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READ THIS MANUAL and construction manual PNEG-707 carefully to learn how to properly use and install equipment. Failure to do so could result in personal injury or equipment damage.

As with all GSI shipments, inspect shipment immediately. The customer is responsible for ensuring that all quantities are correct. The customer should report and note any damage or shortage on the bill of lading to justify their claim to the transport company.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your equipment and should be easily accessible when needed.

This warranty provides you the assurance that the company will back its products when defects appear within the warranty period. In some circumstances, the company also provides field improvements, often without charge to the customer, even if the product is out of warranty. Should the equipment be abused, or modified to change its performance beyond the factory specifications, the warranty will become void and field improvements may be denied.

Figure 1A
2. Safety

Safety Guidelines

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting personal safety and preventing equipment problems. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below. Please read the manual and pay attention to these sections. Failure to read this manual and its safety instructions is a misuse of the equipment and may lead to serious injury or death.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

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

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to personal injury.
2. Safety

General Safety Statement

Our foremost concern is your safety and the safety of others associated with grain handling equipment. This manual is to help you understand safe operating procedures and some problems that may be encountered by the operator and other personnel.

As owner and/or operator, you are responsible to know what requirements, hazards, and precautions exist and inform all personnel associated with the equipment or in the area. Safety precautions may be required from the personnel. Avoid any alterations to the equipment, which may produce a very dangerous situation, where SERIOUS INJURY or DEATH may occur.

You should consider the location of the site relative to power line locations or electrical transmission equipment. Contact your local power company to review your installation plan or for information concerning required equipment clearance. Clearance of portable equipment that may be taken to the site should also be reviewed and considered. Any electrical control in contact with the equipment should be properly grounded and installed in accordance with National Electric Code provisions and other local or national codes.

This product has sharp edges, which may cause serious injury. To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment.

Sidewall bundles or sheets must be stored in a safe manner. The safest method of storing sidewall bundles is laying horizontally with the arch of the sheet upward, like a dome. Sidewall sheets stored on edge must be secured so that they cannot fall over and cause injury. Use care when handling and moving sidewall bundles.

Personnel operating or working around equipment should read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

NOTE: A careful operator reduces risk of personal injury and equipment damage.
2. Safety

Plan Ahead for Electrical Safety

- Read this entire manual before beginning electrical installations.
- Plan ahead to assure safe and proper installation of all parts.
- Electrical safety starts with the design of the facility. Proper design provides for the correct relationship between energy supplies, existing equipment and structures.
- Technical support is available at all times for support should any un-for seen complications arise.
- Use common sense when installing electrical connections.
- Obtain any permits and/or licenses required for work at the electrical installation location.
- Make sure power supply is turned OFF. Lock and tag the equipment on which you are working. Test to make sure it is really locked out.
- Check the work.

NOTE: Electrical wiring should be installed to tower dryers in accordance with national and local codes. The United States National Electric Code (NEC) and/or the Canadian Standards Association (CSA) code provide basic standards for the design and installation of the electrical system.

Electrical Power Supply

GSI recommends you contact your local power company and request that a representative inspect the dryer installation to ensure that the wiring is compatible with the power company’s system and that adequate power will be supplied to the dryer. (See Page 112.)

NOTE: If power being supplied by local supply company becomes an issue or is known to be an issue, please consult with GSI technical service immediately for possible available solutions.

Material Safety Data Sheets (MSDS)

MSDS are available upon request.
Some of the required safety decals are placed on the dryer before shipping. The remainder of the decals are placed on the dryer during electrical installations. The purpose of the safety decals is to immediately alert all personnel to the hazards of operating a grain dryer. However, safety decals do not replace the need for all personnel to know and understand safe dryer operations and requirements. Read the “Tower Dryer Operations and Service Manual”.

**NOTE:** Safety decals should be read and understood by all people in or around the dryer area.

Safety decals are shown on *Pages 13-20*. They identify and give the location of all safety decals to be displayed on every tower dryer. Safety decals are listed in numerical order.

If the safety decals on the following pages are not on the dryer or if they are damaged, immediately contact GSI Group for replacement safety decals.

**GSI Decals**
1004 E. Illinois St.  
Assumption, IL. 62510  
Phone: 1-217-226-4421
Apply Safety Decals

DC-GBC-1A, DC-889, DC-985, DC-987 and DC-988

The “Safety Decals on Dryer” section in the beginning of this manual identifies all safety decals and gives their location on the tower grain dryer. The safety decals are listed in numerical order.

The purpose of the safety decals is to immediately alert all personnel working near the tower dryer to the hazards of an operating dryer.

If the required safety decals are not available or if they are damaged, immediately contact GSI Group for replacement safety decals.

For proper placement of safety decals, refer to the “Safety Decals on Dryer” section in this manual.

---

**DANGER**

Rotating flighting will kill or dismember.
Flowing material will trap and suffocate.
Crusted material will collapse and suffocate.

Keep clear of all augers. DO NOT ENTER this bin!

If you must enter the bin:
1. Shut off and lock out all power.
2. Use a safety harness and safety line.
3. Station another person outside the bin.
4. Avoid the center of the bin.
5. Wear proper breathing equipment or respirator.

Failure to heed these warnings will result in serious injury or death.

---

**WARNING**

Line side of disconnect is energized.
La ligne de débranchement de côté est dynamisée.
Hazardous voltage can shock, burn or cause death.
Une tension dangereuse peut causer un choc, peut brûler ou peut causer la mort.
This unit may contain one or more voltages.
Cette unité peut contenir une ou plusieurs tensions.

---

**FUSE TABLE 1**

<table>
<thead>
<tr>
<th>F #</th>
<th>TYPE</th>
<th>AMP</th>
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</thead>
<tbody>
<tr>
<td>FU1</td>
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<tr>
<td>FU6</td>
<td>___</td>
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</tr>
</tbody>
</table>

---

**DANGER**

HIGH VOLTAGE.
Will cause injury or death.
Lockout power before servicing.

---

**WARNING**

To maintain overcurrent short circuit and ground fault protection, the manufacturer’s instructions for selecting overload relays and setting the instantaneous trip circuit breaker must be followed.

Pour maintenir la protection de surcharge d’un court circuit ou de mise à la terre, les instructions du fabricant doivent être suivies en ce qui concerne la sélection des relais de surintensité et le positionnement du disjoncteur de déclenchement instantané.
Apply Safety Decals (Continued)

DC-989, DC-990, DC-991, DC-1061 and 420-1473-8

**WARNING**

DC-989

Insure that the incoming AC power and all separate power sources are turned off and locked before working on this equipment. Failure to observe this practice may result in severe injury, death, and/or equipment damage. S’assurer que la puissance AC venant de l’extérieur et toutes autres sources de puissance indépendantes soient en arrêt et bloquées avant de travailler sur cet équipement. L’omission d’observer cette pratique peut résulter à des blessures sévères, la mort et/ou des dommages à l’équipement.

**WARNING**

DC-990

DC-991

Flame and pressure beyond door. May cause serious injury. Do not enter when dryer is running.

**WARNING**

DC-1061

Be sure that charge light and all LED’s are out before touching any components.

Soyez assuré que la lumière de charge et toutes les LED soient fermées avant de toucher tout composants.

All test equipment should be connected and disconnected with power off.

Tout l’équipement de test devrait être branché et débranché quand tout est éteint.

Grounded test equipment, such as oscilloscopes, may damage the inverter.

L’équipement de test de mise à la terre, tel que les oscilloscopes, peut endommager l’onduleur de courant.

Isolate all instruments from ground before using. The DC bus remains charged for several minutes after power is removed.

Isoler tous les instruments au sol avant d’utiliser. Le DC bus reste chargé durant plusieurs minutes suivant la mise en arrêt de la puissance.
3. Safety Decals

Apply Safety Decals (Continued)

DC-1063, DC-1064 and DC-1223

**CAUTION!**

Airborne particles during operation. May impair vision and breathing. Do not enter when dryer is running.

**WARNING!**

High speed belt drive operating overhead. Can cause serious injury. Keep head and hands clear. Do not enter when dryer is running.
3. Safety Decals

Safety Decal # DC-GBC-1A

Location of Decal

English and Spanish decals are placed on inside of hatch door prior to shipping.

Keep clear of all augers. DO NOT ENTER this bin!

If you must enter the bin:
1. Shut off and lock out all power.
2. Use a safety harness and safety line.
3. Station another person outside the bin.
4. Avoid the center of the bin.
5. Wear proper breathing equipment or respirator.

Failure to heed these warnings will result in serious injury or death.

Hatch door with decals in place.
3. Safety Decals

Safety Decal # DC-889

Location of Decal

On outside of main power panel, on right door to the left of main disconnect OFF position.

Example - Standard completed installations included with tower dryers.
3. Safety Decals

Safety Decals # DC-985, DC-987 and DC-988

Location of Decal

Inside main power box door, on same side as main electrical disconnect.

**WARNING**

To maintain overcurrent short circuit and ground fault protection, the manufacturer's instructions for selecting overload relays and setting the instantaneous trip circuit breaker must be followed.

Pour maintenir la protection de surcharge d'un court circuit et de mise à la terre, les instructions du fabricant doivent être suivies en ce qui concerne la sélection des relais de surintensité et le positionnement du disjoncteur de déclenchement instantané.

**WARNING**

Line side of disconnect is energized.

La ligne de débranchement de côté est dynamisée.

Hazardous voltage can shock, burn or cause death.

Une tension dangereuse peut causer un choc, peut brûler ou peut causer la mort.

This unit may contain one or more voltages.

Cette unité peut contenir une ou plusieurs tensions.

