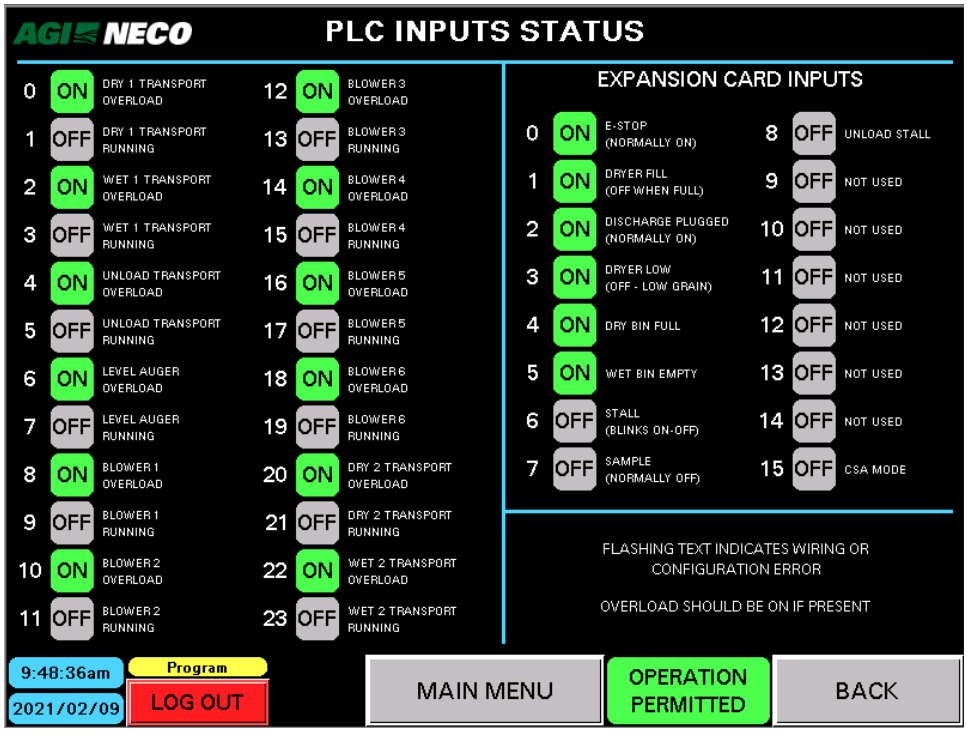


Figure 139. PLC OUTPUTS STATUS screen

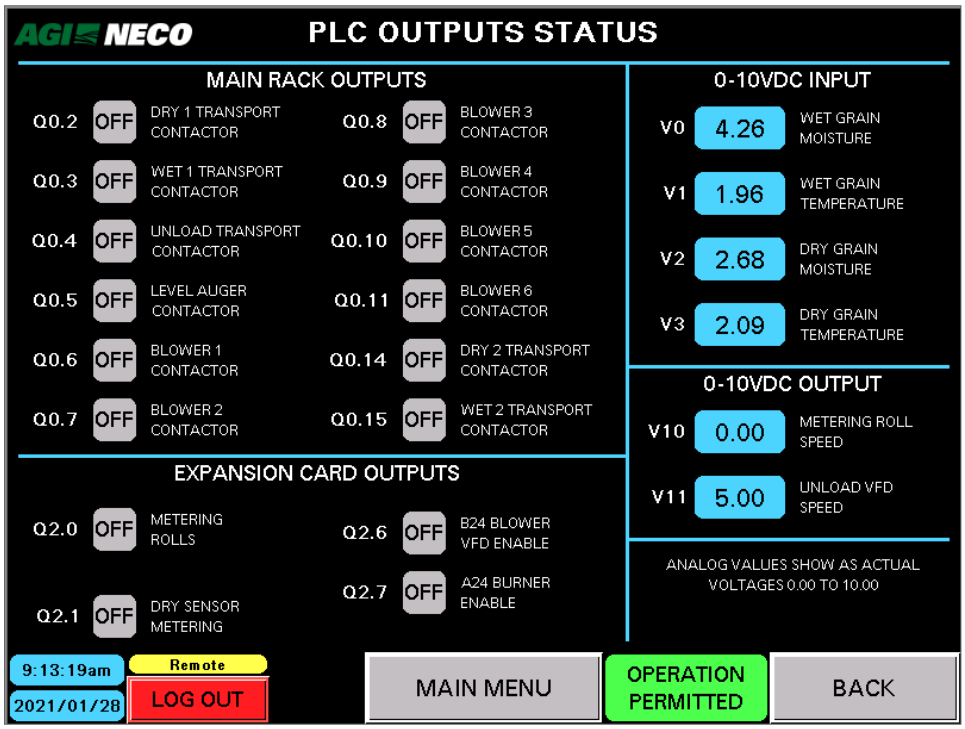


Figure 140. DryerMaster STATUS screen

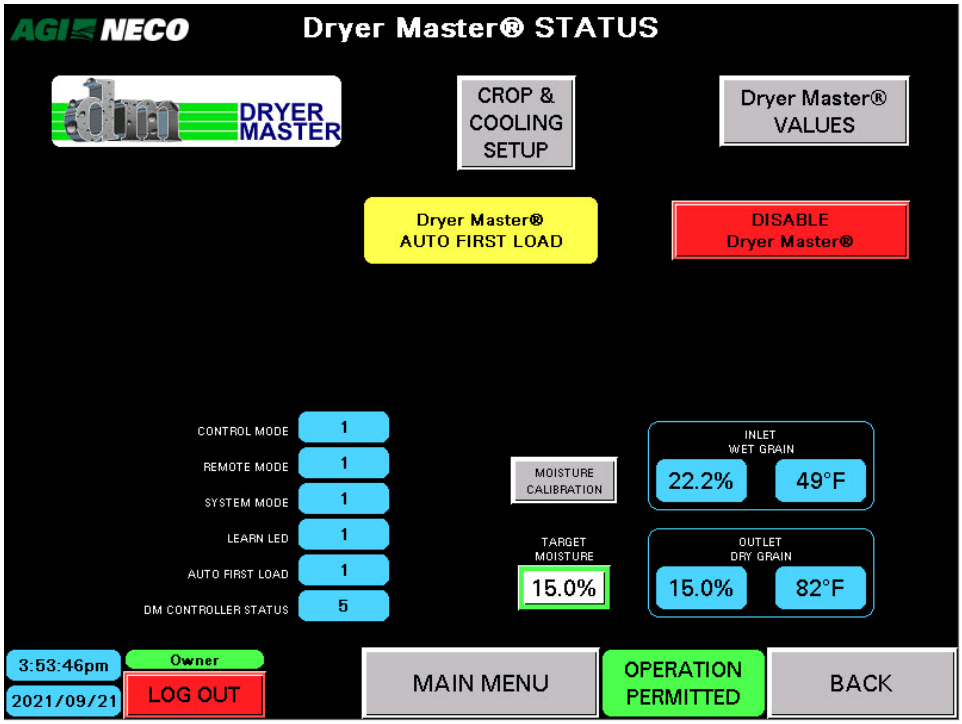


Figure 141. DryerMaster VALUES screen

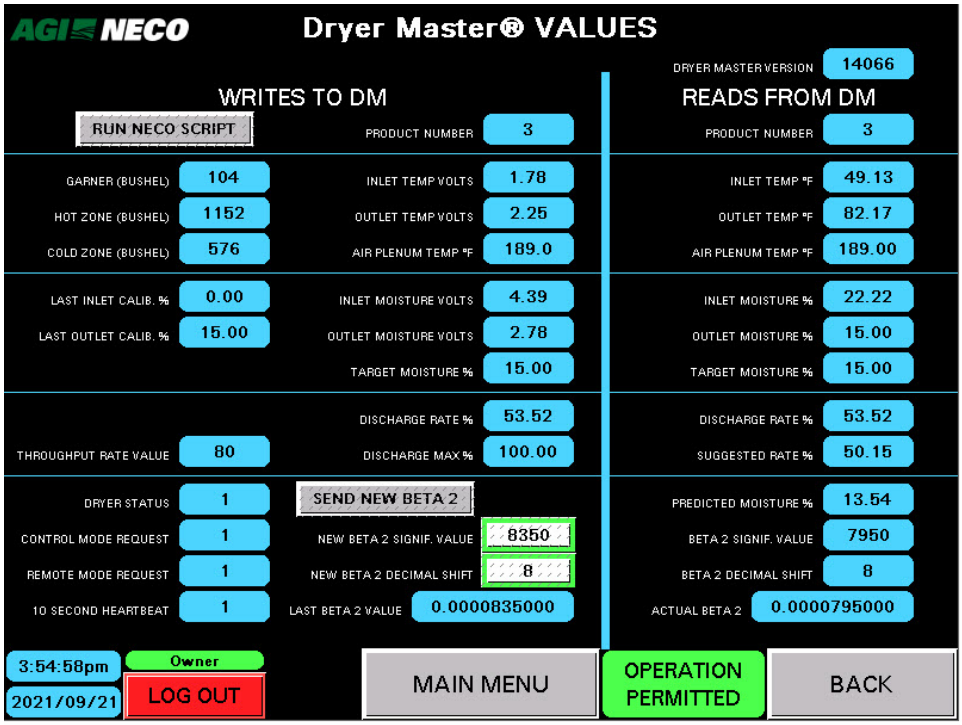


Figure 142. TEMP CONTROL STATUS screen

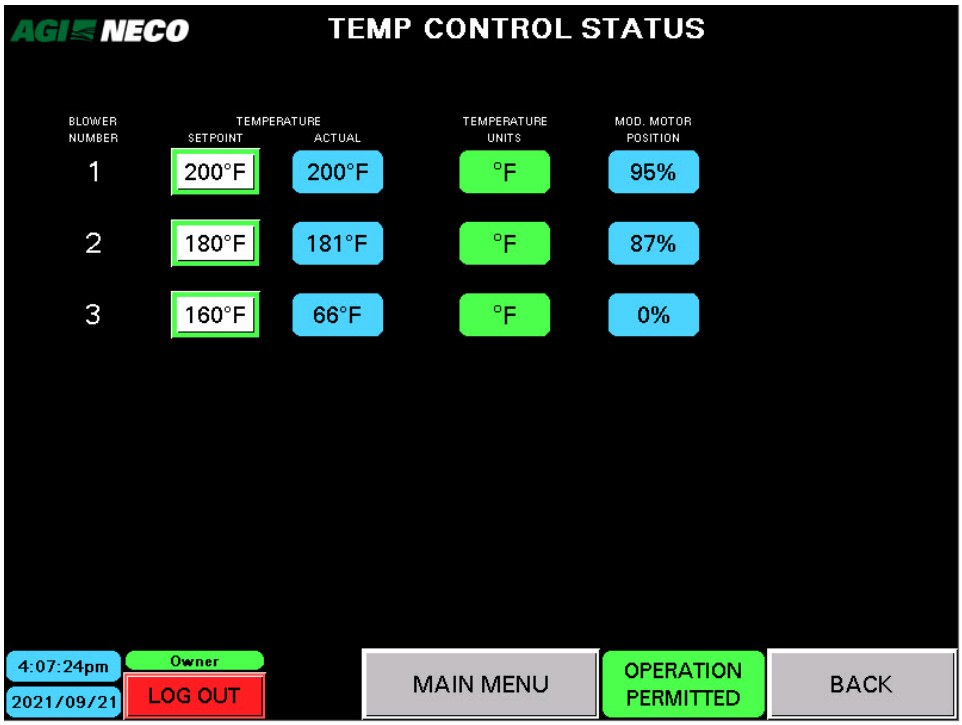


Figure 143. BURNER CONTROL STATUS screen

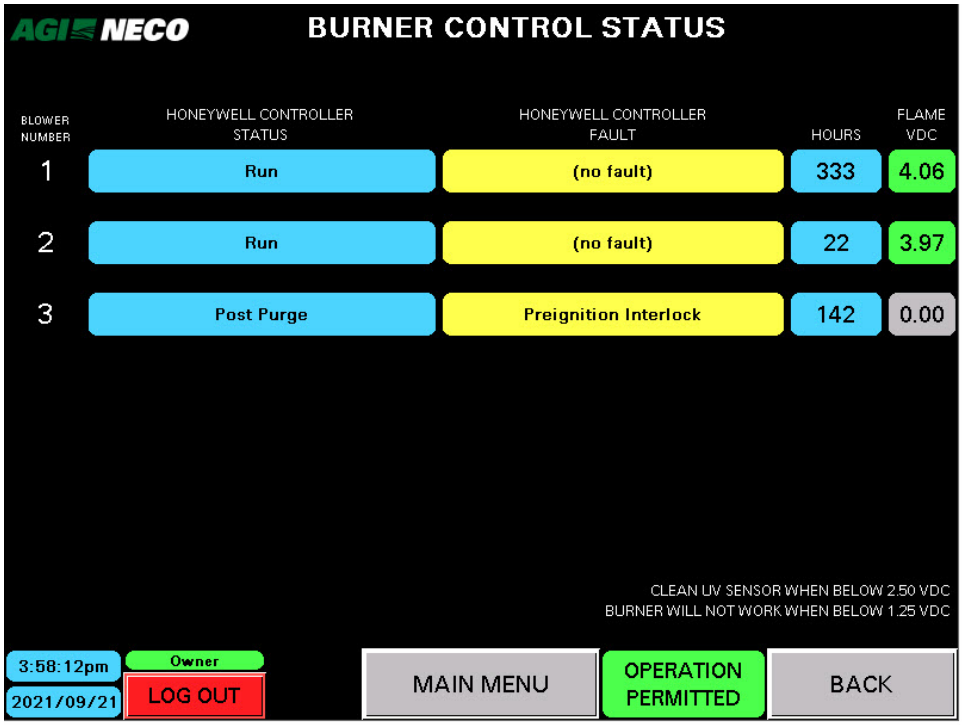


Figure 144. Blower VFD (Eaton) Screen

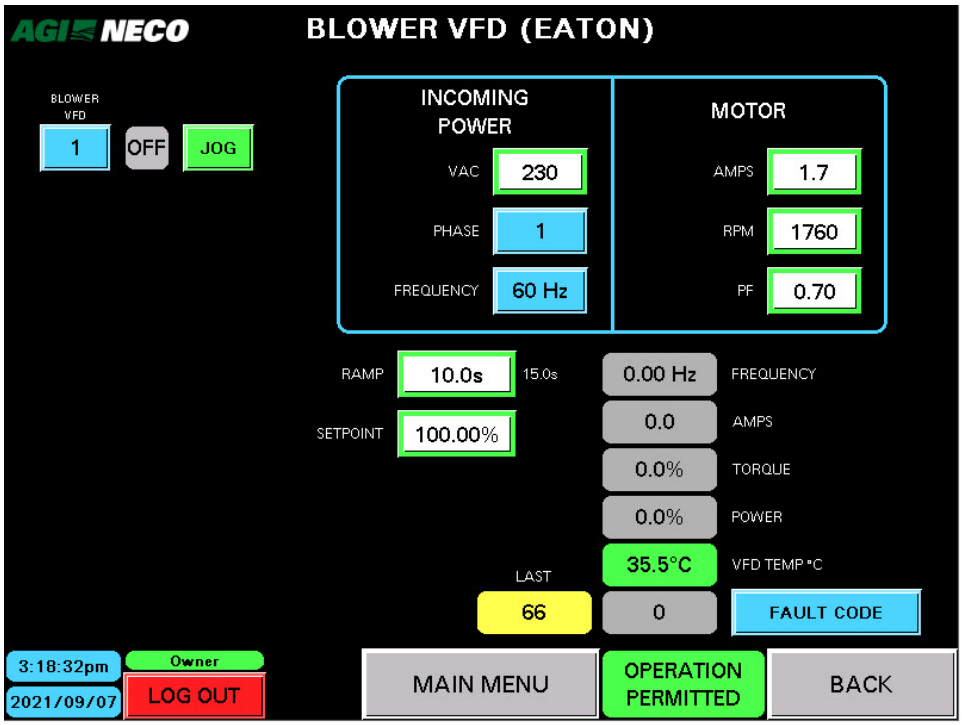


Figure 145. Fault Code (Eaton) Screen

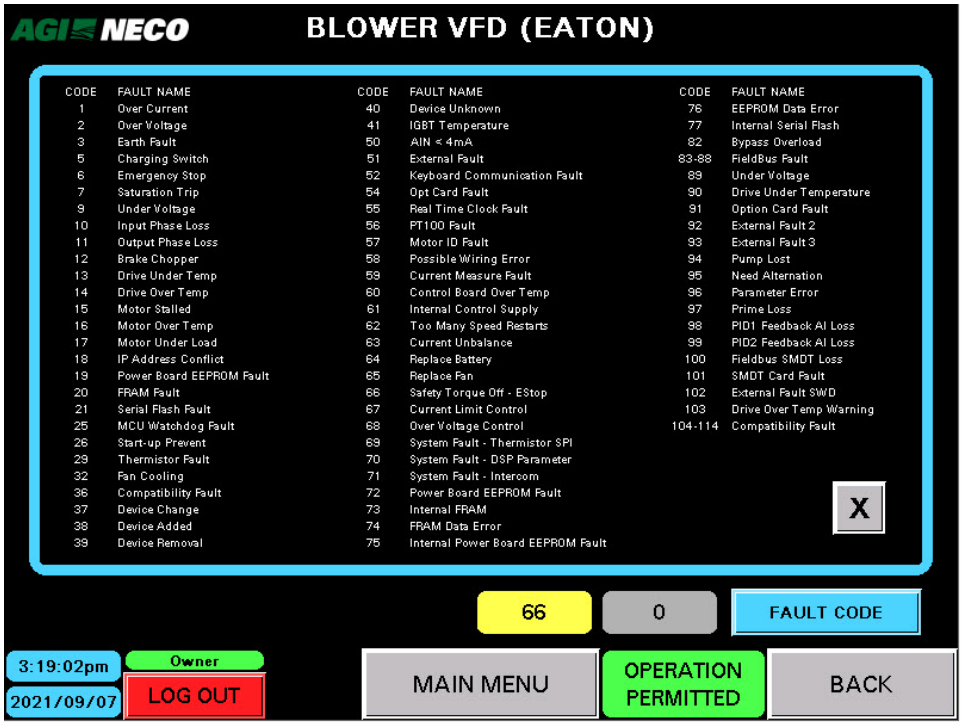
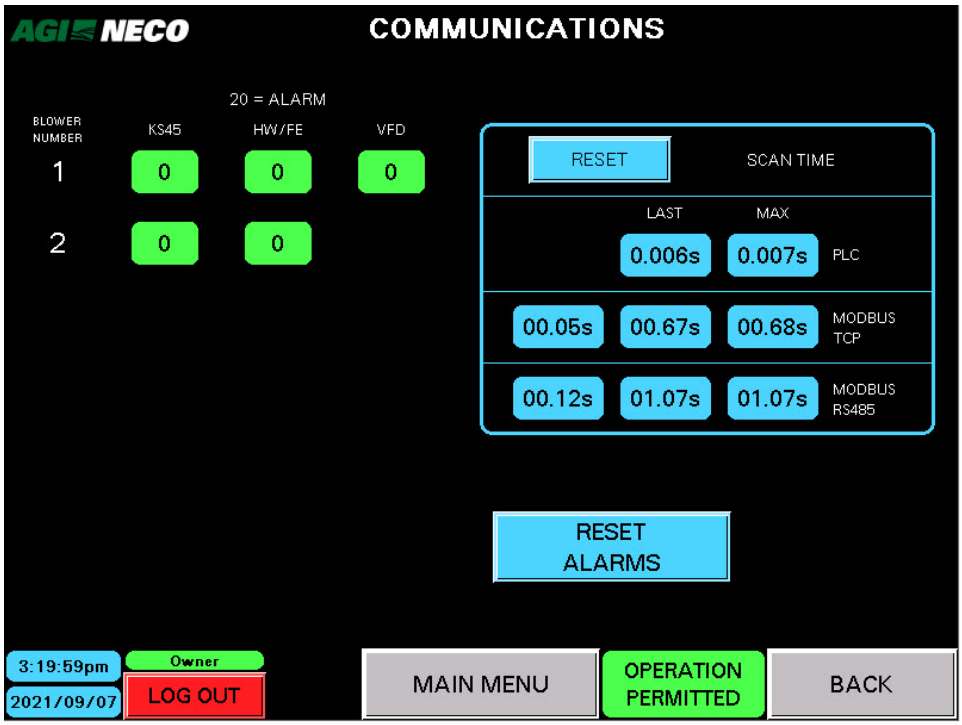


Figure 146. Communications Screen



7. Specifications

7.1. Standard Model Specifications

Refer to the following table for specifications on standard NECO dryers. They are listed by model number as shown on the rating plate located on the front of the main control.

If the model number of your particular dryer is not shown below, contact your dealer.

Table 8. Standard Model Specifications

Model Number	Number of Tiers	Holding Capacity		Number of Burners and Blowers	TOTAL Blower Output (Max)		TOTAL Burner Output (Max)	
		Bushels (See Notes)	Metric Tonnes		cubic ft/min	cubic m/min	MMBTU /hr	kWH
D1660	4	579	15	1	21,500	609	6	1,758
D1670	5	674	17	1	23,500	665	6	1,758
D1680	6	770	19	1	27,500	778	6	1,758
D1690	7	866	22	1	32,000	905	6	1,758
D16106	8	962	24	2	36,600	1,035	12	3,517
D16120	10	1,155	29	2	47,000	1,330	12	3,517
D16140	12	1,347	34	2	55,000	1,556	12	3,517
D16160	14	1,539	39	3	65,300	1,847	18	5,275
D16180	16	1,731	44	3	78,500	2,221	18	5,275
D24108	6	1,155	29	2	41,200	1,165	12	3,517
D24150	8	1,443	36	2	55,000	1,556	12	3,517
D24180	10	1,732	44	2	62,000	1,754	15	4,396
D24210	12	2,020	51	3	82,500	2,334	18	5,275
D24240	14	2,309	58	3	89,500	2,532	21	6,154
D24260	16	2,597	66	4	110,000	3,113	24	7,034
D24330	20	3,174	80	5	137,500	3,891	30	8,792
D24380	24	3,750	95	6	165,000	4,669	36	10,551
D32260	12	2,693	68	3	108,000	3,056	27	7,913
D32340	16	3,463	88	4	144,000	4,075	36	10,551
D32440	20	4,232	107	5	182,000	5,150	45	13,188
D32500	24	5,001	127	6	216,000	6,112	54	15,826

Note

1. Drying capacities represent NECO's best estimate of attainable wet bushel capacities based on a combination of actual field results and computer analysis.
2. Capacities will vary depending on outside temperature, humidity, initial grain temperature, crop maturity and variety, cleanliness of the grain, test weight, operating temperature, drying vs. cooling zones, etc.