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<td>FU7</td>
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<td>FU14</td>
<td></td>
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</tr>
</tbody>
</table>
3. Safety Decals

Safety Decals # DC-989, DC-990 and DC-991

Location of Decal

Inside main power box door, on same side as main electrical disconnect.

**WARNING**

Be sure that charge light and all LED’s are out before touching any components.

Soyez assuré que la lumière de charge et toutes les LED soient fermées avant de toucher tout composants.

All test equipment should be connected and disconnected with power off.

Tout l’équipement de test devrait être branché et débranché quand tout est éteint.

Grounded test equipment, such as oscilloscopes, may damage the inverter.

L’équipement de test de mise à la terre, tel que les oscilloscopes, peut endommager l’onduleur de courant.

Isolate all instruments from ground before using. The DC bus remains charged for several minutes after power is removed.

Isoler tous les instruments au sol avant d’utiliser. Le DC bus reste chargé durant plusieurs minutes suivant la mise en arrêt de la puissance.
Safety Decals # DC-1061, DC-1063 and 420-1473-8

Location of Decal

All heat access entry ways and/or doors must be labeled with this sticker.
3. Safety Decals

Safety Decals # DC-1063 and DC-1064

Location of Decal

On outside of louvered access door to cooling section.
Safety Decals # DC-1223 and DC-1317

Location of Decal

1. On outside of main power box door, to left of main electrical disconnect.
2. On outside of main power box door, above emergency stop disconnect.
3. Safety Decals

Information Decals

Nameplate for Main Power Box

Location of Decal

Inside main power box door, on same side as main electrical disconnect.
4. Overview and Planning

**Important Safety Precaution:**
*All electrical installations must be made by qualified personnel.*

See appendices **on Pages 107-119** for wiring notes and electrical drawings, etc. (**See Pages 114 and 115.**)

**Installation Summary**

**NOTE:** Below is a general overview on how to complete field wiring. The installation procedures may vary due to site location and position of the dryer.

1. This installation summary applies to GSI Tower Grain Dryers of any diameter, voltage or number of fans.

2. The dryer has a **PLC based control system** that consists of a main **power box** and a **control box**.

   The **power box** contains all of the power components necessary to operate the dryer. This power box is a free standing NEMA 4 enclosure of varying sizes, based upon the size of the dryer. The power box is generally anchored on the outer edge of the dryer foundation beneath one of the windows on the dryer. All of the conduit runs will come out of the lower back of the power box. The conduits either run up the exterior of the dryer, into the dryer or to the fuel train.

   The **control box** contains the computerized controller (**electronic monitoring control system**), operator’s controls, switches, etc. The control box can be installed at the base of the dryer with provided mounting equipment or remote mounted. Note, remote mounting control box will require additional materials based upon mounting distance from the dryer.

3. The **fuel train** (with **maxon gas valves**, **modutrol motor**, **pilot fuel train** and **pilot solenoid**) is anchored to the foundation beneath the dryer or secured to dryer legs.

4. Other installations are made during dryer construction as noted.

   * See all “Electrical Installations manual PNEG-708” sections of this manual for additional installation instructions. All work needs to meet the GSI GROUP specifications and meet all NATIONAL ELECTRICAL CODES.

   After the tower grain dryer is erected, wire the dryer electrical components to the **power box** as follows. (**See Pages 114 and 115.**)

5. **Fan motors** (Use 1, 3 or 4 runs of conduit. Size of conduit depends on dryer size and voltage.) (**See Appendix B Fan Motor Wiring Guide on Page 113.**)

   During dryer construction, the fan motors are hung in the walk-in cooling section of the dryer.

   Run a conduit for each fan motor from back of power box, up side of dryer (parallel with other conduits) to the motor window. Turn each conduit into the dryer (parallel with other conduits) and run to its fan motor. (Use flexible conduit at the fan motors so the motor mount can be moved back and forth when tightening the fan belts.) The motor conduit needs to be installed so the motor can be removed or serviced.

   Wire each fan motor from its fan (blower) motor starter in the power box. TIP; Turning the ‘head’ of the motor is an option.
4. Overview and Planning

Installation Summary (Continued)

6. **Air switch tubing (one for each fan)**
   (Use 3/8" copper tubing - same tubing used for pilot fuel line.)

   Air switches are installed in the power box at the factory.

   Brass connectors for the air switch tubing are installed on the side of the power box at the factory prior to shipping. (The brass connections are installed on the side opposite the control box.)

   Air switches are numbered for ease of installation. Run air switch tubing for each fan from its brass connector on the outside of the power box to the fan. Wire tie the air switch tubing to the fan motor conduit as it runs up through motor window to the fan. Extend the air switch tubing up inside fan no more than 1" to 2" past top of venturi. Air switch tubes must connect to the same number on the motor starter.

   ![Figure 4A](image)

   **NOTE:** *Thread sealant is required at all threaded connections.*

7. **Metering unload device** (Use 1/2" conduit)

   During dryer construction, metering unload device is installed below walk-in cooling section of dryer, down the discharge hopper area.

   Run conduit from back of power box, up side of dryer (parallel with other conduits) to dryer window. Turn conduit into dryer motor window, run down through walk-in cooling section floor. (Keep conduit as close to side of dryer as possible.) Clamp conduit along inner hopper and run to metering unload device.

   Wire metering unload device wires to inverter drive in power box at U, V and W terminal points.

8. **Interior high-limits (overheat)** (with copper capillaries), **adjustable plenum high-limit thermostat (overheat)**, **plenum temperature sensor** (RTD)* (Wire all three (3) in one 1/2" conduit.)

   Run conduit from back of power box, up side of dryer (parallel with other conduits) to dryer window (usually the motor window). Turn conduit into dryer, run up above motor window. Install interior high-limits and adjustable plenum high-limit thermostat just above motor window. (Inside walk-in cooling section of dryer.)

   Extend the conduit from the adjustable plenum high-limit thermostat up through divider hopper to approximately 3' above heating section walkway. Install black probe sensor on top of the conduit. Pull copper capillaries from adjustable plenum high-limit thermostat (in walk-in cooling section below), roll capillaries up, attach to the dryer with insulated clamp and ties and install copper capillaries on dryer wall (parallel to heating section walkway).

   Wire from terminal strip in power box to each electrical component in walk-in heating or cooling sections of dryer. (Connect the plenum temperature sensor in the power box to terminals. Run shielded cable (two (2) wire) from sensor PC. Connect red to red and white to white. *(See Pages 114 and 115.)*

   *See Appendix C Field Notes on Pages 114 and 115* and “wiring diagrams manual”.

---

22 PNEG-708 Tower Grain Dryer - Electrical
Installation Summary (Continued)

9. Exterior high-limits (overheats) (Wire all three (3) high-limits in one 1/2" conduit.)

   During dryer construction, upper high-limit, middle high-limit, lower high-limit and their respective copper capillaries are installed on the exterior of the dryer.

   During dryer construction, one conduit for all three (3) exterior high-limits is installed behind or directly to the left or right of the ladder and down to approximately 10’ above foundation.

   Run conduit from back of power box (up parallel with other conduits), around dryer to the ladder and then up side of dryer to connect with existing conduit.

   Wire from the terminal strip in power box to each exterior high-limit. *(See Pages 114 and 115.)*

   See Appendix C Field Notes on Pages 114 and 115 and “wiring diagrams manual”.

   * Resistance temperature device.

10. Bindicator(s)

    Use one 1/2" conduit - also contains grain temperature sensors wiring. Even if the dryer only requires one bindicator, pull wires for two (2) bindicators. This will allow for the addition of a second bindicator if required.

    During dryer construction, bindicator(s) are installed on the exterior of the dryer, within reach of the ladder. The standard bindicator is installed on the side of the dryer, within reach of ladder, approximately 15" to 20" below the dryer roof eave. The optional bindicator is installed on the dryer roof, one sheet to left of the hatch, approximately 40" to 48" above roof eave depending on safety wind ring positioning.

    During dryer construction, one conduit for the bindicator(s) and grain temperature sensor is installed down to approximately 10’ above the foundation.

    Run conduit from back of power box (up parallel with other conduits), around dryer to ladder and then up the side of the dryer to connect with existing conduit. Install tee to conduit for grain temperature sensors approximately 12" below bottom grain temperature sensors.

    Pull bindicator wires and grain temperature shielded cables at the same time from terminal strip in power box to bindicator(s).

    See Appendix C Field Notes on Pages 114 and 115 and “wiring diagrams manual”.

11. Grain temperature sensors (RTDs) Use one 1/2" conduit - also contains wiring for bindicators.

    Run conduit from back of power box (up parallel with other conduits), around dryer to ladder and then up side of dryer to connect with existing 1/2" bindicator conduit.

    Pull shielded cable (when bindicator wires are pulled), from terminal points MC8, MC7 and MC6 on terminal strip in power box to grain temperature sensors.

    See Appendix C Field Notes on Pages 114 and 115 and “wiring diagrams manual”.
4. Overview and Planning

Installation Summary (Continued)

12. **Ignitor** - ignition, spark plug

   Use 1/2" conduit - **MUST RUN SEPARATE FROM AND PARALLEL TO FLAME SENSOR CONDUIT.** Ignitor and flame sensor conduits run parallel from power box to burner.

   During dryer construction, the burner with installation point for the ignitor is installed in the walk-in heating section.

   Run conduit parallel with flame sensor conduit and other conduits up the side of dryer to the dryer window. Turn up and run through divider hopper. Turn and run through burner housing, then extend conduit approximately 4" beyond burner housing. **NOTE: Conduit must run within 16" of ignitor to protect ignition cable.** Install 1/2" liquid-tight cable connector to conduit. Install ignitor to burner. Wires must be pulled snug and tied up so they cannot blow upon the burner. Conduit must be installed below the burner manifold.