3. Hot grain discharged from the dryer will dry an additional 1.5% – 2% when properly cooled.
4. Average burner output MMBTU/hr is based on 155° F temperature rise. Ambient of 55° F and dryer operating temperature of 210° F.
5. Holding capacity values represent corn at 15.5% moisture content (56 lb/bushel).

8. Appendix

8.1. Manual Dryer Speed

Note

These speeds are recommended as a STARTING POINT only for input as manual metering roll speed until the DryerMaster system reaches full automatic. As grain drying factors change, speeds will need to change in order to maintain a correct and steady output grain moisture value.

Some factors to consider when drying grain are:

- The type of grain. Some varieties are moisture-resistant compared to others.
- The end usage of the grain - will it be used for seed, feed, commercial, or some other usage.
- The outside weather conditions - including temperature, humidity, and even wind.
- The moisture content of the incoming grain.
- The cleanliness of the incoming grain.
- The crop region.

Table 9. Speed setting (DC motor %)

MODEL - RPM	MOISTURE CONTENT (%)						
	3	5	7	9	11	13	15
D1240 - 27 RPM	42%	25%	18%	14%	12%	10%	9%
D1250 - 27 RPM	52%	32%	23%	18%	15%	13%	11%
D1260 - 27 RPM	63%	38%	27%	21%	18%	15%	13%
D1660 - 27 RPM	42%	26%	19%	15%	13%	10%	9%
D1670 - 27 RPM	52%	32%	23%	18%	15%	12%	11%
D1680 - 27 RPM	62%	38%	27%	21%	17%	15%	13%
D1690 - 27 RPM	73%	44%	32%	25%	20%	17%	15%
D16106 - 42 RPM	53%	32%	23%	18%	15%	13%	11%
D16120 - 42 RPM	67%	40%	29%	22%	18%	16%	14%
D16140 - 42 RPM	80%	48%	34%	27%	22%	19%	16%
D16160 - 62 RPM	63%	38%	27%	21%	17%	15%	13%
D24108 - 27 RPM	62%	38%	27%	21%	17%	15%	13%
D24150 - 27 RPM	53%	32%	23%	18%	15%	12%	11%
D24180 - 42 RPM	67%	40%	29%	22%	18%	16%	14%
D24210 - 42 RPM	80%	48%	34%	27%	22%	19%	16%
D24240 - 62 RPM	63%	38%	27%	21%	17%	15%	13%
D24260 - 62 RPM	72%	43%	31%	24%	20%	17%	15%
D24330 - 83 RPM	68%	41%	29%	23%	19%	16%	14%
D24380 - 83 RPM	81%	49%	35%	27%	22%	19%	16%

Table 9 Speed setting (DC motor %) (continued)

MODEL - RPM	MOISTURE CONTENT (%)						
	3	5	7	9	11	13	15
D32260 - 62 RPM	54%	32%	23%	18%	15%	13%	11%
D32340 - 62 RPM	72%	43%	31%	24%	20%	17%	15%
D32440 - 92 RPM	61%	36%	26%	20%	17%	14%	12%
D32500 - 92 RPM	73%	44%	31%	24%	20%	17%	15%

8.2. Optional External Transport Configurations

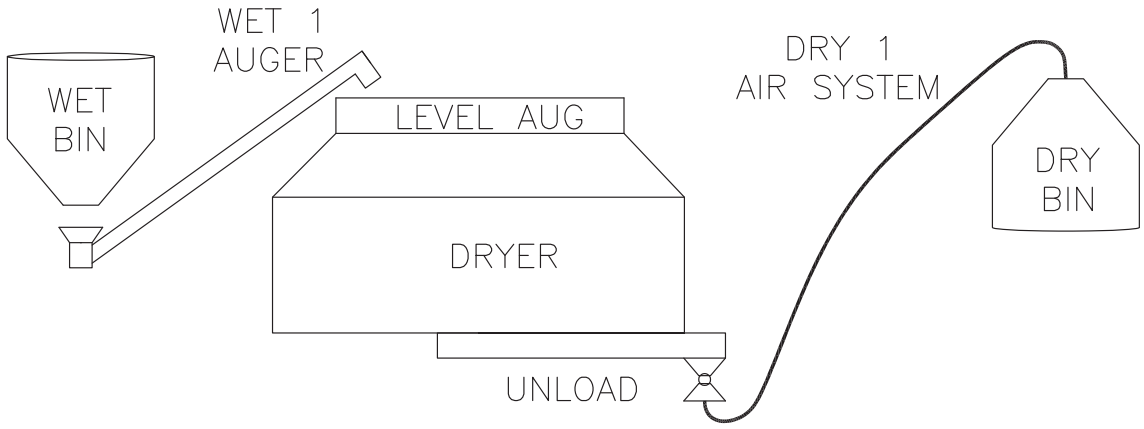
Example 1: Wet 1 Auger and Dry 1 Air System

The following diagram shows an example of a one-wet and one-dry air system to be controlled and operated by the Commander system.

Note

Shown for example only. Individual configuration vary.

Figure 147. Wet 1 auger and dry 1 air system



Note

The table information below is an example of the Fill/Empty Setup data inputs that would be required for the Wet/Dry type of layout shown above.

Table 10. Fill/Empty setup data

	Motor Present	Run Continuous	Stop After Drying Stops	Start Delay Seconds	Stop Delay Seconds	Relay #
Wet 2 Transport (Farthest From Dryer)	No					
Wet 1 Transport (Closest To Dryer)	Yes	No		1	1	63CR

Table 10 Fill/Empty setup data (continued)

	Motor Present	Run Continuous	Stop After Drying Stops	Start Delay Seconds	Stop Delay Seconds	Relay #
Level Auger	Yes	No		1	1	- -
Unload Auger	Yes			5	5	- -
Dry 1 Transport (Closest To Dryer)	Yes			1	1	62CR
Dry 2 Transport (Farthest From Dryer)	No					

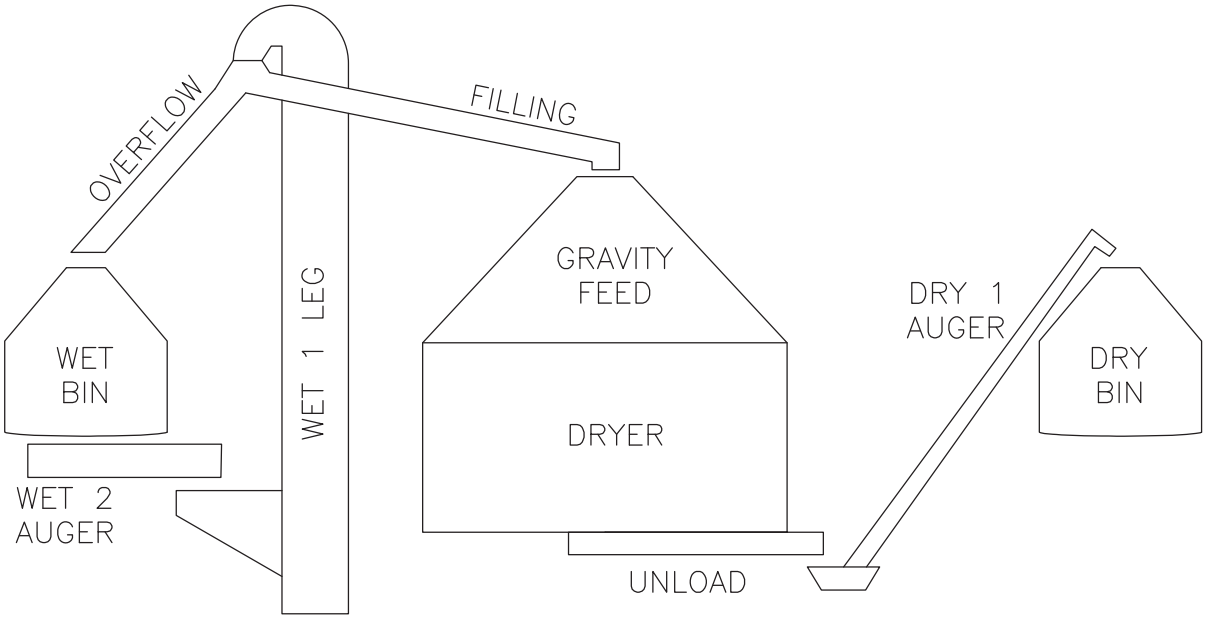
Example 2: Wet 1 and Wet 2 Augers and Dry 1 Auger

The following diagram shows an example of a two-wet and one-dry air system to be controlled and operated by the Commander system.

Note

Shown for example only. Individual configuration vary.

Figure 148. Wet 1 and Wet 2 augers and Dry 1 auger



Note

The table information below is an example of the Fill/Empty Setup data inputs that would be required for the Wet/Dry type of layout shown above.

Table 11. Fill/Empty setup data

	Motor Present	Run Continuous	Stop After Drying Stops	Start Delay Seconds	Stop Delay Seconds	Relay #
Wet 2 Transport (Farthest From Dryer)	Yes			1		75CR
Wet 1 Transport (Closest To Dryer)	Yes	Yes	No			63CR
Level Auger	No					- -
Unload Auger	Yes			1	5	- -
Dry 1 Transport (Closest To Dryer)	Yes	No		1	15	62CR
Dry 2 Transport (Farthest From Dryer)	No					

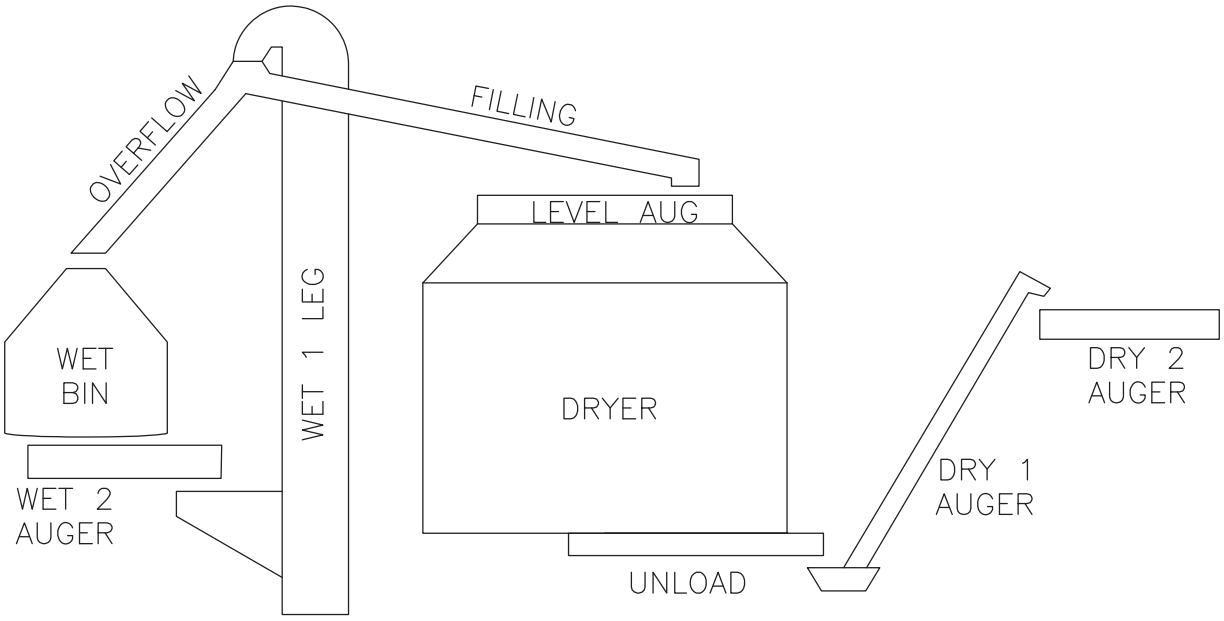
Example 3: Wet 1 and Wet 2 Augers and Dry 1 and Dry 2 Augers

The following diagram shows an example of a two-wet and two-dry air systems to be controlled and operated by the Commander system.

Note

Shown for example only. Individual configuration vary.

Figure 149. Wet 1 and Wet 2 Augers and Dry 1 and Dry 2 Augers



Note

The table information below is an example of the Fill/Empty Setup data inputs that would be required for the Wet/Dry type of layout shown above.

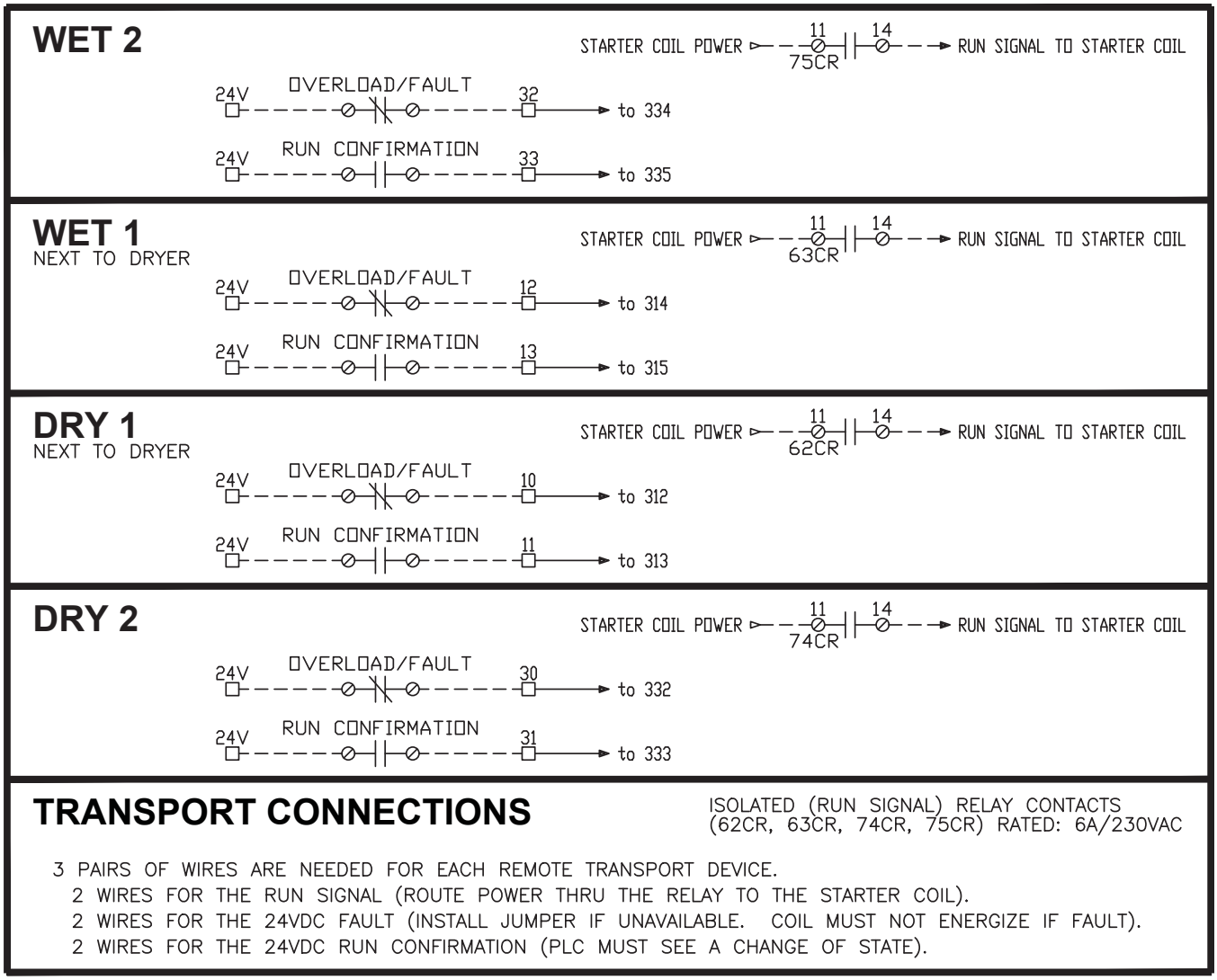
Table 12. Fill/Empty setup data

	Motor Present	Run Continuous	Stop After Drying Stops	Start Delay Seconds	Stop Delay Seconds	Relay #
Wet 2 Transport (Farthest From Dryer)	Yes			1		75CR
Wet 1 Transport (Closest To Dryer)	Yes	Yes	Yes			63CR
Level Auger	Yes	Yes	Yes			- -
Unload Auger	Yes			1	5	- -
Dry 1 Transport (Closest To Dryer)	Yes	No		1	15	62CR
Dry 2 Transport (Farthest From Dryer)	Yes	No		1	5	74CR

8.3. Wiring External Transports

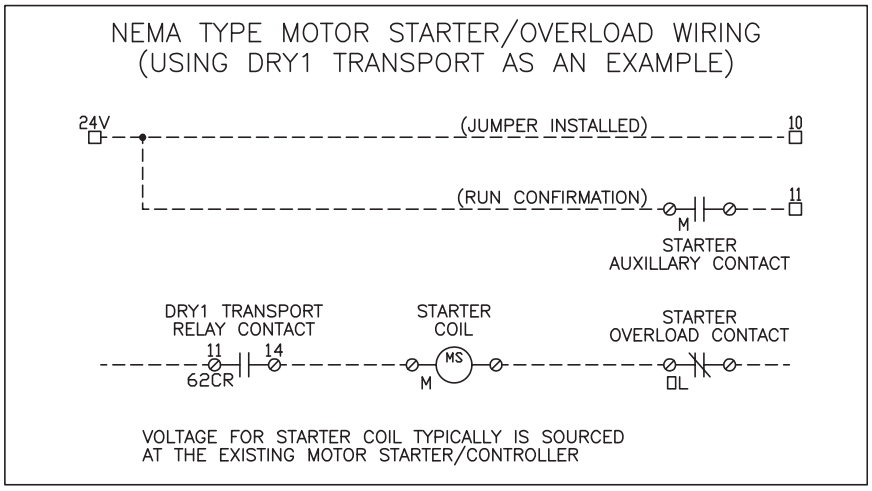
The customer is responsible for wiring any external transport equipment. The following schematics are for reference.