   Pull ignition cable from ignition transformer in power box to ignitor in burner.

13. **Flame sensor** - flame probe, flame rod

   Use 1/2" conduit - **MUST RUN SEPARATE FROM AND PARALLEL TO IGNITOR CONDUIT.** Flame sensor and ignitor conduits run parallel from power box to burner.

   During dryer construction, the burner with installation point for the flame sensor is installed in the walk-in heating section.

   Run conduit parallel with ignitor conduit and other conduits up side of dryer to dryer window. Turn conduit up and run through divider hopper. Turn and run through burner housing, then extend conduit approximately 4" beyond burner housing. Install 1/2" liquid-tight cable connector to conduit. Install flame sensor to burner.

   Pull wires (14 gauge) from protectofier (terminal E) in power box to flame sensor in burner. Wire must be pulled snug and tied down tight. Wires must be installed below the burner manifold and conduit.

14. **Fuel train**

   **Pilot fuel line** - Use 3/8" copper tubing - same tubing used for air switches.

   **Fuel train wiring** - Use one 1/2" conduit to wire pilot solenoid, maxon gas valves and modutrol motor.

   During dryer construction, the fuel train is anchored to the foundation under the dryer or secured to the dryer legs, includes pilot fuel train assembly, pilot solenoid, maxon gas valves and modutrol motor.

   **Pilot fuel line:** Connect 3/8" copper pilot fuel line from pilot fuel train assembly on fuel train to connecting point on burner. Wire tie 3/8" copper pilot fuel line to fuel piping. Fuel piping runs from fuel train up exterior of dryer, through motor window into walk-in cooling section and up along fuel line to burner.

   **Fuel train:** Run conduit up dryer leg closest to power box, around dryer parallel with other conduits, down dryer leg closest to fuel train using flexible conduit and then over to the fuel train.

   Wire from respective points on terminal strip in power box to pilot solenoid, maxon gas valves and modutrol motor on fuel train.

   See Appendix C Field Notes on Pages 114 and 115 and “wiring diagrams manual”.

Installation Summary (Continued)

15. **Work light and safety package** - Use one 1/2" conduit.

   Locate and install according to dryer owner preference.

   The work light and safety package usually are installed on dryer, just above power box.

   *See Appendix C Field Notes on Pages 114 and 115 and “wiring diagrams manual”.*

Planning Electrical Control System Examples

The **electrical control system** consists of **power box** in NEMA 4 cabinet and **control box** with **electronic monitoring control system**. *(See Figure 4B.)*

**NOTE:** Power box is shipped pre-assembled. *(See Figure 4C on Page 26.)*

**NOTE:** Control box or display box with PLC control system is provided with all necessary hardware for a typical mounting at base of dryer. *(See Figure 4D on Page 26.)*

---

**Figure 4B**

A. Power box as shipped.
B. Control box with electronic monitoring control system as shipped.
4. Overview and Planning

Planning Electrical Control System Examples (Continued)

Figure 4C Interior of Power Box

Figure 4D Interior of control box with electronic monitoring control system.

Figure 4E Close Up - Air switches (for 3 fan dryer) as shipped.

Figure 4F Close Up - Blower motor starters (for 4 fan dryer) as shipped.
Planning Electrical Control System Examples (Continued)

Figure 4G

Figure 4H Close Up - Terminal strip, etc., as shipped.
4. Overview and Planning

Planning Electrical Control System Examples (Continued)

The location of the electrical control system is determined by the tower dryer owner or by someone designated by the tower dryer owner, such as the elevator manager.

Tools and materials

Four (4) 1/2" x 5-1/2" heavy duty expanding anchor bolts with four (4) washers and four (4) nuts. Drill and 1/2" masonry bit 3/4" wrench. Forklift or tractor to place the power box under a dryer window.

WARNING: Lift the power box using eyelets on top of box - box may tip if lifted from below.

Steps to Anchor Power Box on Foundation

1. Determine location for electrical control system.
2. Center power box under dryer window.
3. Measure, mark and drill four (4) holes in concrete of tower dryer foundation.
4. Bolt power box legs into concrete with heavy duty expanding anchor bolts.

NOTE: PLC monitoring control display systems panel comes separately packaged. Operators panel package does include mounting rails, mounting backer panel, hood and all hardware needed. All interconnects are done during the field wiring process.

NOTE: Elevator electrician will wire electrical supply feed.

Figure 4I Heavy Duty Expanding Anchor Bolt

Figure 4J Heavy duty expanding anchor bolts (red heads) anchor power box to dryer foundation.
Planning Electrical Control System Examples (Continued)

Figure 4K Control box with electronic monitoring control system installed.

Figure 4L Power Box Installed (3 Fan Dryer).
A. Ignition transformer
B. Protectifier burner control
C. Terminal strip
D. Air pressure switches
E. 15V MC power supply
F. Dry conveyor starter/contactor
G. Wet conveyor starter/contactor
H. Fan/blower soft starts
I. Fan/blower contactors
J. Fan/blower starter-breaker
K. Toshiba inverter
L. 120V 6 Amp receptical
M. Main PLC components
N. Control voltage transformer
O. Control power breakers
P. Control power fuses block
Q. Unload motor starter
R. In-line reactor
S. Block heater
T. WatchDog and power supply system
U. Main power distribution block
V. Main disconnect/ground lug
W. In-line filter
X. Main panel emergency stop
Y. Door safety switch

1. Dryer manual compartment
2. Dryer informations
3. Main disconnect assembly

Figure 4M Interior of Power Box Wired
Planning Electrical Control System Examples (Continued)

Figure 4N Close Up - Power Box Wired

Planning Conduit Examples (10' Lengths, Diameter 1/2", 1" and 2-1/2")

Guidelines

1. If power box is to be located under dryer, place it so that there is enough room for all conduits to exit the back of the power box and run directly up to the dryer window, which is usually the motor window.

2. Fan motor conduits are usually run through the center of the motor window, with all 1/2" conduits placed to either side as space permits. There are a minimum standard of ten (10) 1/2" conduits required. (See List on Page 33.)

3. Run conduit parallel or perpendicular to other conduits.

4. Vertical conduit runs should be plumb, neat, sealed and tight.

5. Note orientation of electrical components both inside and outside of dryer with respect to direction of conduit leaving power box.

6. Support conduit systems with superstrut channels. Install Z-bracket where conduits enter motor window and behind parallel conduits to keep them in line.

7. Electrical boxes should be readily accessible.

8. All electrical ‘4 way gang’ style box connections completed in the field wiring process must be installed to be completely and safely accessible.

9. Use heavy duty thread sealing compound on conduit connections to tighten seals and prevent leaks.

10. Dryers must be wired to NECA standards and surpass local codes.
4. Overview and Planning

Planning Conduit Examples (10' Lengths, Diameter 1/2", 1" and 2-1/2") (Continued)

Figure 4O Flexible Conduit

Figure 4P IMC Rigid, Threaded Conduit
Planning Conduit Examples (10' Lengths, Diameter 1/2", 1" and 2-1/2") (Continued)

There are Ten (10) 1/2" Conduits on all Dryers - Three (3) External and Five (5) Internal

Exterior conduits to top of dryer:

1. Exterior upper, middle and bottom high-limits receives 1. (See “H” in Figure 4R.)
2. Upper and lower bindicator and GT RTD receives 1. (See “J” in Figure 4R.)
3. Wet moisture sensor when applicable receives 1. (See “I” in Figure 4R.)

Other exterior conduits:

1. Operators panel receives 1 (two (2) preferred). (See “K” in Figure 4R.)
2. Gas and pilot fuel train receives 1. (See “B” in Figure 4R.)
3. Work light, alarm light and horn receives 1. (See “G” in Figure 4R.)
4. Dry moisture sensor when applicable receives 1. (See “I” in Figure 4R.)
5. One conduit to fuel train electrical components.

Interior conduits are normally 4-1/2" conduits and applicable fan/blower motor conduits:

1. Flame sense conduit. (See “E” in Figure 4R.)
2. Spark wire conduit. (See “F” in Figure 4R.)
3. Unload metering device. (See “D” in Figure 4R.)
4. Inside high-limit, adjustable plenum high-limit and plenum temperature RTD. (See “C” in Figure 4R.)
5. Fan/blower motor conduits range from 1 to 4. (See “A” in Figure 4R.)
Planning Conduit Examples (10' Lengths, Diameter 1/2", 1" and 2-1/2") (Continued)

**Figure 4S** Rear View - Lights and horn installed on 3 fan dryer.

**Figure 4T** Side View - Conduit installed on all dryers with the tri-point moisture sensor option.

1. Bindicator and grain temperature RTD conduit.
2. Wet/dry moisture sensor conduit.
3. Outside high-limit thermal sensor conduit.
Planning Knock Outs Examples

Guidelines

1. All of the dryer’s electrical wiring exits the lower back of the power box through knock outs.

2. Plan ahead for the correct number, size and spacing of knock outs.

3. Space knock outs as close together as possible and run conduits straight up dryer. **NOTE:** Avoid bending conduits whenever possible.

4. Carefully mark and drill knock outs.

5. In power box, install weather-tight myers hub to each conduit hole to protect wires.

Figure 4U Hydraulic punch driver set with 1/2” to 2” knock out punches.

Figure 4V Interior View of Power Box - With myers hubs installed to knock outs.
Planning Knock Outs Examples (Continued)
NOTE: Verify all these connections to panel are located correctly and sealed tight.
Planning Wiring Examples

Guidelines

1. Run wires within wireways inside the power box.
2. Wires that cross wireways should run underneath raceways, especially high-voltage wires such as the ignition cable.