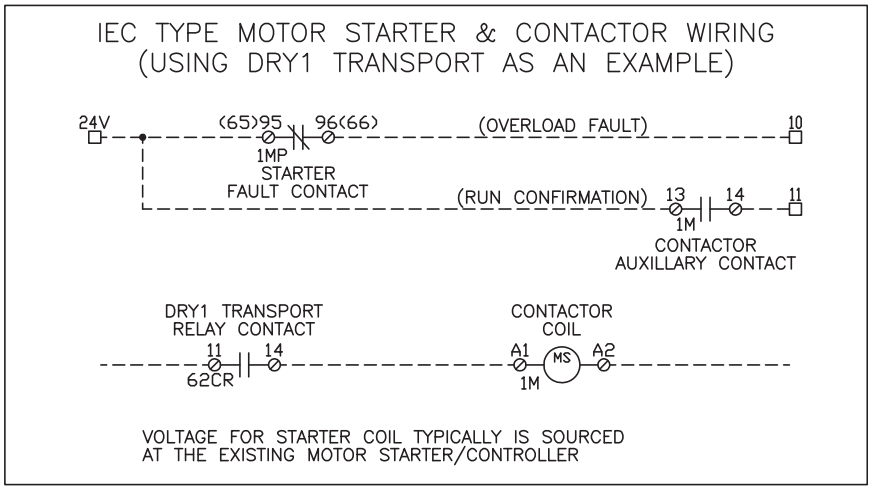
Figure 150. Wiring Connections for External Transports

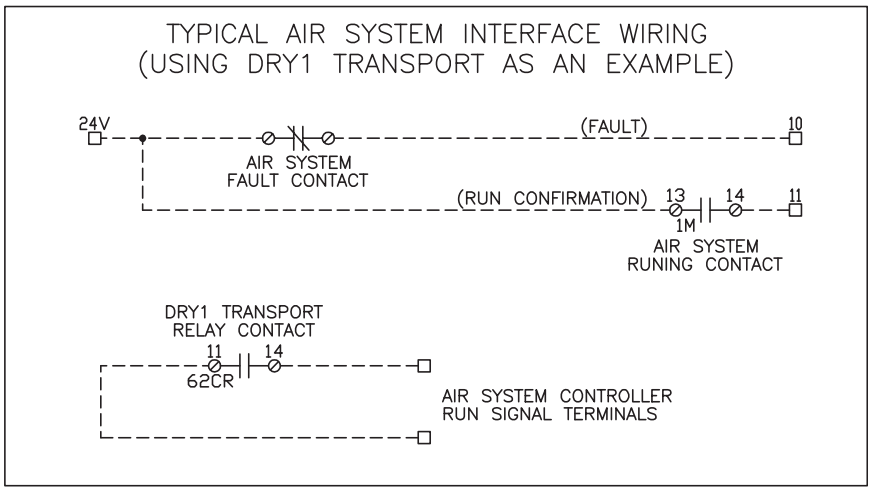


8.4. Wiring NEMA Starters / IEC Starters / Air Systems

Figure 151. Starter and Air System Wiring Diagrams







8.5. PLC and HMI Recorded Data Sheet

(Circle choice or Enter data)

SETUP TAB

Temp & Volume Units: Imperial Metric

SETUP TAB - Dryer Configuration

Length: 12' 16' 24' 32'

Gearmotor RPM:

Level Auger: Yes No

Number of Blowers: 1 2 3 4 5 6

Number of Burners: 1 2 3 4 5 6

Number of Tiers at Blower:

Blower #1	Blower #2	Blower #3	Blower #4	Blower #5	Blower #6
3 4 5	3 4 5	3 4 5	3 4 5	3 4 5	3 4 5

Gas Type: Liquid Propane (LP) or Natural Gas (NG)

SETUP TAB - Fill & Empty Setup

Wet Transport 2: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Wet Transport 1: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Level Auger: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Unload Auger: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Dry Transport 1: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Dry Transport 2: Yes No

- Run Continuous: Yes No
- Stop Ater Drying Stops: Yes No
- Start Delay Seconds:
- Stop Delay Seconds:

Wet Bin Empty Switch: Yes No

Dry Bin Full Switch: Yes No

Low Level Switch: Yes No

Meterig Roll Max Speed:

SETUP TAB - Timers Setup

Factory Defaults shown in ( )

Auto Filling Delay (10 SEC):

Low Level Ignore (30 SEC):

Max Run Time (5 MIN):

Blower Start Delay (5 SEC):

Burner Enable Delay (5 SEC):

Enable Discharge (30 SEC):

Metering Roll Stall (3 MIN):

Metering Roll Pause (60 SEC):

Discharge Plugged Ignore (1 SEC):

Dryer Cooling Time (5 MIN):

SETUP TAB - Control Setup (Overrides)

Inlet Grain Moisture Alarm Setpoint:

MAIN MENU TAB - Trouble Shooting

Dealer Info:

TROUBLE SHOOTING - Temperature Control

Ramp Deg/Min
1
2
3
4
5
6

MAIN MENU TAB - Trends

Discharge Rate Factor:

Throughput:

Total Throughput:

Hours:

MAIN MENU TAB - Fill / Empty Dryer

Manual Metering Roll Setpoint:

Serial #:

PLC & HMI Version #:

8.6. Updating the PLC and HMI Programs

Program Update Instructions

Note

Updating the PLC and HMI programs results in the loss of certain setup configuration data. Settings on various screens will need to be manually re-entered. Make a copy of the *Section 8.5 – PLC and HMI Recorded Data Sheet on page 134* to record the necessary data.

Note

It is best and easiest to take photos of each screen prior to updating the PLC and HMI programs.

- Update the PLC unit first. Then follow with the HMI update.
- In order to access and re-enter data, you must be logged in as:

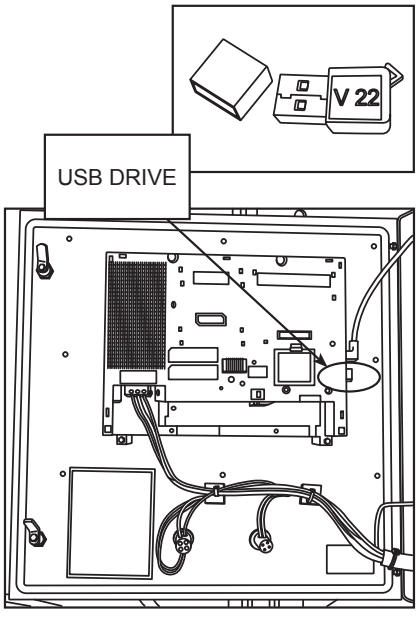
User = N e c o T e c h

Password = (Contact your dealer for the required password)

Install PLC and HMI Program

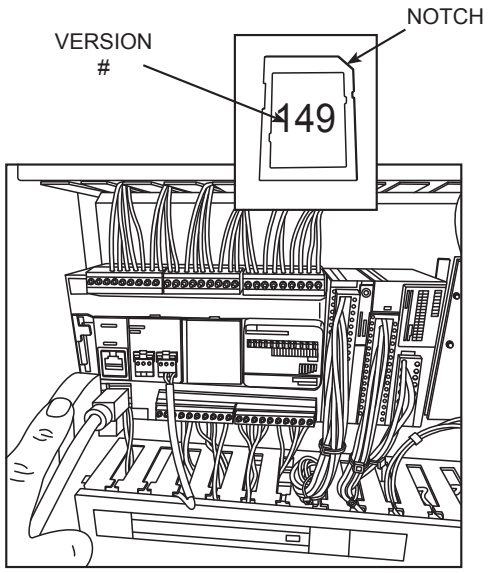
- Installing the XBTGT6330 screen software
  1. Keep the HMI power on.
  2. Install the new single install USB drive with the new files.
  3. When prompted, press the “Yes” icon to begin installing.
  4. Do not remove the USB drive.
  5. When prompted press the “Restart” icon.
  6. Leave this USB in the HMI when finished (do not remove).

Figure 152. XBTGT Series



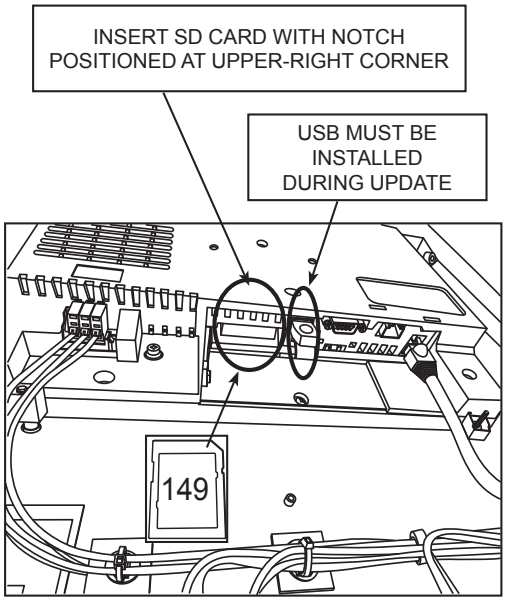
- Installing the M221 PLC software
  1. Power off the PLC.
  2. Install the SD card in the PLC.
  3. Power on the PLC.
  4. There should be a solid green PWR led and a solid red ERR led.
  5. The green SD led should be on solid (not flashing) green for 10-20 seconds.
  6. After the SD led goes off, power off the PLC.
  7. Remove the SD card, then power on the PLC.
  8. There should be a solid green PWR led and a solid red ERR.
  9. The solid red ERR should go off ~4 seconds.
  10. Then the green RUN led should light and stay flashing beyond 8 times.
  11. Power the PLC off then back on.
  12. The green PWR led will be on solid & the green RUN led should flash ~8 times then go solid on

Figure 153. M221 Series



- Installing the HMIGTO screen software
  1. Power off the HMI.
  2. Remove USB drive from dryer HMI.
  3. Format USB drive to Fat32.
  4. Replace the USB drive in the HMI.
  5. Install the SD card with the new files.
  6. Power on the HMI.
  7. Install should begin automatically (~2 minutes).
  8. When install complete, remove the SD card, then press the “Restart” icon.