**WARNING**

No wires should run over the top of any wireway.

A. #33 Electrical tape
B. #2210 Mastic roll tape

---

**Figure 4AE**

**Figure 4AF Wire Rack**

**Figure 4AG Wire #1 THW Black**
Planning Wiring Examples (Continued)

Figure 4AH Pairing off wires for pilot fuel train.

Figure 4AI Close Up - Pulling wires from rear of power box.
4. Overview and Planning

Planning Wiring Examples (Continued)

Figure 4AJ  Tying wire to fish tape prior to pulling it through conduit.

Figure 4AK  Pulling wires to exterior high-limits.
See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

**Fan Motors Wiring and Installing Air Switch Tubing**

1, 3 or 4 Fan motors are installed during construction based upon dryer size.

**Figure 5A** Example: 100 HP, 230V/460V Fan Motor

**Figure 5B** Example: Wiring for 3 fan motors installed. Note 3/8" copper tubing for each air switch is wire tied to fan motor conduit. **NOTE:** Fan cover is not yet installed.
5. Fan Motors

Wire (1, 3 or 4) Fan Motor(s) as Required by Dryer Size

1. Determine where conduit for each fan motor(s) will exit the power box and knock out hole(s) in power box for conduit (size 1" to 2-1/2" depending on motor size). Install myers hubs. For 3 or 4 fan dryers position conduits as close together as korn clamps will allow. This will leave room for other 1/2" conduits that will exit power box in later steps.

**NOTE:** Conduit and fittings for fan motor(s) are shown in Figure 5C.

**NOTE:** Close up photos of fittings are shown on Page 43.

2. Install LB-bodies at back of power box and run conduit up dryer.

3. Turn conduit into motor window and run conduit or seal-tight into dryer. Install seal-tight from fan motor conduit to fan motor. This allows the motor mount to be adjusted.

4. Pull wires and terminate. Wrap split bolt connections in electrical tape, then mastic tape. Follow manufacturer’s instruction manual and terminal wiring diagram on motor nameplate.

---

**Figure 5C Fan Motor Electrical Fittings**

A. Scru-tight hub (myers)
B. Close nipple conduit
C. LB-body with gasket and cover
D. Korn clamps, RA
E. Strut clamp
F. Channel strut (perforated) (cut to required length)
G. IMC Threaded conduit (cut to required length)
H. Elbow conduit, 90°
I. Conduit couplings
J. Straight connector
K. Seal-tight flexible conduit (cut to required length)
L. 45° Connector, liquid-tight conduit
Fittings for Fan Motor Electrical Installation

Figure 5D

A. 1-1/2" Scru-tight hub
B. Close nipple
C. 1-1/2" LB-body with gasket and cover

Figure 5F

D. 1-1/2" Korn clamp
E. 1-1/2" Strut clamp

Figure 5E Split Bolt Connectors (6 per fan motor).

J. 1-1/2" Straight connector
L. 1-1/2" 45° Seal-tight connector

Figure 5G
5. Fan Motors

Example - Pulling Fan Motor Wires

Figure 5H

Figure 5J

Figure 5I

Figure 5K Drill hole in angle iron for mini clamp.
Example - Making Up Motor Connections

Figure 5L Connections (split bolt connectors) wrapped in electrical tape, then in mastic tape.
5. Fan Motors

Example - Fan Motors Wired in Power Box

NOTE: Special ordered 380 VAC package, Ukraine’s first 10K tower dryer.

Figure 5M Interior View of Power Box
Install 3/8” Copper Tubing for Air Switches

NOTE: 3/8” Copper tubing is same tubing used for pilot fuel train.

1. Run 3/8” copper tubing in motor window - one for each fan.
2. Extend 3/8” copper tubing into fan, but not past the top edge of fan inlet venturi (curved interior of fan).
3. Clamp 3/8” copper tubing inside each fan at midpoint and at bottom edge of venturi.
4. Run 3/8” copper tubing from each fan to power box along respective fan motor conduit. Secure with wire ties.
5. With brass compression fittings, screw 3/8” copper tubing to brass fittings on side of power box. The 3/8” copper air switch tubing must be located properly as described in order for the correct amount of negative pressure/vacuum to register a closed state at the air pressure switch inside the main power panel. (These pressure switches are preset and need no adjustment.)

This in turn signals the computer that all needed safety signals at this point of the start up have been satisfied and that the blowers are running correctly.

Figure 6A Air switch tubing runs to no more than 1” to 2” above top of venturi.
6. Air Switches

Example - Fan Motors Wired and Air Switch Tubing Installed in Dryer

Figure 6B L.H. View - Fan motors wired and air switch tubing installed.

Figure 6C R.H. View - Fan motors wired and air switch tubing installed.

Figure 6D L.H. View - Fan motors wired and air switch tubing installed.

Figure 6E Tower dryer electrical access free air window. Looking upward and standing on the metering device access floor. Each fan motor conduit has air switch copper tubing installed and tied securely.
Example - Running Air Switch Tubing

Figure 6F

Figure 6G

Figure 6H
Figure 6I

Figure 6J Brass connectors connect 3/8" copper tubing to air switches.

Figure 6K Air Switch Tubing Installed

NOTE: Use wire ties to secure the 3/8" copper air lines to the appropriate motor conduit. Wire ties should be secure and spaced evenly along the length of the dryer conduit to each respective motor. Verify that the correct air line is positioned to the correct motor conduit.
During dryer construction, metering device motor is installed to gearbox on metering device. Specifications: Toshiba, inverter-duty, 3 phase, AC. (See Figure 7A.)

1. Determine where conduit for metering device motor exits back of power box and knock out hole for 1/2" conduit. Install myers hub.
2. Install LB-body at back of power box and run conduit up dryer.
3. With 90° bend (parallel to other conduits) turn conduit into motor window.
4. Install LB-body and run conduit down inside dryer. Keep conduit as close to inside wall of dryer as possible.
5. Use knock out set to punch 1/2” hole in bottom of walk-in cooling section floor and run conduit through floor.
6. With 45° bend turn and run conduit to approximately 4’ from metering device. Clamp conduit to inner wall of hopper.
7. Connect to metering device motor with flexible conduit.
8. Pull wires and terminate. Follow terminal wiring diagram on motor nameplate.

**NOTE:** Wire size varies with application.

**NOTE:** Refer to Appendix C Power Box Wiring - Field Notes on Page 114 and 115, for wires, colors and connections.
7. Metering Device Motor

**Figure 7B** Typical conduit installations for a Zimmerman unload system.

**Figure 7C** Conduit GSI style unload system, the conduit comes in window and straight down to metering device floor. Then attach a short length seal-tight to motor.

Example 1 - Metering Unload Device Components

- A. Metering device drive shaft
- B. Metering device gearbox
- C. Four (4) torque arms
- D. Hopper - inner wall
- E. Metering device motor conduit

**Figure 7D** Metering Device Motor Installed
Example 2 - Metering Unload Device Wiring (Dryer Shown After Operation)

**Figure 7E** Typical GSI Style Metering Device Install

**Figure 7F** Typical Zimmerman Style Unload Metering Device Installations
Conduit installed to metering unload device and along inner wall of hopper with the following fittings.

A. Unload motor
B. Unload reducer
C. Seal tight fitting with 3/4" to 1/2" reducer washers installed
D. Flex seal-tight conduit
E. Seal-tight to rigid conduit connections
F. Conduit ‘mini’ and beam clamps used to secure conduit to the inner hopper.

Figure 7G Below Inside walk around platform at metering device level.

A. 1/2" Conduit clamps and beam clamps used to secure conduit to inner hopper.
B. 1/2" Aluminum conduit.
C. Mini and beam clamp for securing conduits.

Figure 7H Below inside walk around platform, down interior wall sheet and continuing down the inner hopper sheet. Changing into seal-tight and completed to motor.
Example 2 - Metering Unload Device Wiring (Dryer Shown After Operation) (Continued)

Figure 7I Close Up - Beam Clamp

Figure 7J Close Up - Conduit Coupling

Figure 7K Liquid-Tight Conduit Straight Connector
See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

**Interior High-Limits, Adjustable Plenum High-Limit Thermostat (Overheat), Plenum Temperature Sensor (RTD)**

1. Determine where conduit for interior high-limit, adjustable plenum high-limit thermostat and plenum temperature sensor exits power box and knock out hole for a single 1/2” conduit. Install Myers hub.

2. Install LB-body at back of power box and run conduit up dryer.

3. Bend conduit 90° to turn conduit into dryer window (usually the motor window) and run conduit into dryer. Install LB-body and run conduit up inside walk-in cooling section to just above motor window.

4. Connect interior high-limit to conduit.

5. Extend copper capillaries from interior high-limit (horizontally to right and left) and secure with insulated clips and 5/16” whiz nuts to be located for easy access.

6. Install 4” junction box above interior high-limit with 1/2” x 2” nipple.

7. Install adjustable plenum high-limit thermostat to 4” junction box with 1/2” close nipple.

**NOTICE**

*High-limit copper capillaries and 3/8” O.D. copper lines can be damaged easily. These sensors need care in placement.*

- a. Verify that the lines wrapping around the dryer are directly level with the 4 way connections box and remain as straight and level as possible all the way around the dryer.

- b. Verify that all lids and fittings are tight and gaskets are used where applicable.
Example 1

A. Double inside high-limit junctions box and capillaries
B. 1/2" Conduit tee junction
C. 1/2" Conduit LB junctions
D. Adjustable plenum high-limit sensor

Figure 8A
A. Double/inside high-limit
B. Adjustable plenum high-limit
C. Conduit supported to plenum rolled channel
D. Left/right capillary for inside high-limit
E. 3/8” Copper air line for proof at fan/blower

Figure 8B
8. Drill hole in hopper divider from above and run conduit up from 4" junction box to walk-in heating section of dryer.