Figure 154. HMIGTO Series



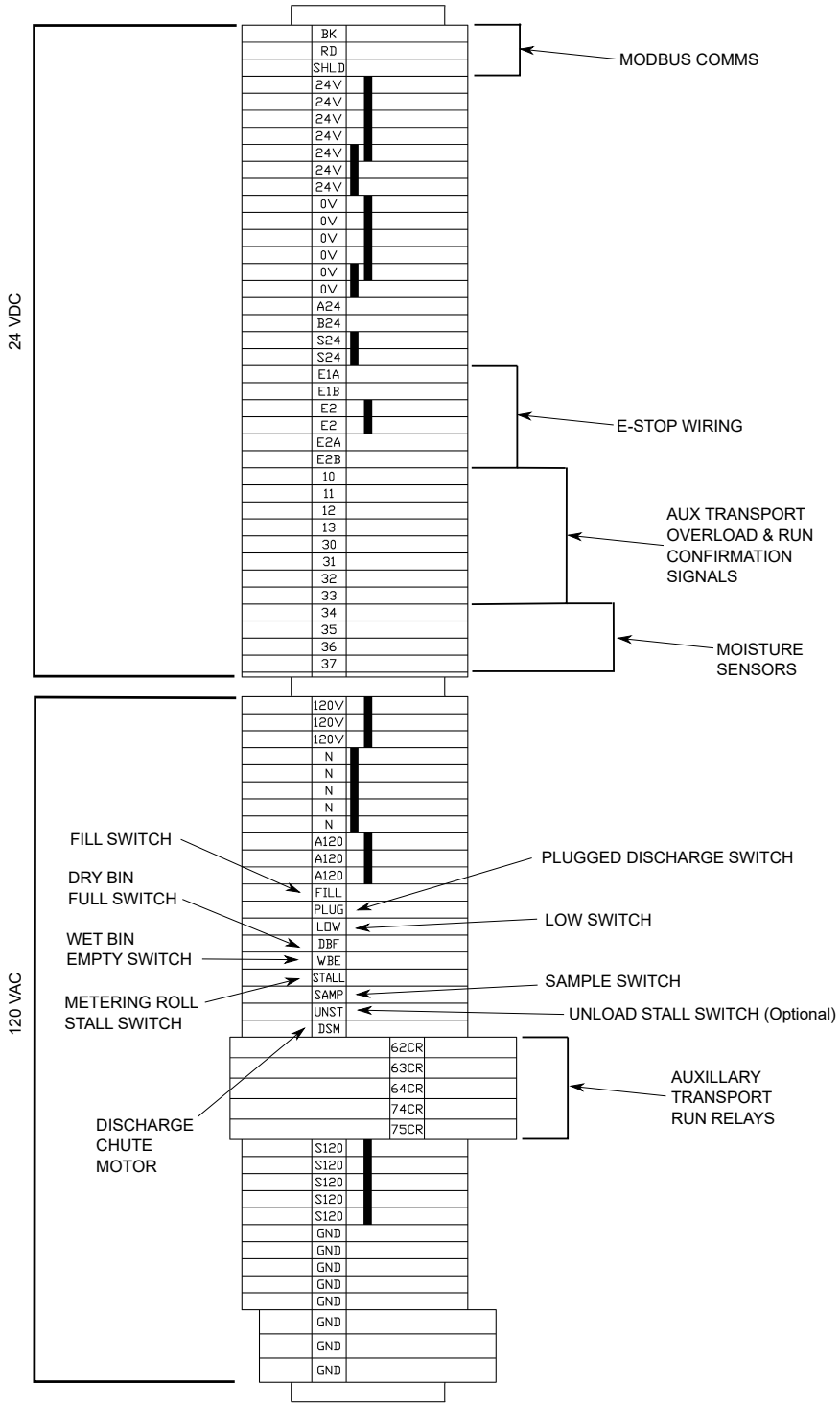
SD CARD PORT ON LEFT END OF HMI REAR PANEL

8.7. Main Control Box Terminal Strip

Important

After installation is complete check the motor wires for the correct motor rotation and auger rotation direction.

Figure 155. Main Control Box Terminal Strip



8.8. Honeywell Burner Control Fault Codes

The Honeywell burner control system displays system faults by illuminating the red ALARM LED, and turning the green POWER LED on and off in patterns. The patterns consist of one or more fast, and one or more slow, flashes of the POWER LED. These patterns are sometimes referred to as “blink codes”. The following table provides a description of the “blink codes” and their meanings.

Figure 156. Honeywell burner control location and LEDs

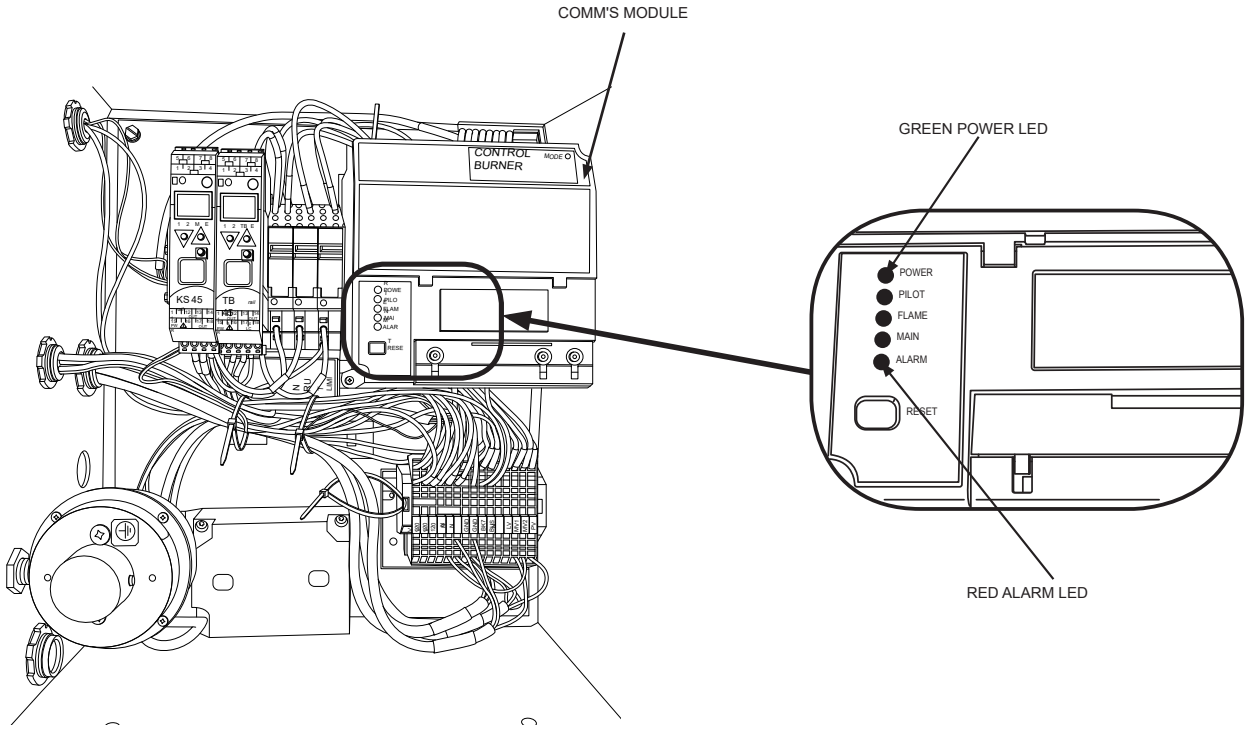


Table 13. Power LED fault codes

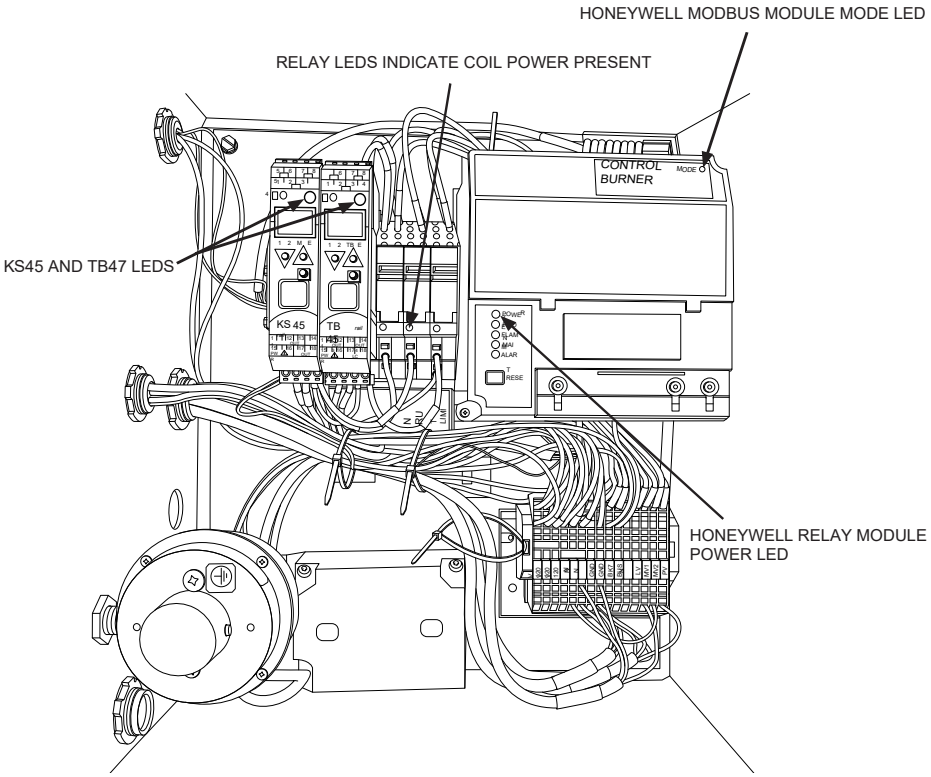
CODE (Fast-Slow)	FAULT DESCRIPTION
1-1	Low AC line voltage
1-2	AC quality problem
2-1	Unexpected flame signal
2-2	Flame signal absent
2-3	Flame signal overrange
3-1	Running ILK switch problem
3-2	Running ILK switch in Standby
3-3	Valve proving fault
4-1	Purge card problem
4-2	Wiring problem/internal fault
4-3	Flame amplifier problem

Table 13 Power LED fault codes (continued)

CODE (Fast-Slow)	FAULT DESCRIPTION
4-4	Configuration jumper problem
5-1	PII fault (Normal state when turned off)
5-2	HFS/LFS fault
5-3	MOS/Start switch
6-1	Output drive failure
6-2	Internal fault
6-3	Device specific fault
6-4	Accessory fault
7-7	Unrecognized fault

8.9. KS45 & TB45 Controller LEDs

Color	Meaning
Green	Ok
Green, blinking	No Modbus communications
Red	Excessive Temperature or bad Thermocouple
Red, blinking	Internal fault, replace controller



Honeywell Modbus Mode LEDs

LED Behavior	Pulse Period	Interval	Meaning
Mostly ON with 1 blink (good)	50ms (OFF)	1 sec	Normal Operation Both ControlBus and ModBus are active
Always OFF		OFF	No power or device failure
Always ON		ON	Modbus card failure
Mostly OFF with 1 flash	50ms (ON)	3.85 sec	ModBus is not active Check ModBus wiring
Mostly OFF with 2 pulses	2 x (200ms ON, 200ms OFF)	1.75 sec	Program CRC error
Most OFF with 3 pulses	3 x (200ms ON, 200ms OFF)	2.15 sec	No ControlBus signal from the burner controller

Honeywell Relay Module blinking Power LED indication

Note

A 5-1 blink code (Pre-Ignition Interlock) is a normal stand-by condition on NECO dryers with Commander & Commander Lite controls when not running.

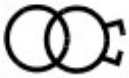
Fault Code	System Failure	Recommended Troubleshooting
Code 1-1 *Low AC Line Voltage*	Low AC Line detected.	1. Check the relay module and display module connections. 2. Reset and sequence the Relay Module. 3. Check the 7800 power supply and make sure that frequency and voltage meet specifications. 4. Check the backup power supply, as appropriate.
Code 1-2 *AC Quality Problem*	Excessive noise or device running on slow, fast, or AC line dropout detected.	
Code 2-1 *Unexpected Flame Signal*	Flame sensed when no flame is expected during STANDBY or PURGE.	1. Check that flame is not present in the combustion chamber; correct any errors. 2. Make sure that the flame amplifier and flame detector are compatible. 3. Check the wiring and correct any errors. 4. Remove the flame amplifier and inspect its connections. Reseat the amplifier. 5. Reset and sequence the relay module. 6. If the code reappears, replace the flame amplifier and/or the flame detector. 7. If the fault persists, replace the relay module.