9. Secure conduit to dryer with mini clamps. *(See Figure 8A on Page 57 and Figure 8B on Page 58.)*

10. Approximately 3’ above heat section walkway, the plenum RTD temperature sensor will be installed later at the correct level in the burner section.

11. Feed adjustable plenum high-limit thermostat capillary up outside of conduit to conduit tee in walk-in heating section. Roll up access tube tie with wire ties.

12. Secure copper capillary to dryer wall with insulated clips and 5/16" whiz nuts.

   **NOTE:** *Do not mount capillary on plenum channels.*

13. Pull wire or cable and terminate.

   See Appendix C Power Box Wiring - Field Notes on Pages 114 and 115.

---

**Figure 8C**

A. Inside cooling high-limit/over heat sensor.
B. Plenum adjustable high-limit sensor.
C. 1/2" Conduit LB and tee junctions.
D. All 1/2" conduits secured with mini’s and beam clamps.
E. Plenum adjustable high-limit capillary secured to 1/2" conduit.

**NOTE:** *Notice the placement of the plenum adjustable high-limit. Positioning is vital for end-user accessibility during changing seasonal drying conditions and grains.*
8. Interior High-Limits, Thermostat, Plenum Temperature Sensor

Figure 8D

A. 1/2" Conduit for plenum temperature sensor
B. Installed through divider hopper also
C. Note 1/2" conduits for flame sensor and ignitor

Figure 8E Insulated Clip for Copper Capillary (GT4-0057 and GT4-0148)
9. Exterior High-Limits

**Important Safety Precaution:**
All electrical installations must be made by qualified personnel.

See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

**Exterior High-Limits (Overheats)**

During construction, upper, middle and lower exterior high-limits (and their copper capillaries which encircle dryer) are installed on exterior of dryer.

During dryer construction, one 1/2" conduit for the three (3) exterior high-limits is installed behind ladder to approximately 10' above foundation.

1. Determine where conduit for exterior high-limits exits power box and knock out hole for 1/2" conduit. Install myers hub.
2. Install LB-body at back of power box. Run conduit up and around dryer to existing conduit.
3. Pull wires and terminate. See Appendix C Power Box Wiring - Field Notes on Page 114 and 115.

![Figure 9A](Image)
**Figure 9A** Exterior high-limit sensor with gas-filled copper tubing is installed inside copper capillary at factory.

![Figure 9B](Image)
**Figure 9B** One exterior high-limits with copper capillaries.

**CAUTION**
Do not cut off end of gas-filled copper tubing.

**During Dryer Construction**

**Upper exterior high-limits** are installed on perforated sheets approximately 5" below top rows of solid sheets.

**Middle exterior high-limits** are installed on perforated sheets between the upper and lower exterior high-limits.

**Lower exterior high-limits** are installed on perforated sheets, above or below middle row of solid sheets, 20' below upper exterior high-limits. (See Page 9C on Page 62.)
9. Exterior High-Limits

**NOTICE**

*High-limit copper capillaries and 3/8” O.D. copper lines can be damaged easily. These sensors need care in placement.*

1. Verify that the lines wrapping around the dryer are directly level with the 4 way connections box and remain as straight and level as possible all the way around the dryer.

2. Verify that all lids and fittings are tight and gaskets are used where applicable.

Figure 9C *Outside high-limit positions are as indicated.*

A. Being the top/upper high-limit over heat.
B. Being the middle high-limit over heat.
C. Being the bottom/lower high-limit over heat.
A. Upper and lower bindicators and grain temperature RTD sensor
B. Wet moisture sensor
C. Dry moisture sensor
D. Outside high-limits/overheats
E. Grain temperature sensor
F. Bottom/lower high-limit sensor

Figure 9D Side View - Conduit installed on 4 fan dryer.
10. Sensors

Important Safety Precaution:
All electrical installations must be made by qualified personnel.

See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

Bindicator(s) and Grain Temperature Sensors (RTDs)

During dryer construction, bindicator(s) are installed on exterior of roof garner section.

See Figure 10A for standard upper and lower bindicator placements.

One 1/2” conduit for bindicator and grain temperature sensors is installed beside ladder (and to left of exterior high-limits conduit) to approximately 10’ from top of discharge hopper.

![Figure 10A Bindicators (Wired for demonstration.)](image)

A. Lower bindicator
B. Upper bindicator

Bindicator(s)

1. Determine where 1/2” conduit for bindicator(s) exits power box and knock out hole. Install myers hub.

2. Install LB-body at back of power box.

   **IMPORTANT:** See Grain Temperature Sensors Probe on Page 66 before installing bindicator conduit. Grain temperature sensor cables are run in same conduit with bindicator wires.

3. After installing conduit tee for grain temperature sensors, run 1/2” conduit to existing bindicator conduit.

4. Pull wire/cable and terminate. (See Figure 10B on Page 65.)

   See Appendix C Power Box Wiring - Field Notes on Pages 114 and 115.
10. Sensors

**Figure 10B #14 Fork**

**Figure 10C Bindicator as Shipped**

- A. Bindicator
- B. Gasket
- C. Cover
- D. Mounting bracket
- E. Mounting gasket ring
- F. Blades
- H. Hardware

**Figure 10D RA6 Bindicator**

Coupling H38 (RA6) (796-1195-7)

Extension shaft 12" (806-1419-1)

Conduit cap (806-1667-5)

Bindicator ext. con. (806-1437-3)

Mounting plate H-192 (769-1199-9)

ESNA #4-40 (090-1668-4)

#4-40 SHCS x 1" (090-1667-6)
10. Sensors

Grain Temperature Sensors Probe

NOTE: Grain temperature sensor (RTD) cables are pulled in the 1/2” bindicator conduit and RTD’s were replaced with grain temperature probe.

1. While running 1/2” bindicator(s) conduit, install conduit tee for grain temperature RTD sensors at screen 15” to 20” above the top of divider hopper.

2. Run flexible conduit from conduit tee to sensor probe.

3. Run flexible seal-tight conduits from 4 way junction box and/or conduit tee connector to bottom bindicator. Continue from the top of 4 way junction box and/or conduit tee connector with aluminum 1/2” conduit up the outside of the dryer to the outer roof sections within 16” of the upper bindicator. Use flexible seal-tight conduit and fittings to connect to bindicator. **NOTE:** Be sure to secure all lines to dryer for stability.

4. Pull shielded cable for grain temperature sensor with bindicator wires and terminate.

*See Appendix C Power Box Wiring - Field Notes on Pages 114 and 115.*
Example - Wiring Bindicator(s)

Figure 10F One option available for installations. Lower bindicator.

Figure 10G Typical install at bindicator’s with the wet moisture = Sensor housing installed.

Figure 10H Excessive length’s of flex seal-tight conduit is discouraged.
10. Sensors

Wiring Bindicator(s) (Continued)

Figure 10I Close Up - Bindicator Wired

Example - Grain Temperature Sensors Installed

Figure 10J Installing conduit tee on bindicator conduit for grain temperature sensors cables.

A. Grain temperature RTD sensor conduit tee.
B. Upper and lower bindicator and grain temperature RTD sensor conduit.
Example - Grain Temperature Sensors Installed (Continued)

Figure 10K Connections at Grain Temperature RTD Sensor.

Figure 10L Grain RTD mounted and conduit tee with seal-tight completed and tight.
10. Sensors

Example - Bindicator(s) and Grain Temperature Sensors Installed

Figure 10M Side View - Conduit installed on 4 fan dryer.

A. Conduit tee installations
B. Outside bottom/lower high-limit/overheat
C. Conduit LB installations
D. Top/bottom bindicator and grain temperature RTD sensor conduit.
E. Dry moisture sensor conduit
F. Wet moisture sensor conduit
G. Outside high-limit/overheat sensors
Moisture Sensor Kit

**Figure 10N** Low Noise 602E020-D Series

**NOTE:** Moisture kit arrives together in the dryer load with operators panel, main panel and specified supply of an aluminum 1/2" conduit package.
### Moisture Control Optional Tower Panel (GT4-0417)

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**NOTE:** Quantities at conduit and cable may vary with tower dryer height sizing.

---

**Figure 10P** Wet/Dry Hardware

**Figure 10Q** Dry Sensor Mounting Plate and Bracket
Figure 10R *Flow Directional Sticker*

Figure 10S *Sensor 20/5 cable attached to moisture sensor - As supplied from factory.*

Figure 10T *Moisture sensors 20/5 cable prepared from factory.*
10. Sensors

Dry sensor terminations depicted: (20/5 Line shielded cable)

a. White with blue strip and white with brown strip. Twisted, soldered, “OVDC (12V-) at terminal strip”.
b. Brown. Dry grain temperature or DGTAT terminal strip.
c. Blue. 12 VDC (12V+) at terminal strip.
d. White with orange strip. Dry moisture high or DMH at terminal strip.
e. Orange. Dry moisture low or DML at terminal strip.
f. Shields are always grounded at green/yellow term locations.

Wet sensor terminations depicted: (Another style 5 line)

a. White. Wet moisture high or WMH at terminal strip.
b. Black. Wet moisture low or WML at terminal strip.
c. Brown. Wet grain temp or WGT at terminal strip.
d. Green: OVDC (12V+) at terminal strip.
e. Red. 12 VDC (12V+) at terminal strip.

NOTE: *No shielding wires at wet sensor connections.*

Figure 10U *Both styles wiring depicted in terminal.*
10. Sensors

**Figure 10V Moisture Sensor Power Supply and Terminal Strip Locations**

2 Amp fused power supply for 12 VDC sensor systems at tower dryer panel.

**Figure 10W Wet Moisture Sensor Housing**

Installations are at top heat section of tower dryer. In the second solid stainless steel sheet down from the roofs eave.

**Figure 10X Thumb Screw**
10. Sensors

- Thumb screw and hardware are included to simplify installations.
- **NOTE:** *Attach sensor housing to stainless sheets with provided stainless steel nuts and bolts.*
- When drilling stainless steel remember, a 1/4" sharp pilot bit, a 3/8" sharp drill bit, slow drill speeds and a lot of pressure helps.

![Figure 10Z](image)

A. The moisture sensor housing has been installed using 5/16" stainless steel nuts and bolts. The housing has been installed in the second row of stainless solid outside sheets.
B. Bindicators and junctions box with conduit completed securely.

**Figure 10Z** *Tower Dryer Roof Sections with Bindicators and Wet Sensor Housing Mounted*

Bindicators could be wired to the Junctions box at this time. (First section of dryer erections.) *(See Page 122.)*
Figure 10AA Dry Sensor Installations at GSI Tower Dryer

Figure 10AB Dry Sensor Installations at Zimmerman Tower Dryer

NOTE: Upon install, verify ease of access of the housing assembly for inspect at sensor and sample port.
10. Sensors

Dry Moisture Sensor Housing Assembly

Figure 10AC Dry Moisture Sensor Housing Assembly

Universal Fit Dry Sensor Housing

Figure 10AD Grain Moisture Mounting Location

Figure 10AE Sample Port (180° of Mounting Location)

Figure 10AF Sensor/sample basket area with cleaning grill installed. (Grain discharge side.)
10. Sensors

**Figure 10AG** Sensor basket with gate and grills installed.

**NOTE:** Restriction gates are provided for adjustment at grain flow through sensor mounting basket. The grills are provided to keep any larger materials from getting lodged in the sensor basket and disrupting sensor performance.

**Dryer Moisture Sensor Assembly Completed with Dry Sensor Installed**
NOTE: When install is complete, seal the sensor housing assembly. Inspect all equipment attached, is secured for tight with applicable safety stickers in place. (Secure all four (4) gates with end user.)

A. Conduit tee installations.
B. Outside bottom/lower high-limit/overheat.
C. Conduit LB installations.
D. Top/bottom bindicators and grain temperature RTD sensor conduit.
E. Dry moisture sensor conduit.
F. Wet moisture sensor conduit.
G. Outside high-limit/overheat sensors.
Figure 10AK Wet/Dry Sensor Package

Figure 10AL Sample Port Lid Warning Label
10. Sensors

Dryer Control Center’s Virtual Touch Screen Operations Display

NOTE: Graph may assist in predicting possible swings in percentages.

NOTE: The tower dryer’s wet and dry moisture sensors must be calibrated to verify (%) percentages to be accurate.

Figure 10AM Sensor basket with gate and grills installed.
11. Ignitor and Flame Sensor

**Important Safety Precaution:**
*All electrical installations must be made by qualified personnel.*

See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

1. Locate burner pilot section for ignitor and flame sensor installation.

   **NOTE:** *Run one conduit for ignitor. Run separate and parallel conduit for flame sensor.*

   a. Determine where ignition cable exits power box and knock out hole for 1/2" conduit. Install myers hub.

   b. Determine where #14 wire (THW or THHN) for flame sensor exits power box and knock out opening for 1/2" conduit. Install myers hub.

2. Install LB-bodies for ignitor and flame sensor at back of power box.

3. Run two (2) conduits parallel with other conduits up to dryer window (usually the motor window). Bend conduits 90° and run in motor window to walk-in cooling section.

4. Install LB-bodies and run conduits up inside of dryer to divider hopper. Stay as close as possible to inside wall of dryer. Drill through divider hopper. Run conduits up to level with bottom of burner.

5. Turn conduits 90° toward burner housing. Drill through burner housing. Extend conduit 4" through burner housing.

   **NOTE:** *Conduits must run within 16" of ignitor to protect ignition cable.*
6. Install 1/2" appleton (liquid-tight cable connector) to each conduit.

Figure 11C Note conduit has been extended inside burner can housing and is securely mounted to reducer and burner housing.
11. Ignitor and Flame Sensor

7. Install ignitor and flame sensor (with rubber boots) to installation points on burner.

**NOTE:** Make any necessary adjustments to flame sensor after dryer start-up.

![Figure 11E](image1)

_Installed to Pilot Section_

A. Maxon supplied port for 3/8" brass compression fitting location used for pilot fuel line.
B. Maxon supplied port for spark plug installations.
C. Maxon also provides 3 ports for flame sensor installations needs.
D. Flame sense ground wire can be secured to hardware at this point.

![Figure 11F](image2)

_Close up installed to pilot section._

A. Maxon flame sensing probe completed
B. Maxon spark plug completed
C. 3/8" Compression fitting and 3/8" O.D. Copper tubing completed to maxon supplied burner end plate.
D. Locations for 16 gauge ground wire. (Paired with flame sense wire.)
11. Ignitor and Flame Sensor

8. Pull ignition cable to ignitor and terminate at ignition transformer in power box. (*See Figure 11G on Page 86.*)

Pull #14 wire red flame sensor wire and terminate at protectofier terminal E in power box. (*See Figure 11O on Page 89.*)

![Figure 11G Hardware](image1)

A. #14 Eyelet connector  
B. Insulated clip  
C. 5/16" Whiz nut  
D. Beam clamp  
E. Rubber boot  
F. Mini clamp

Not shown
6" or 8" electrical wire ties.

![Figure 11H Ignitor and Ignition Cable](image2)

![Figure 11I Flame Sensor and #14 Red Flame Sensor Wire](image3)
11. Ignitor and Flame Sensor

Figure 11J Maxon Flame Sensor

Figure 11K Maxon Spark Plug

Figure 11L Insulator Boot

Figure 11M Maxon “Quik” Connector

NOTE: “Quik” connectors and insulator boots usage is required.
11. Ignitor and Flame Sensor

A. Ignition transformer
B. Protectifier burner control
C. Terminal strip
D. Air pressure switches
E. 15V MC power supply
F. Dry conveyor starter/contactor
G. Wet conveyor starter/contactor
H. Fan/blower soft starts
I. Fan/blower contactors
J. Fan/blower starter-breaker
K. Toshiba inverter
L. 120V 6 Amp receptical
M. Main PLC components
N. Control voltage transformer
O. Control power breakers
P. Control power fuses block
Q. Unload motor starter
R. In-line reactor
S. Block heater
T. WatchDog and power supply system
U. Main power distribution block
V. Main disconnect/ground lug
W. In-line filter
X. Main panel emergency stop
Y. Door safety switch

1. Dryer manual compartment
2. Dryer informations
3. Main disconnect assembly

Figure 11N Ignitor Wires to Ignition Transformer
A. Ignitions transformer.
B. 5 Amp time.
C. ACF Relay.
D. Terminal screw, use this for point of terminations for the maxon flame sensing probe.
E. UV Terminations screw for oil fired maxon burner ultra violet eye sensor.
F. Terminations screw, all grounds come back to this point.
G. Protectofier burner controls (high light this one.)
H. Control transformer for flame sense.
I. Flame pack relay.
J. Tamper proof terminations screws.
K. Proof/on light and testing port.

Figure 11O Flame sensor wires to protectofier terminal E.
12. Fuel Train

**Important Safety Precaution:**
All electrical installations must be made by qualified personnel.

See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

**Fuel Train Installations (Natural Gas or Liquid Propane)**

![Diagram of Fuel Train](image)

A. Ball valve, fuel train/line drain valve  
B. Modulation motor  
C1. Upstream/primary maxon  
C2. Downstream/secondary maxon  
D. Regulator  
D1. Regulator vent  
D2. Regulator relief valve  
D3. Regulator Oz. gauge  
E. Pilot solenoid flex conduit  
F. 1/2" Conduit tee connections too maxon’s  
G. 1 of 2 U-Bolt clamps securing fuel train  
H. CV ‘butterfly’ valve  
I. Oz. Gauge  
J. 1/2" Flex conduit to honeywell modulation motor  
K. 3/8" Pilot copper fuel tubing

**Figure 12A Fuel Train**

All completed fuel trains, should always have a slight fall towards the brass drain shut off valve (call out “A”). Verify with level at maxon shut off valves before mounting is completed.

![Diagram of Domestic Pilot Line](image)

**Figure 12B Domestic Pilot Line**
Fuel Train - Demonstration Close Ups

**Figure 12C**

- A. Main fuel train
- B. Shut off (fuel train intake)
- C. Nipple
- D. Strainer with clean out
- E. Tee
- F. Pilot fuel train

**Figure 12D**

- A. Secured
- B. Strainer
- C. Pressure regulator
- D. Pilot valve solenoid
- E. 1/2" Flexible seal-tight conduit
- F. 1/2" LB conduit junction
- G. 3/8" Copper pilot tubing
A. Main fuel train
B. Main regulator
C. Solenoid regulator on pilot fuel train
D. Downstream control valve
E. Maxon

Figure 12E

A. Primary maxon (closest to fuel intake)
B. Secondary maxon (downstream from primary maxon)

Figure 12F
12. Fuel Train

Fuel Train - Demonstration Close Ups (Continued)

Figure 12G

A. Secondary maxon
B. Modutrol valve - with linkage (butterfly valve)
C. Ounce gauge
D. Tee (up to dryer) (down to drain valve)

Figure 12H

A. (-) Terminal
B. (+) Terminal
C. L-1
D. L-2
E. Ground
Fuel Train - Demonstration Close Ups (Continued)

NOTE: This shut off ball valve should always be open when dryer is its shut down state.