Fault Code	System Failure	Recommended Troubleshooting
Code 2-2 *Flame Signal Absent*	No-flame time present at the end of the Pilot Flame Establishing Period; lost during the Main Flame Establishing Period or during RUN.	1. Measure the flame signal. If one exists, verify that it meets specifications. 2. Make sure that the flame amplifier and flame detector are compatible. 3. Inspect the main fuel valve(s) and valve connection(s). 4. Verify that the fuel pressure is sufficient to supply fuel to the combustion chamber. Inspect the connections to the fuel pressure switches. Make sure they are functioning properly. 5. Inspect the Airflow Switch and make sure that it is functioning properly. 6. Check the flame detector sighting position; reset and recycle. Measure the flame signal strength. Verify that it meets specifications. If not, refer to the flame detector and/or flame amplifier check-out procedures in the installation instructions. 7. Replace the flame amplifier and/or the flame detector, if necessary. 8. If the fault persists, replace the relay module.
Code 2-3 *Flame Signal Overrange*	Flame signal value is too high to be valid.	1. Make sure the flame detector and flame amplifier are compatible. 2. Remove the flame amplifier and inspect its connections. Reset the flame amplifier. 3. Reset and sequence the relay module. 4. Check the flame detector sighting position; reset and recycle. Measure flame strength. Verify that it meets specifications. If not, refer to the flame detector and/or flame amplifier checkout procedures in the installation instructions. 5. If the code reappears, replace the flame amplifier and/or the flame detector. 6. If the fault persists, replace the relay module.
Code 3-1 *Running/ Interlock Switch Problem*	Running or Lockout Interlock fault during Prepurge.	1. Check wiring; correct any errors. 2. Inspect the fan; make sure there is no air intake blockage and that it is supplying air. 3. Make sure the Lockout Interlock switches are functioning properly and the contacts are free from contaminants. 4. Reset and sequence the relay module to Prepurge (place the TEST/RUN Switch in the TEST position, if available). Measure the voltage between terminal 7 and G (ground); 120 Vac should be present. Switch TEST/RUN back to RUN. 5. If steps 1 through 4 are correct and the fault persists, replace the relay module.
Code 3-2 *Running/ Interlock On During Standby*	Lockout Interlock powered at improper point in sequence or On in Standby.	1. Check wiring to make sure that the Lockout Interlocks are connected properly between terminals 6 and 7. Correct any errors. 2. Reset and sequence the relay module. 3. If the fault persists, measure the voltage between terminal 6 and G (ground), then between terminal 7 and G. If there is 120 Vac at terminal 6 when the controller is off, the controller switch may be bad or is jumpered. 4. If steps 1 through 3 are correct and there is 120 Vac at terminal 7 when the controller is closed and the fault persists, check for a welded or jumpered Running Interlock or Airflow Switch. Correct any errors. 5. If steps 1 through 4 are correct and the fault persists, replace the relay module.
Code 3-3 *VPS in Improper State*	VPS (Valve Proving Switch) in wrong state during VPS Test.	1. Check wiring, making sure upstream valve is connected to terminal 9 and downstream valve is connected to terminal 17. 2. Conduct Valve Seat leakage test using a manometer. 3. Reset and sequence the relay module; if fault repeats, test VPS (connected to terminal 16) is functioning properly; replace if necessary. 4. Reset and sequence the relay module. 5. If fault persists, replace the relay module.
Code 4-1 *Purge Card Problem*	No purge card or the purge card timing has changed from the original configuration.	1. Make sure the purge card is seated properly. 2. Inspect the purge card and the connector on the relay module for any damage or contaminants. 3. Reset and sequence the relay module. 4. If the fault code reappears, replace the purge card. 5. Reset and sequence the relay module. 6. If the fault code persists, replace the relay module.
Code 4-2 *Wiring Problem/ Internal Fault*	Pilot (ignition) valve terminal, main valve, ignition or Main Valve 2 was on when it should be off.	**⚠ WARNING** **Electrical Shock Hazard; Fire or Explosion Hazard.** **Can cause severe injury, death or property damage.** Remove system power and turn off power supply. 1. Remove system power and turn off fuel supply. 2. Check wiring; correct any errors. 3. inspect Pilot Fuel Valve(s), both places, and connections. 4. Reset and sequence the relay module. 5. If the fault persists, replace the relay module.

Fault Code	System Failure	Recommended Troubleshooting
Code 4-3 *Flame Amplifier Problem*	Flame not sensed, or sensed when it should be on or off.	1. Check wiring; correct any errors. 2. Make sure the flame amplifier and flame detector are compatible. 3. Remove the flame amplifier and inspect the connections. Reseat the amplifier. 4. Reset and sequence the relay module. 5. If the code reappears, replace the flame amplifier and/or the flame detector. 6. If the fault persists, replace the relay module.
Code 4-4 *Configuration Jumper Problem*	The configuration jumpers differ from the sample taken at startup.	1. Inspect the jumper connections. Make sure the clipped jumpers were completely removed. 2. Reset and sequence the relay module. 3. If the fault persists, replace the relay module.
Code 5-1 *Preignition Interlock*	Preignition Interlock fault.	1. Check wiring and correct any errors. 2. Check Preignition Interlock switches to assure proper functioning. 3. Check fuel valve operation. 4. Reset and sequence the relay module; monitor the Preignition Interlock status. 5. If the fault persists, replace the relay module.
Code 5-2 *High Fire Sw. or Low Fire Sw.*	Either High Fire Switch or Low Fire Switch failure.	1. Check wiring and correct any errors. 2. Reset and sequence the relay module. 3. Use manual motor potentiometer to drive the motor open and closed. Verify at motor switch that the end switches are operating properly. Use RUN/TEST switch if manual potentiometer is not available. 4. Reset and sequence the relay module. 5. If the fault persists, replace the relay module.
Code 5-3 *Man-Open Sw.; Start Sw. or Control On*	Man-Open Switch, Start Switch or Control On in the wrong operational state.	1. Check wiring and correct any errors. 2. Make sure that the Manual Open Valve Switch, Start Switch and Control are operating properly. 3. Stat Switch held “On” too long. 4. Reset and sequence the relay module. 5. Reset and sequence the relay module. If the fault persists, replace the relay module (RM7838A1014; RM7838B1013 or RM7838C1004 only).
Code 6-1 *Internal Faults*	Relay Module self-test failure.	1. Reset and sequence the relay module. 2. If fault reappears, remove power from the device, reapply power, then reset and sequence the relay module. 3. If the fault persists, replace the relay module.
Code 6-2 *Internal Faults*	Relay Module Self-Test failure.	1. Reset and sequence the relay module. 2. If fault reappears, remove power from the device, reapply power, then reset and sequence the relay module. 3. If fault does not repeat on the next cycle, check for electrical noise being copied into the relay module through the external loads or possibly an electrical grounding issue. 4. If the fault persists, replace the relay module.
Code 6-3 *Device Specific*	Fault with special OEM input circuits.	1. Check wiring and operation of special OEM inputs. 2. Reset and sequence the relay module. 3. If fault reappears, remove power from the device, reapply power, then reset and sequence the relay module. 4. If the fault does not repeat on the next cycle, check for electrical noise being copied into the relay module through the external loads or possibly an electrical grounding issue. 5. If the fault persists, replace the relay module.
Code 6-4 *Accessory Fault*	Unused at this time.	—
Code 7-7 *Unused*	Unused at this time.	—

Fireye Lockout Codes Interpretation

During an alarm condition, the Alarm LED is made to flash at approximately a twice per second rate. The remaining LED's are illuminated as a coded sequence identifying the reason for the lockout. This remains true if power is removed and then restored in a locked out condition.

LED DISPLAY READOUT ● = ON							
LOCKOUT MESSAGE	FAN	OPEN DAMPER	CLOSE DAMPER	AUTO	IGN	FLAME	
							
T13 FUEL VALVE END SWITCH OPEN					●	●	
M-D LOW FIRE START OPEN				●		●	
M-D LOW FIRE START OPEN - PTFI	●			●		●	
M-D LOW FIRE START OPEN - MTFI	●	●		●		●	
M-D CLOSED			●		●		
M-8 CLOSED			●			●	
M-8 HIGH PURGE CIRCUIT OPEN				●			
FALSE FLAME-STANDBY				●	●		
FLAME FAIL PTFI	●			●	●	●	
FLAME FAIL - MTFI	●	●		●	●	●	
FLAME FAIL AUTO				●	●	●	
3-P RUN INTLK OPEN - PREPURGE	●		●			●	
3-P RUN INTLK OPEN - PURGE	●		●		●		
3-P RUN INTLK OPEN-PTFI	●		●				
3-P RUN INTLK OPEN-MTFI	●	●	●				
3-P RUN INTLK CLOSED-STANDBY						●	
3-P RUN INTLK OPEN-AUTO			●				
FUEL VALVE STATE CHANGE					●		
CHECK FUSE			●	●	●		
CHECK WIRING			●	●		●	
CHECK SCANNER			●		●	●	
CHECK PROGRAMMER			●	●			
CHECK CHASSIS		●					
CHECK EXPANSION MODULE			●	●	●	●	

8.10. HMI Wiring Connections

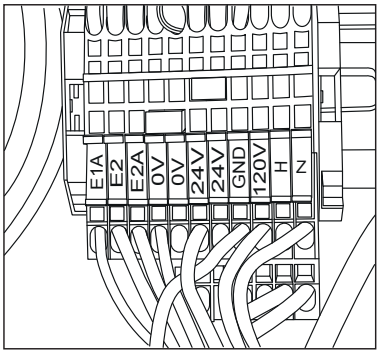
Important

The HMI must be connected to a customer-supplied 120 VAC, 400 to 600 VA uninterruptible power supply (UPS).

Electrical Wiring from Main Control to HMI

1. Using the labels provided, pull and connect the following wires from the main control terminals to the HMI terminals:

Figure 157. Terminals Inside HMI Enclosure



Wire Label	Wire Color
E1A	Blue
E2	Blue
E2A	Blue
24V	Blue
0V	White

Ethernet Cable from Main Control to HMI

1. Pull Cat 6 shielded Ethernet cable from the main control to the HMI. The maximum distance should be less than 300 feet.
2. Terminate each end of the Ethernet cable (if not already terminated).
3. Plug one end into the ethernet switch in the main control panel.
4. Plug the other end into the Ethernet switch inside the HMI enclosure.

Figure 158. Ethernet Cable Connection in Main Control Panel

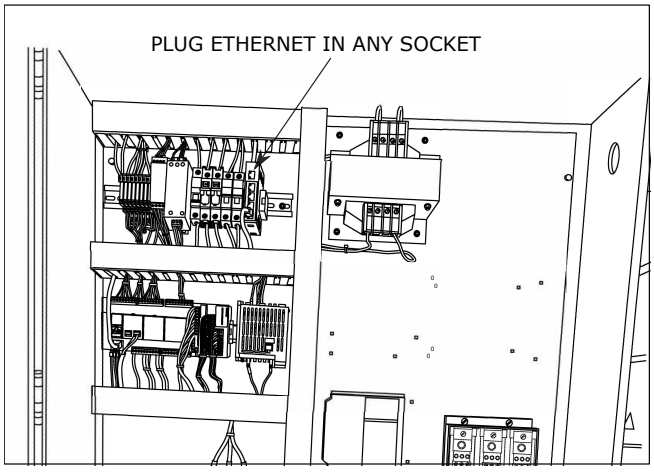
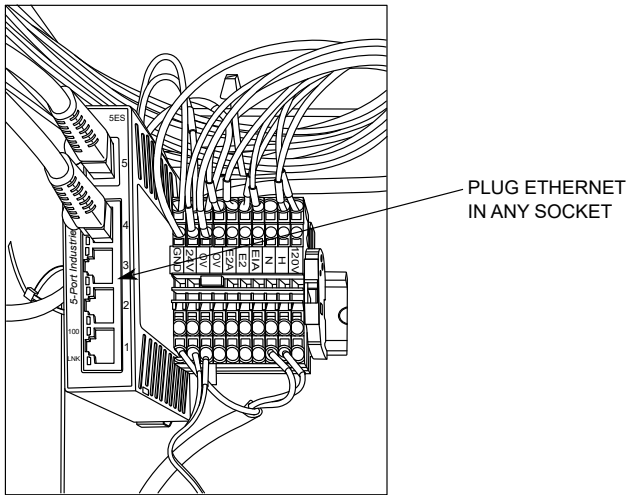


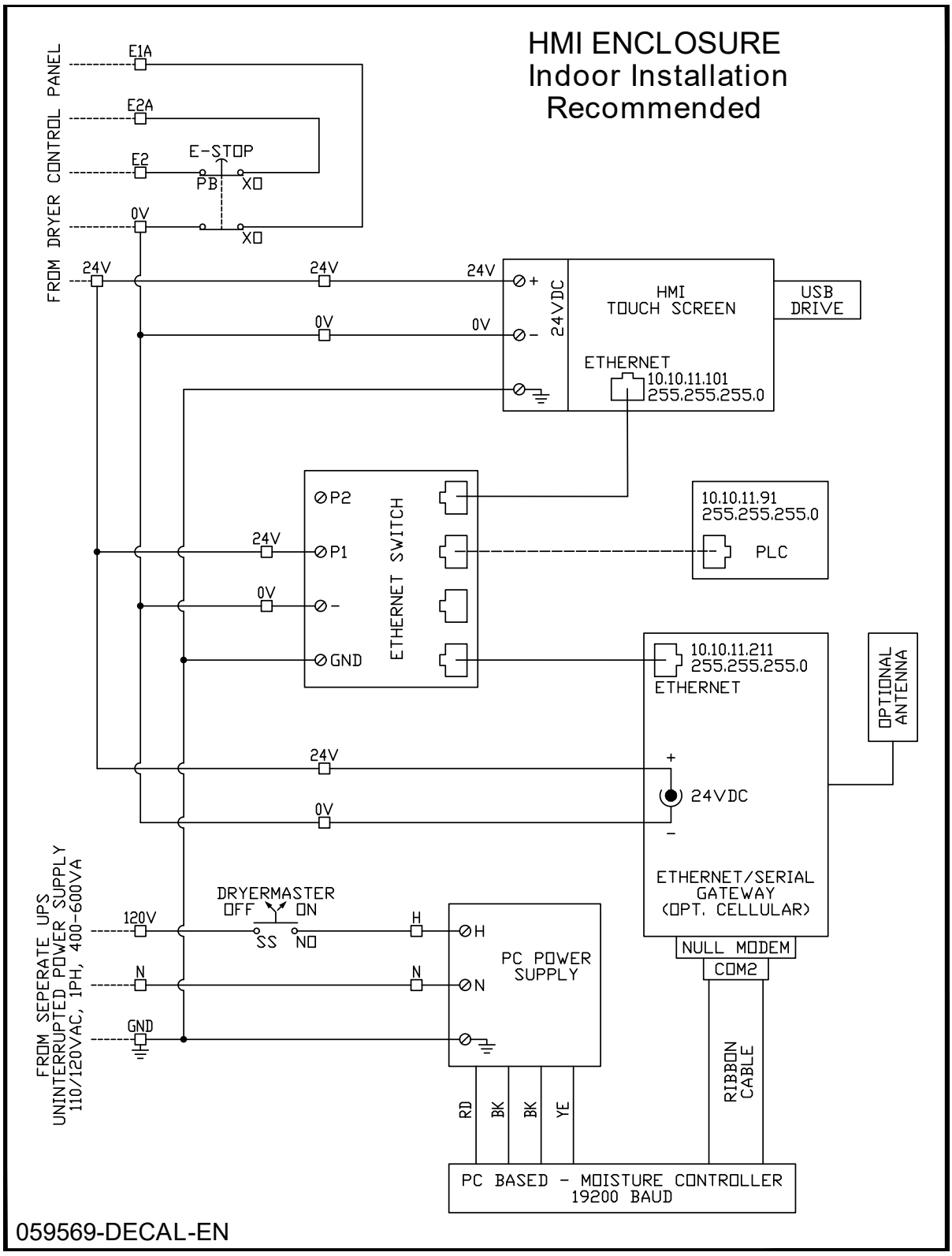
Figure 159. Ethernet Cable Connection in HMI Cabinet