Pilot Fuel Line

NOTE: 3/8" Copper tubing used for pilot fuel line is same tubing used for air switches.

1. Connect pilot fuel line to 3/8" brass compression fitting on pilot fuel train. (See Figure 12G.)

2. Run 3/8" copper pilot fuel line up along fuel piping and through dryer window above fuel train. (See Figure 12C on Page 91.)

3. Drill 1/2" hole (beside fuel piping) through blower splice plate (burner floor). (See Figure 12E on Page 92.)

4. Run pilot fuel line up to connecting point on burner pilot section (wire tie to burner manifold). (See Figure 12F on Page 92.)

5. Connect pilot fuel line to connecting point on burner pilot section with 3/8" brass compression fitting. (See Figure 12F on Page 92.)

NOTE: Wire tie pilot fuel line along fuel piping inside and outside of dryer.
Figure 12J Completed 3/8" copper pilot tubing and 4" natural gas pipe. All attached securely and fresh paint complete a tower dryer fuel train.

Figure 12K Pilot copper tubing continuing inside dryers cooling section and up through the fan/blowers to the terminations point in the burner. **NOTE:** Notice un-painted pipe line.
Pilot Fuel Line (Continued)

Figure 12L

Figure 12M Running 3/8" pilot fuel line up along burner manifold to connecting point in burner pilot section. Wire tie.

Figure 12N 3/8" Compression fitting completed from maxon pilot port continuing at 3/8" pilot fuel.

Figure 12O Pilot fuel line installed to connecting point on burner pilot section.

A. Maxon flame sensing probe.
B. Maxon spark plug.
C. 3/8" Pilot fuel tubing.
D. Ground wire connections points.
Fuel Train Wiring

Use one 1/2" conduit for pilot solenoid, maxon gas valves* and modutrol motor (See Figure 12J on Page 95) wiring.

1. Determine where conduit for fuel train wiring exits power box and knock out hole for 1/2" conduit. Install myers hub.
2. Install LB-body at back of power box and run conduit up to top of nearest dryer leg.
3. Run conduit around dryer, attaching to each leg with 1/2" korn clamp.
4. Install 1/2" LB-body and run conduit down dryer leg closest to fuel train, then run flexible conduit to fuel train.
5. Connect conduit to pilot solenoid, maxon valves and modutrol motor.
6. Group and pull wires.

See Appendix C Field Notes on Page 114 and 115.

NOTE: Line has been secured with a 1/2" U-bolt.

Figure 12Q Modutrol motor, cover and cover hardware supplied as shipped.
Example - Installing Conduit for Fuel Train Wiring

Figure 12R Leveling Conduit

Figure 12S Running Flexible Conduit

Figure 12T Putting korn clamp on conduit.

Figure 12U 1/2” Fuel and Pilot Conduit Installed
Example - Wiring Fuel Train

**Figure 12V** Standard Wiring for Primary/Upstream Electronically Controlled Maxon

**Figure 12W** Standard Wiring for Secondary/Downstream Electronically Controlled Maxon
A. 4-20 (-) negative = White at shielded.
B. 4-20 (+) Positive = Black at shielded.
C. 16 Gauge L-1 = Black.
D. 16 Gauge L-2 = White.
E. 18 Gauge ground = Green with yellow strip.

A. From valve = Red too white = L-2
B. Grounds will be tied together
C. From valve = Red too orange = 505
Example - Wiring Fuel Train (Continued)

Figure 12Z Attaching seal-tight to conduit tee on maxon valve.

Figure 12AA Cutting Seal-Tight

Figure 12AB Attaching Seal-Tight Fitting to Seal-Tight
Example - Wiring Fuel Train (Continued)

Figure 12AC Fuel Piping and Pilot Fuel Piping

Figure 12AD Fuel Train on 2000 BPH Dryer.
Example - Wiring Fuel Train (Continued)

Figure 12AE Standard Pilot and Fuel Trains Securely Mounted

Figure 12AF 3/8” Pilot Copper Tubbing Secured to Fuel Train

Figure 12AG Pilot fuel train installations almost completed.
Figure 12AH 3/8" Pilot fuel copper tubing up through center of 3 fan dryer.

Figure 12AI Pilot fuel train piping and fuel piping runs up through divider hopper.
13. Lights and Safety Horn

**Important Safety Precaution:**
All electrical installations must be made by qualified personnel.

See appendices on Pages 107-119 for wiring notes and schematics, etc. (See Pages 114 and 115.)

**Work Light, Safety Light and Safety Horn**

Install lights and horn with parts provided in kits.

1. Determine where conduit for work light, safety horn and safety light exits power box. Knock out opening for 1/2" conduit. Install myers hub.

2. Locate lights and horn according to customer preference. Often lights and horn are installed on dryer above power box. If so, run conduit up dryer to above power box.

3. Measure for lights and horn.

4. Check with level.

5. Drill holes and install lights and horn.

6. Pull #14 wires.

*See Appendix C Power Box Wiring - Field Notes on Pages 114 and 115.*

![Figure 13A](image)

A. Weather-tight electrical box  
B. Gasket  
C. 90° Light base with globe and guard  
D. 1/2" x 2" Nipple  
E. 1/2" to 3/4" Reducer  
F. Safety horn  
G. 1/2" Weather-tight conduit plugs  
H. Screws and nuts
13. Lights and Safety Horn

**Figure 13B** Front View - Lights and safety package installed on 3 fan dryer.

**Figure 13C** Rear View - Lights and safety package installed on 3 fan dryer.
Recommended Tools and Equipment List

**Important Safety Precautions:**
Dryer parts have sharp edges. Use appropriate personal protective equipment. Use proper lifting technique.

- Forklift(s) or tractor (optional to place electrical control system) with 2" x 14' nylon lifting straps, rating 2000 pounds.
- Drill: 3/8" Bits, assorted drill bits
  Hammer drill: 1/2" Masonry bits (to anchor power box)
- Screwdrivers: #2 Standard flat blade, phillips head
  Pliers: Side cut, tongue and groove, locking (vise grips), channel lock
- Ladders: Stepladder, 4', 8', extension
- 3/8" Alignment punches
- 13 Ounce ball-peen hammer
- Banding cutters
- Tape measure
- Wire stripper
- 12" Level (install horizontal conduit as level as possible)
- Conduit deburring tool
- 1/2" Pipebender *(See Figure 14A.)*
- Reciprocating saw *(See Figure 14B)* or hacksaw and pipe joint compound or heavy duty thread sealing compound
- Hydraulic punch driver set *(See Figure 14C on Page 108)* or manual knock out with 1/2" to 2" knock out punches
- Fish tape *(See Figure 14D on Page 108.)*
- Pipe threader *(See Figure 14E on Page 108.)*

![Figure 14A](Hand Bender for 1/2" Aluminum Conduit)

![Figure 14B](Hand Threader for 1/2" Aluminum Conduit)
14. Appendix A

Recommended Tools and Equipment List (Continued)

Figure 14C Standard “Knock Out Set”

Figure 14D Standard 100’ “Fish Tape”

Figure 14E Pipe Vise and Hand Threader 1/2”
Hardware

Part

Running conduit............................................. Solid conduit (10' lengths - cut to size)
(aluminum, rigid or IMC (intermediate conduit))
uni-strut (10' lengths - cut to size)
1/2" to 2-1/2" seal-tight flexible conduit.

A. 1/2" Coupling
B. 1/2" to 3/4" Reducing bushing
C. 1/2" Union
D. 1/2" Seal-tight connector
   (Use 1/2" to 2-1/2")
E. 1/2" Conduit tee

Figure 15A

Figure 15B Weather-tight Myers Hub - Portion
installed inside power box.

Figure 15C Weather-tight Myers Hub - Portion
installed to rear of power box (connects
to portion inside power box).
15. Appendix B

Hardware

Figure 15D 4" Junction box as packaged for shipping.

Figure 15E 4" Junction Box

Figure 15F 1-1/2" LB-Body with gasket and cover. (Use 1/2" to 2-1/2").

Figure 15G Conduit Hanger

D. 1-1/2" Korn Clamp
E. 1-1/2" Strut Clamp
(Use 1/2" to 2-1/2")

Figure 15H

Figure 15I Insulated clip for copper capillaries.
Hardware (Continued)

Part

Air switches ................................................................. 3/8” Copper tubing, insulated clips, wire ties.

Pilot fuel train .............................................................. 3/8” Copper tubing, wire ties, liquid-tight cable connector (Appleton, Hayco, strain relief).

Metering unload device ........................................... Crimp connector or wire nuts, 1/2” seal-tight connector myers hub.

Ignitor (spark plug) and flame sensor .......................... Rubber boot, (See Figure 15A on Page 109 to Figure 15I on Page 110) mini clamp, beam clamp, insulated clips, 6” or 8” electrical wire ties, 5/16” whiz nuts, #14 eyelet connector, beam clamp two (2) LB-bodies with cover and gasket, liquid-tight cable connector (Appleton, Hayco, strain relief).

Interior high-limits ...................................................... #14 Fork connector, crimp connector or wire nuts, 5/16” whiz nuts, insulated clips.

Adjustable plenum high-limit thermostat (overheat) ................ #14 Fork connector, crimp connector or wire nuts.

Plenum temperature sensor (RTD) .............................. Crimp connector or wire nuts.

Exterior high-limits (overheat) ....................................... Crimp connector or wire nuts.

Bindicator(s) ............................................................... #14 Fork connector.