HMI Enclosure Wiring

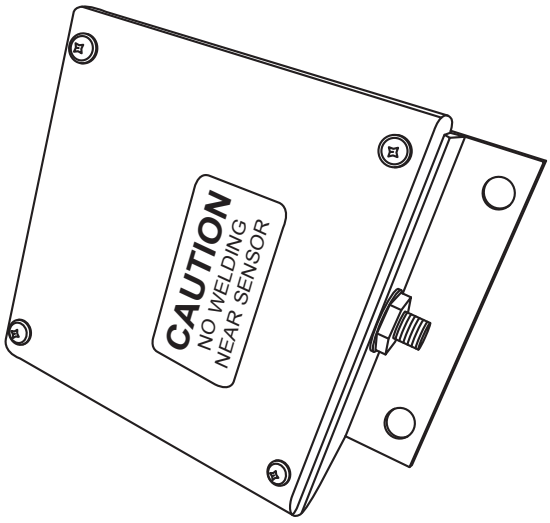
The following diagram shows electrical and Ethernet wiring entering the HMI enclosure (dashed lines).

Figure 160. HMI Wiring Diagram



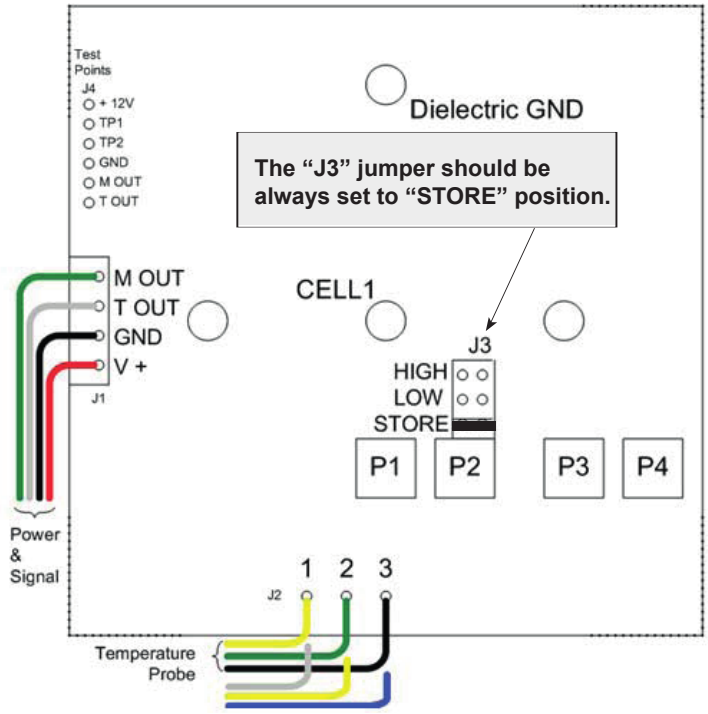
8.11. DryerMaster Moisture Sensor Circuit Board

Figure 161. DryerMaster enclosure



The DryerMaster moisture sensor circuit board is factory set and should not need adjustment.

Figure 162. DryerMaster circuit board and connections



8.12. Commander Wi-Fi access (Vijeo Air App)

Version date: 7/5/2018

Warning

- You must consider the potential of accidental touches from remote mobile devices. Know and understand the hazards regarding equipment movement started by a remote operation. You, as the operator, are responsible for all gates and interlock for protecting people and equipment.
- Failure to follow these instructions can result in death, serious injury, or equipment damage.

Required Hardware (source locally)

- Wi-Fi router
- Ethernet cable
- Tablet or cell phone with Wi-Fi capability

Hardware installation

- Locate Wi-Fi router in a suitable location near the HMI enclosure.
- The Wi-Fi router should be powered by its own power supply.
- Connect an ethernet cable from Wi-Fi router to the ethernet switch inside the HMI enclosure.

Router configuration

- Configure router
  - static IP address 10.10.11.5
  - subnet mask 255.255.255.0
  - gateway 10.10.11.211
- Set router name (NECO dryer)
- Set router security password to prevent unauthorized access
- Record security password here _____

Required Software (download app)

- Schneider Vijeo Design'Air (available on google apps)

Tablet / Phone Wi-Fi settings

- Connect to router (NECO dryer)
- Enter router security password

Initial Vijeo Design'Air app settings

1. Press "+ Add device" icon
2. Name: NECO dryer
3. Host: 10.10.11.101
4. Port: 37891
5. Press "OK"

Using the Vijeo Air app

Note

The use of this app allows remote access to monitor, make minor operational setting changes and to stop the dryer only. Starting of equipment must be performed at the dryer HMI panel.

The local operator (User, Owner or NecoTech) via the HMI must start and get the dryer and associated equipment in the desire state of operation.

Once all equipment is running as desired, the local operator enables remote access

MAIN MENU > SETUP > SECURITY SETUP > I ACCEPT > ENABLE REMOTE ACCESS.

When the “ENABLE REMOTE ACCESS” icon is pressed the current operator is logged out and the “Remote” user is logged in on the HMI.

The user is now able to access the dryer control via the Vijeo Design’Air app.

Press the app icon on the tablet / phone, then press “NECO dryer”.

Read accept the liability statement. Press “OK” or “View-only” icon.

Login.

- Username: RemoteWiFi
- Password: 1379
- Press “OK”

At this point the tablet / phone displays the same image the HMI screen.

The operator may remotely:

- change Burner Temperature(s)
- change Target Moisture
- change Manual Metering Speed Setpoint
- and view all screens

Note

If the “LOGOUT” icon is pressed the dryer control will not be able accessible until operator locally re-enables the remote access.

8.13. Dryer Temperature Considerations

High-Limit Temperature Consideration

⚠ WARNING Fire Hazard

- In cases where the grain has a lot of trash, or when drying high moisture grain (that is immature or frozen grain), drying at these temperatures may not be possible, as the risk of fire is increased..
- In cases where there is blockage in the machine due to trash, it is possible for this material to become subject to spontaneous combustion.
- Shut the blower(s) OFF immediately in ANY case where a person may see smoke coming from the machine.

- When the High Temperature Limit alarm is activated, the equipment will immediately shut down with NO cool-down period (blowers OFF).

- To avoid tripping the High Temperature Limit, ensure the High Limit Switch is set to 30°F (17°C) above the operating temperature at each burner.

Cool-Down

When stopping the machine the grain should be cooled down:

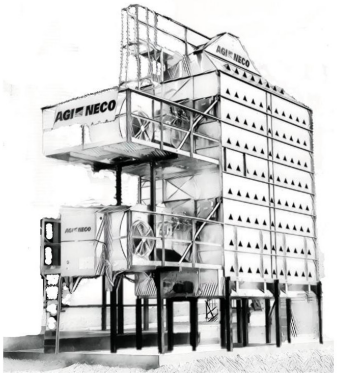
- **Manual Cool-Down:** Turn off burners, but leave blowers on for a period of 5 to 15 minutes.
- **Automatic Cool-Down:** The system has five possible grain level monitors. Certain conditions can result in the equipment automatically shutting down. Most of these conditions include a cool-down period. A few conditions, such as High Limit Temperature, that are reached provide a shut-down with NO cool-down period.

8.14. Grain Drying Tips

8.14.1 Specific Crops

DRYING SUGGESTIONS

FOR SPECIFIC GRAINS / SITUATIONS IN YOUR AGI NECO DRYER



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NOTES TO THE READER:

The information presented here should be considered suggestions only and do not constitute any guarantee of drying performance in your dryer.

The NECO Continuous Flow Grain Dryer is one of the most flexible and robust dryers on the market, but keep in mind that every crop, hybrid, and drying condition is different and vary from season to season. Every drying situation is unique and careful evaluation and planning should be given to each situation.

WARNING:

High temperature grain dryers utilize many moving parts and fuel trains supplying combustible fuel to the burners. It is critical to work safely around the dryer and keep an eye on changing conditions. Dryers and the area around them should be kept clean. Dryers and their supporting equipment should be properly maintained at all times.

All power to the dryer must be locked-out and tagged-out before any work is performed. Even without power, extreme caution should be exercised when working inside of the dryer.

For any questions, please call the NECO factory at 402-453-6912 or send an email to service@necodryers.com.

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CORN

DIFFICULTY: ●○○○○

DRYING TEMP: 210°F (100°C)

NOTES:

Corn is probably the easiest of the grains to dry in the NECO dryer. Corn will handle quite high temperatures and is generally dried at 210°F.

Known issues with corn can be a crop that has experienced a difficult growing season and is immature or stressed. These kernels will be more difficult to dry and capacities through the dryer will be reduced. Certain hybrids that are designed to be drought or moisture resistant will have thicker seed coats and smaller attachment points that make the drying process more difficult. Capacities will be markedly reduced.

CONCERNS:

Bees' wings or red dogs will be present during drying and worse with high moisture corn. Cleanup in and around the dryer as often as necessary.

Very wet bees' wings can buildup on the upper sections of the dryer causing several issues. Accumulations near the inlet moisture sensor can cause faulty readings of the inlet moisture.

Very high moisture corn will generate large amounts of steam exiting the dryer. Buildup of ice on the fan blades can occur on very cold days causing overamping of the blower motors and dryer shutdowns.

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WHITE CORN / FOOD GRADE

DIFFICULTY: ●●○○○

DRYING TEMP: 130-140°F (54-60°C)

NOTES:

Grains that are highly susceptible to stress cracking are well suited to the NECO dryer. Similar to corn, white corn dries well. Slow cooling is the most critical factor with these grains to avoid stress cracking.

Reduce burner temperatures to 130-140°F (54-60°C) and slow the rate of cooling. With multiple burner dryers, the upper temperatures may be able to run slightly hotter. Stagger the temperatures to slowly reduce kernel temps as the grain progresses through the dryer.

CONCERNS:

Bees' wings or "white" dogs will be present during drying and worse with high moisture corn. Cleanup in and around the dryer as often as necessary.

On very warm days use as many cooling floors as possible or run the dryer with reduced temperatures in an All-Heat mode and slow cool in the bin with properly sized aeration fans.

CAUTION - on extremely cold days, the outside cooling air will likely be too cool. The kernels will shrink too quickly and stress cracks will form. Consider slow cooling in the bin. If using the entire bottom section for cooling, run this burner at a low temperature like 80-90°F (27-32°C).

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WHEAT

DIFFICULTY: ●●○○○

DRYING TEMP: 180°F (82°C) or lower

NOTES:
Wheat should be dried at slightly lower temperatures than corn – perhaps 180°F (82°C) to achieve highest quality.

Wheat will dry quite easily and sometimes will move through the dryer so quickly that the unloads will have problems keeping up.

CONCERNS:
If wheat gets above 28% moisture – watch the quality closely. It may need to run in two passes. Too high of temperatures used on very high moisture wheat can damage the quality.

High moisture wheat that is full of debris can be "sluggish" as it moves through the dryer. Perform periodic inspections to make sure grain columns are moving.

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BARLEY / OATS

DIFFICULTY: ●●●○○

DRYING TEMP: 160-170°F (71-77°C)

NOTES:
Barley and oats run well in a NECO dryer but bearded barley especially can hang up in the dryer. Reduce burner temperatures to 160-170°F (71-77°C).

Check regularly to make sure the grain is moving through the dryer. Look in each of the lower ducts for grain movement. There might be bridging that is keeping the column from moving freely.

CONCERNS:
If working on the outside of the dryer - blockages in the upper ducts can be removed while the dryer is running. If the blockage seems to be in the bottom duct, stop the unload and lockout the machine before trying to work with the metering rolls. If you need to access the ducts inside the dryer, stop the dryer and lockout the machine.

As incoming barley or oats gets dryer, it can get quite light and fail to engage the fill switch to shut down the filling equipment. Lower the adjustable height rotary switch into the grain or consider adding paddle extensions to better engage the grain mass.