Grain temperature sensors (RTD’s) ............................ Tee conduit, crimp connector or wire nuts.

Maxon valve ................................................................. (Wire according to diagram.)

Modutrol motor ............................................................ (Wire according to diagram.)

Pilot solenoid ............................................................. Crimp connector or wire nuts.

Fan motors ................................................................. Split bolt connectors (6 per fan) liner-less rubber splicing tape, for low and high-voltage scotch 33+ electrical tape.
## Hardware (Continued)

### 2008 Tower Dryer Main Circuit Breaker Size

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<th>Volts</th>
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<th>Full Load Amps (480 V)</th>
<th>Full Load at 1.25 Largest Motor</th>
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**Note 1:** Dryer full load amps assumes a 10 HP fill and unload conveyor on 460V dryers and a 7-1/2 HP fill and unload conveyor on 230 volt dryers.

**Note 2:** Used to determine minimum main circuit breaker and electrical service size by code.

Invertor at 230V = 16.5 Amps

Invertor at 460V = 8.5 Amps

7-1/2 HP motor at 230V = 22 Amps

10 HP motor at 460V = 14 Amps
Fan Motor Wiring Guide

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<th>Conduit, IMC* (Diameter)</th>
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*IMC = Intermediate conduit.
### Dryer Field Wiring to Panel - Size and Color

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<th>Parts or Devices</th>
<th>Wire Gauges (AWG)</th>
<th>Wire Color</th>
<th>Terminal Strip Wire #</th>
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<td>Upper Grain Level Bindicator (UBS)</td>
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<td>Common</td>
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# Dryer Field Wiring to Panel - Size and Color (Continued)

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<td>Ignition Transformer</td>
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<td>Green or Green/Yellow</td>
<td>Panel Ground</td>
<td>Ground at Burner</td>
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<td><strong>Unload Sweep or Metering Unload Device</strong></td>
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<td>10 Gauge for (230 VAC)</td>
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<td>A-B AC Inverter (U, V, W)</td>
<td>AC Unload Motor (L1, L2, L3)</td>
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<td>12 Gauge/16 Gauge</td>
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<td>Panel Ground</td>
<td>Ground at Motor</td>
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17. Appendix D

Tower Dryer Control Panel Wiring Diagram

Figure 17A
Figure 17B

Tower Dryer Control Panel Wiring Diagram (Continued)
Gas Train Wiring Schematic Diagram
Gas Train Wiring Schematic Diagram (Continued)
Fuel Train with Pilot Fuel Line

Figure 18A
Cutaway - Ignitor and Flame Sensor Conduits
Sensor and Conduit Location

Figure 19B

Top bindicator sits just below bottom roof ring

Bottom bindicator sits in middle of top ring

Ladder stand offs on first and fourth bolts

Bolt pattern

Top overheats

Moisture sensor
Exterior Sensors Conduits

Position this bindicator approximate 21" down from the eave in the center of the sheet.

Position this bindicator approximate 46" up from the eave.

Position this overheat approximate 5" below the solid sheets.

Center this overheat between the top and the bottom overheats.

Position this overheat approximate 5" above the solid sheets.

Solid sheets

Burner floor

Figure 20A

Solid sheets
Tower Cutaway

Position this b indemnator approximate 21" down from the eave in the center of the sheet.

Position this overheat approximate 5" below the solid sheets.

Center this overheat between the top and the bottom overheat.

Position this overheat approximate 5" above the solid sheets.

Position the RTD grain sensor so it is above the burner floor.

Figure 21A
# Glossary of Installation Terms

<table>
<thead>
<tr>
<th>Terms</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>BPH</td>
<td>Bushels Per Hour</td>
</tr>
<tr>
<td>Cable connectors</td>
<td>Liquid-tight cable connector (strain relief), Appleton, Heyco.</td>
</tr>
<tr>
<td>Flexible conduit</td>
<td>Brand names include seal-tight, ultra-tight, etc.</td>
</tr>
<tr>
<td>Heavy duty thread sealing compound</td>
<td>Also called pipe thread sealer, pipe dope.</td>
</tr>
<tr>
<td>Field notes</td>
<td>Electrician’s working summary of wiring requirements.</td>
</tr>
<tr>
<td>Hoppers</td>
<td>Divider hopper - funnels any debris to cooling section (divides heating section from cooling section). Discharge hopper - discharges grain at bottom of dryer, it consists of inner hopper and outer hopper. <em>Inner hopper wall</em> - directs grain to metering device (below cooling section floor). <em>Outer hopper wall</em> - discharges grain from dryer.</td>
</tr>
<tr>
<td>Motor window</td>
<td>Dryer fan motors conduits enter through motor window.</td>
</tr>
<tr>
<td>RTD</td>
<td>Resistance temperature device.</td>
</tr>
<tr>
<td>R.H.</td>
<td>Right hand</td>
</tr>
<tr>
<td>L.H.</td>
<td>Left hand</td>
</tr>
<tr>
<td>Venturi</td>
<td>Tube, e.g., curved inner wall of fan that constricts to increase air velocity and lower air pressure.</td>
</tr>
</tbody>
</table>
U.S. to Metric Conversion Tables

Refer to Conversion Tables in appendix J for conversions from U.S. measures to metric measurements.

To assemble this grain dryer, you may need standard U.S. dimension tools. However, some metric tools will fit on U.S. dimension hardware.

<table>
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<th>Millimeters</th>
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## U.S. to Metric Conversion Tables (Continued)

### Conversion Factors

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<tr>
<td>British Thermal Unit (Btu)</td>
<td>2.928 x 10^{-4}</td>
<td>Kilowatt-Hr (kWh)</td>
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<tr>
<td>Btu/Hr</td>
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<td>Horsepower (HP)</td>
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<td>Btu/Hr</td>
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<tr>
<td>Horsepower (HP)</td>
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<td>Watt (W)</td>
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<td>Inch (in.)</td>
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<tr>
<td>Foot (ft.)</td>
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<tr>
<td>Pound-mass (lbm avdp*)</td>
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<tr>
<td>Pounds per Square Inch (PSI)</td>
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<td>Pascal (Pa)</td>
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<tr>
<td>Bushels (BU)</td>
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<td>Cubic Meter (m³)</td>
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<td>(°F-32) / 1.8</td>
<td>°C (Celsius)</td>
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<tr>
<td>°C (Celsius)</td>
<td>1.8 (°C) + 32</td>
<td>°F (Fahrenheit)</td>
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*Awg = American wire gauge.

### AWG* Wire Gauge (Solid Conductor Wire)

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<tr>
<th>AWG Gauge #</th>
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<th>Diameter of Solid Wire</th>
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<td>inches²</td>
<td>mm</td>
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<td>2</td>
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*Awg = American wire gauge.
Dryer Decals Used on Structure

All stickers will be installed by electrical installations crews and/or start-up personnel.

1. DC-2014 - Decal, Fill tube for tower dryer - 2 - EA
   a. Will be installed in inlet fill tube/spout.

2. 420-1473 - Decal, Danger confined space - 2 - EA
   a. Will be installed at any and all access doors on dryer.

3. DC-1060 - Decal, Danger rotating drum - 2 - EA
   a. Will be installed at Zimmermen/GSI walk-in floor access ports to unload system.

4. DC-1061 - Decal, Warning flame and pressure - 2 - EA
   a. Will be installed at all heat section access door.

5. DC-1062 - Decal, Danger - 2 - EA
   a. Will be installed at Zimmermen/GSI walk-in floor access ports to unload system.

6. DC-1064 - Decal, Warning high speed belt - 1 - EA
   a. Will be installed at cooling sections access door.

7. DC-1224 - Decal, Danger high voltage (LG) - 2 - EA
   a. Will be installed at cooling access door and main power panel.

8. DC-1901 - Decal, Warning; No step - 6 - EA
   a. Unknown - Check with engineering safety.

9. DC-GB-1A - Decal, Suffocation/Flighting - 1 - EA
   a. Unknown - Check with engineering safety.

10. DC-GB-1S - Decal, Suffocation/Flighting - 1 - EA
    a. Unknown - Check with engineering safety.
GSI Group, LLC Limited Warranty

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user’s sole remedy (and GSI’s only obligation) is to repair or replace, at GSI’s option and expense, products that in GSI’s judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

Warranty Extensions:

The Limited Warranty period is extended for the following products:

<table>
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<td>AP Fans and Flooring</td>
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</tr>
<tr>
<td>Performer Series Direct Drive Fan Motor</td>
<td>3 Years</td>
</tr>
<tr>
<td>All fiberglass Housings</td>
<td>Lifetime</td>
</tr>
<tr>
<td>All fiberglass Propellers</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Cumberland Feeding/Watering Systems</td>
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<tr>
<td>Feeder System Pan Assemblies</td>
<td>5 Years **</td>
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<tr>
<td>Feed Tubes (1-3/4&quot; and 2.00&quot;)</td>
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</tr>
<tr>
<td>Centerless Augers</td>
<td>10 Years *</td>
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<tr>
<td>Watering Nipples</td>
<td>10 Years *</td>
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<tr>
<td>Grain Systems</td>
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</tr>
<tr>
<td>Grain Bin Structural Design</td>
<td>5 Years</td>
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<tr>
<td>Grain Systems Farm Fans Zimmerman</td>
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<tr>
<td>Portable and Tower Dryers Pan Assemblies</td>
<td>2 Years</td>
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<tr>
<td>Portable and Tower Dryer Frames and Internal Infrastructure</td>
<td>5 Years</td>
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GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12th) month from the date of purchase and continuing until the sixtieth (60th) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

9101239_1_CR_rev7.DOC (revised July 2009)
This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.