If the incoming grain contains large amounts of chaff, consider pre-cleaning or view the section on Special Harvest Situations – EXCESS CHAFF.

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SOYBEANS

DIFFICULTY: ●●●○○

DRYING TEMP: 140-145°F (60-63°C)

NOTES:
Reduce drying temperatures to 140-145°F (60-63°C). If having problems with seed coat cracking, use slow cooling techniques (see WHITE CORN). Oilseed crops should not be left unattended while drying.

CONCERNS:
The plenum area can get a buildup of "fuzz" that needs to be cleaned each day. Soybeans can be quite "trashy". Bean pods can build up in corners of the dryer causing blockages and "hot spots".

This lighter material (seed pods) can build up in the dryer to the outside ends of the dryer at the very top (viewed from inside the plenum top section). Every couple of days – turn off the fill equipment until the grain level falls below the low dryer switch. Refill the dryer and continue drying. This will help "flush" some of this material through the dyer. If in doubt, it is a best practice to simply empty the dryer to remove the excess material, refill the dryer, and resume drying.

Leafy material can be pulled into the blowers and ignited at the burner. On very windy days, watch for this issue. Consider drying on a different day.

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SORGHUM / MILLET

DIFFICULTY: ●●●●○

DRYING TEMP: 130-140°F (54-60°C)

NOTES:
Sorghum or milo dries relatively well if caution is used. Reduce drying temperatures to 130-140°F (54-60°C).

CONCERNS:
Sorghum can be quite "trashy" with chaff and debris. Buildup in the corners of the dryer can cause blockages and "hot spots".

This lighter material can build up in the dryer to the outside ends of the dryer at the very top (viewed from inside the plenum top section). Every couple of days – turn off the fill equipment until the grain level falls below the low dryer switch. Refill the dryer and continue drying. This will help "flush" some of this material through the dyer. If in doubt, it is a best practice to simply empty the dryer to remove the excess material, refill the dryer, and resume drying.

Leafy material can be pulled into the blowers and ignited at the burner. On very windy days, watch for this issue. Consider drying on a different day.

If coming off the field very wet, too much heat in the upper sections can cause auto-ignition problems. Very wet sorghum as been known to auto-ignite in the grain carts. Reduce heat to the upper section and make sure the grain is getting plenty of air – especially in the wet bin.

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EDIBLE BEANS

DIFFICULTY: ●●●●○

DRYING TEMP: 120-130°F (49-55°C)

NOTES:
The NECO mixed flow dryer is well suited for the gentle drying required with edible beans. Reduce temperatures to 120-130°F (49-55°C) to keep seed coat from cracking or discoloring. At this point the handling of the product needs to be considered.

CONCERNS:
Augers should be slowed down with a pulley change or VFD to keep them running as full as possible. Smaller VFDs can be installed in the main cabinet. Larger VFDs should be installed in a secondary cabinet to reduce electrical noise to components in the main cabinet.

If having problems with seed coat cracking, use slow cooling techniques (see WHITE CORN).

Consider purchasing poly flighting for even better results – or consider the option of a drag unload with VFD. Some customers have installed after market belt conveyors.

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RAPE / CANOLA

DIFFICULTY: ●●●●○

DRYING TEMP: 130-140°F (54-60°C)

NOTES:
Rape seed or canola will dry relatively trouble free – but special conditions apply. Reduce burner temperatures to 130-140°F (54-60°C). Rape seed should not be dried unattended due to its oil content. Rape has numerous varieties. Those with very high oil content should NOT be dried unattended.

CONCERNS:
Material can fly out of the ducts at the top corners for the dryer. These ducts may need to be partially blocked with duct cover (7715095). Contact the NECO factory to determine if a Small Grains Kit might be applicable to your situation. Or the air can be slowed slightly with a pulley change or even a VFD on the blower motor – but anytime the airflow is reduced, the operator should check to make sure they are still achieving good flame quality. If using a VFD, install the equipment in a secondary cabinet to reduce electrical noise to components in the main cabinet.

If the rape seed gets above 24% - watch quality closely. It may need to run in two passes. If the rape seed or canola has excess chaff – see the section on Special Harvest Situations – EXCESS CHAFF.

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RICE

DIFFICULTY: ●●●●●

DRYING TEMP: 115-125°F (46-52°C) NIGHT
105-115°F (41-46°C) DAY

NOTES:
Rice can be quite difficult to dry. Most operators will bring rice to the dryer around 19-22% moisture. The dryer should be set to run in all heat (without cooling). Drying temperatures should be set at 115-125°F (46-52°C) in the nighttime and 105-115°F (41-46°C) in the daytime hours.

CONCERNS:
Rice can only be brought down approximately 3-4 points in moisture at a time. More than this and the kernel may shrink too quickly causing internal stress cracking. Some customers have reported success removing 7 points in one pass but complete drying data was not available.

Partially dried rice should be stored in bins with fan aeration and left at least 24 hours to temper. At that point, a decision can be made to leave it in aeration or bring it back through the dryer for a second pass. Rice can also see some moisture rebound in the bin.
Final moisture should be brought to 12.5-13.0%. If rice is already less than 18%, consider an air-only pass.

Rice hybrids can be caustic and produce significant wear. Watch very closely the leveling augers if equipped and discharge auger wood bearings. Wood bearings may need to be rotated after only a short while.

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SUNFLOWER

DIFFICULTY: ●●●●●

DRYING TEMP: 120-130°F (49-55°C)

NOTES:
Sunflowers present the greatest challenge in a high temperature dryer. Because it is an oil seed with a large surface area, it could ignite if subjected to high temperatures for long periods of time. Reduce drying temperature to 120-130°F (49-55°C). Sunflower seeds should NEVER be dried unattended.

CONCERNS:
Sunflowers can be one of the dirtiest crops. The plenum area can get a buildup of "fuzz" that needs to be cleaned each day. Lighter material can build up in the dryer to the outside ends of the dryer at the very top (viewed from inside the plenum top section). Every couple of days – turn off the filling equipment until the grain level falls below the low dryer switch. Refill the dryer and continue drying. This will help "flush" some of this material through the dyer.

If in doubt, it is a best practice to simply empty the dryer to remove the excess material, refill the dryer, and resume drying.

(See CONCERNS continued on next page)

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SUNFLOWER

DIFFICULTY: ●●●●●

DRYING TEMP: 120-130°F (49-55°C)

(CONCERNS CONTINUED):

The seeds can start lifting out of the ducts as they get dryer at the bottom. It may be necessary to restrict the airflow by blocking ducts with duct cover (7715095). Contact the NECO factory to determine if a Small Grains Kit might be applicable to your situation. Or the air can be slowed slightly with a pulley change or even a VFD on the blower motor– but anytime the airflow is reduced, the operator should check to make sure they are still achieving good flame quality. If using a VFD, install the equipment in a secondary cabinet to reduce electrical noise to components in the main cabinet.

On very windy days, make sure floating material is not being pulled back into the blower inlets. If possible, stop drying until calmer conditions are met.

As a last note – sunflowers have one of the highest moisture-rebound rates. It might be necessary to dry to a couple points under the desired setpoint before putting into the bins.

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SPECIALTY CROPS

OTHER SPECIALTY CROPS:

The NECO dryer has been used to dry many other specialty crops including radish seed, mustard seed, sesame seed, grass seed, grape seed, chickpeas and even some nuts - like hazelnuts. Drying data was not available in all instances.

Use caution and start slowly until you have learned the best techniques to use in your instance.

Begin at a lower temperature and work your way up to a point where you are comfortable.

Always remember the crop needs to be free flowing, relatively clean of debris and foreign material.

Always maintain a clean dryer and a clean working area around the dryer.

For any questions, please call the NECO factory at 402-453-6912 or send an email to service@necodryers.com.

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HARVEST SITUATIONS

SPECIAL HARVEST SITUATIONS:

EXCESS BULK MATERIAL

During difficult harvest seasons, it is very common to speed up the combines to shorten the harvest. This often results in excess corn cobs, stalks, leafy material and the like. This situation can be common with certain types of harvest machines – no matter the speed.

Keep in mind any dryer is designed to dry free flowing grains and not bulky material (cobs, stalks, leaves) that may bridge. Material that is not free flowing may plug up a dryer and restrict the free movement of the grain.

Material that is hung up in the dryer will eventually over dry to the point it becomes a hazard. If the grain is full of this material - regularly inspect random sections of the dryer to ensure the grain is free flowing. If in doubt – it is a best practice to empty the dryer and inspect for the presence of this material. Clean the dryer, refill the dryer and resume drying.

Consider putting grain with excess bulky material through a scalper or pre-cleaner before bringing it to the dryer. The grain will flow better, the potential for bridging will be reduced, and you will not be paying to dry the bulk material.

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HARVEST SITUATIONS

SPECIAL HARVEST SITUATIONS:

EXCESS CHAFF

Crops that come to the dryer with an excess amount of chaff will cause similar hazards.

Chaff is lighter than grain and will “float” on top of the flowing grain – remaining somewhat stationary and accumulating over time. This can happen anywhere in the dryer.

A tell-tale sign of excess chaff would be the buildup in the heat ducts where the constant flow of air will push it to the sidewall of the dryer. Over time this material will over dry and become a hazard. If the grain is full of this material - regularly inspect random sections of the dryer to ensure there is no buildup of chaff in the heat ducts. If in doubt – it is a best practice to empty the dryer to remove this material. Clean the dryer, refill the dryer and resume drying.

It might be possible to stop drying and simply run the unloads for 15-20 minutes to see if this material will be drawn into the mass of flowing grain. Recheck for the excess chaff condition and if in doubt - empty the dryer completely, refill the dryer and resume drying.

Consider putting material with excess chaff through a pre-cleaner prior to bringing it to the dryer. The grain will flow better, the potential for hot spots will be reduced, and you will not be paying to dry chaff.

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8.14.2 Measuring Actual Seed Temperatures

Note

Putting a thermometer directly in the dryer only gives the temperature of the air between the kernels and not the correct temperature of the actual kernels.

When operating in batch mode:

- To determine correct kernel temperature, take a sample from a duct at the lower part of the heating section.
- Put into an insulated (covered) container, with a thermometer directly in the grain.
- After 10 minutes record the temperature reading.

9. Compliance

Declaration of Conformity
Konformitätserklärung

Nebraska Engineering Company (NECO)
a Division of Ag Growth International (AGI)
9364 North 45th Street
Omaha, NE 68152 USA
Phone: 402-453-6912

Continuous Flow Grain Dryer, 380V 3PH 50Hz

Models: **D1660CE, D1670CE, D1680CE, D1690CE, D16106CE, D16120CE, D16140CE, D16160CE**
D24108CE, D24150CE, D24180CE, D24210CE, D24240CE, D24260CE, D24330CE, D24380CE
D32260CE, D32340CE, D32440CE, D32500CE

Conforms to applicable requirements of directive 2006/42/EC
In Übereinstimmung mit der Richtlinie des Rates 2006/42/EC

Omaha, NE USA

10. Limited Warranty

For a period of one (1) year after shipment of goods by the Buyer to the Buyer's customer, NECO will supply, free of charge, FOB per NECO's factory located in Omaha, Nebraska, replacement parts for any parts that NECO identifies to be defective due to workmanship or material.

- This limited warranty does not extend to parts that wear due to normal operation and need to be replaced periodically.
- Goods not manufactured by NECO carry only their manufacturer's warranty.
- This undertaking is in lieu of all other warranties, expressed or implied, including merchantability and fitness for a particular purpose.
- You must obtain a "Return Authority" form NECO prior to returning any defective goods. Those defective goods must be returned, freight-prepaid, to the NECO factory in Omaha, NE. See the back cover of this manual for complete address information.
- NECO reserves the right to make changes or improvements to products and goods without incurring any obligation with respect to previously manufactured products.
- Failure to follow the instructions contained in this manual, as well as the existence of any of the conditions listed below, will cause this Limited Warranty to be null and void:
    1. Improper assembly.
    2. Improper installation, including power and wiring.
    3. Unauthorized alteration of the product or components therein.
    4. Operation of the unit when repairs are needed.
    5. Use of unauthorized parts.
    6. Operation by children or uninstructed personnel.
    7. Processing of materials that are abrasive, that do not flow freely, or that are otherwise unsuited for processing in farm equipment.
    8. Misuse of the equipment or any of its components.
    9. Damage due to negligence, abuse, or accidents.

LIMITATION OF LIABILITY

- Buyer agrees that in no event shall NECO have liability for direct damages in excess of the contract price of the goods for which the claim is made.
- Buyer further agrees that in no event shall NECO have liability for loss of use, loss of profits, or for any indirect, incidental, or consequential damages on any claim of any kind.

NECO is an AGI Brand.

AGI is a leading provider of equipment solutions for agriculture bulk commodities including seed, fertilizer, grain, and feed systems with a growing platform in providing equipment and solutions for food processing facilities. AGI has manufacturing facilities in Canada, the United States, the United Kingdom, Brazil, South Africa, India and Italy and distributes its products globally.

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AGGROWTH.COM aggrowthintl

If you have any comments or questions on this manual, or find an error, email us at comments@aggrowth.com.
Please include the part number listed on the cover page in your message.