



CENTRIFUGAL GRAIN DRYER

Continuous Flow / Automatic Batch

QuadraTouch™ Dryer Control System

EU – Under Declaration of Incorporation



OWNER'S OPERATION MANUAL

Sukup Manufacturing Co.

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Thank you for purchasing a Sukup Grain Dryer.

At Sukup Manufacturing Co., we strive to provide our customers with the best products available. It's important to us that you get the best value for your money. This means producing top-quality products that will provide you and your grain operation with many years of satisfied ownership.

We back our products with an experienced staff and the best customer service in the industry. Our dedicated employees have done their very best to ensure that your Sukup Grain Dryer provides a hassle-free grain drying experience. With proper installation and use, it will serve you for many years.

Thank you again for your purchase. We wish you years of profitable, effective, and safe use of your Sukup Grain Dryer.

The Entire Sukup Family

Sukup Manufacturing Co.
Sheffield, Iowa, USA

Centrifugal Fan Grain Dryer Owner's Operation Manual

This manual is comprised of several tabbed sections. The first provides safety information and identifies components of dryer. Others provide instructions for installation, testing, operation, service and maintenance of dryer, and for troubleshooting. Please read entire manual thoroughly before installation or operation.

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IMPORTANT: Please quote full serial number in any correspondence pertinent to this product.

Preliminary Information

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LIMITED DRYER WARRANTY

SUKUP MANUFACTURING CO. (Sukup) warrants to original retail purchaser that within time limits set forth, new equipment shall be free from defects in material and workmanship. A part will not be considered defective if it substantially fulfills performance specifications. Should any part prove defective within warranty period, part will be replaced or repaired without charge F.O.B. Sukup Manufacturing Co., Sheffield, Iowa USA or Distribution Centers - Arcola, Illinois; Aurora, Nebraska; Cameron, Missouri; Defiance, Ohio; Jonesboro, Arkansas; Watertown, South Dakota. To claim warranty, a copy of original invoice is required.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS OR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. Sukup neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part, and will not be liable for incidental or consequential damages. **THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS LIMITED WARRANTY.**

Sukup reserves the right to change specifications, add improvements or discontinue manufacture of any of its equipment without notice or obligation to purchasers of its equipment. This warranty gives you specific legal rights. You may also have other rights, which vary according to state or province.

WARRANTY EXCLUSIONS - Labor, transportation, shipping, or any cost related to a service call is not provided by Sukup. This Limited Warranty does not apply to damage resulting from misuse, neglect, normal wear, accident or improper installation or maintenance. **ITEMS NOT MANUFACTURED BY SUKUP** (e.g. tires, belts, motors) **ARE COVERED UNDER WARRANTIES OF THEIR RESPECTIVE MANUFACTURERS AND ARE EXCLUDED FROM COVERAGE UNDER THE SUKUP WARRANTY.**

GRAIN DRYER WARRANTY PERIOD - Sukup warrants continuous flow grain dryers (single module and stacked units) for a period of two years (24 months) from date of purchase.

An optional **THREE-YEAR LIMITED WARRANTY EXTENSION (COMP # TWARREXT)** may be purchased **only** at time of grain dryer purchase. This period of extended warranty begins on the twenty-fifth (25th) month after date of purchase, and continues through the sixtieth (60th) month from the date of purchase. Dryer parts found to be defective during this time period will be replaced or repaired, with the exception of motors (as excluded herein) or "wear parts" (any part worn by high usage, such as augers, bearings, burner components, moving parts, sensors, etc.). This extended limited warranty does not apply to labor, transportation, shipping, or any cost related to a service call.

HEATER CIRCUIT BOARD WARRANTY PERIOD - Sukup warrants heater circuit boards for three (3) years from date of purchase.

ELECTRIC MOTOR WARRANTY - The manufacturers of electric motors warranty their motors through authorized service centers. Contact motor manufacturer for nearest location. If motor warranty is refused by a service center based upon date of manufacture, use following procedure: Have motor repair shop fill out the warranty report form as if they were providing warranty service. State on the report the reason for refusal. Send report, motor nameplate, and proof of purchase date to Sukup. If electric motor warranty is not satisfactorily handled by motor service center, contact Sukup for assistance. Warranty may also be claimed by returning motor to Sukup Manufacturing Co. or Distribution Centers with prior authorization. **NOTE:** Sukup will not be responsible for unauthorized motor replacement or repair.

WARRANTY CERTIFICATION - Warranty registration card should be completed and returned to Sukup Dryer Service Department within two weeks of product delivery to certify warranty coverage.

UNAPPROVED PARTS OR MODIFICATION - All obligations of Sukup under this warranty are terminated if: unapproved parts are used, or if equipment is modified or altered in any way not approved by Sukup.

Purchaser must adhere to applicable safety regulations and federal, state and local codes in the location, installation, and use of this product. Sukup assumes no responsibility for property damages or personal injuries.

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GENERAL SAFETY PRACTICES



On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety. They indicate potential hazards and levels of intensity.



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



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



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

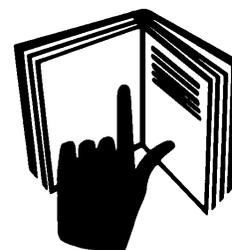


NOTICE alerts you to practices unrelated to personal injury, such as messages related to property damage.

IMPORTANT: To prevent serious injury or death to you or your family, it is essential that safety decals are clearly visible, in good condition, and applied to the appropriate equipment.

FOLLOW MANUAL AND SAFETY DECAL MESSAGES

Observe safe operating practices. Carefully read this manual and all safety decals on your equipment. Safety decals must be kept in good condition. Replace missing or damaged safety decals free of charge by contacting Sukup Manufacturing Co. by mail at Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or on our website, www.sukup.com.



It is the responsibility of the owner/operator to know what specific requirements, precautions, and work hazards exist. It is also the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of the hazards and safety precautions that need to be taken to avoid personal injury or death. **An example training register is printed in this section to assist in that process.**

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit well maintained according to procedures in Service and Maintenance section.

Basic Safety Rules

1. Learn how to use controls and operate equipment.
2. Do not let anyone operate unit without thorough training of basic operating and safety procedures. **Always follow a proper lockout procedure.**
3. Periodically check all mechanical and electrical components. Keep unit in good working condition.
4. Handle equipment and parts with care. **Wear protective clothing** to avoid injury from sharp metal edges.
5. Wear Personal Protective Equipment (PPE) such as safety glasses, gloves, hardhat, steel-toe boots, ear protection and dust mask as required by local, state and national regulations.

Keep unit well maintained according to procedures outlined elsewhere in this manual.



WARNING: TRUCKER-TRANSPORTER IS TO PROVIDE APPROVED SAFETY CHAIN WHEN TOWING DRYER.

TRANSPORTING THIS EQUIPMENT ON PUBLIC ROADS REQUIRES PRECAUTIONARY MEASURES in order to prevent serious injury or death. If road travel is required, it is essential that all of these conditions are met:

- Read and understand operator's manual.
- Check and comply with state and local regulations.
- Use required emblems or lights.
- Travel at a reasonable and safe speed. Reduce speed and/or use lower gear on rough ground or slopes.
- Stop gradually.
- Have extended rear angle mirrors on vehicles.
- Signal and check behind you when turning.
- Use safety chain when towing dryer.



WARNING: CHECK FOR OTHER VEHICLES WHEN TURNING. Two thirds of roadway farm accidents occur while turning.

- Use mirrors.
- Be sure to have clear visibility.
- Use signal lights.



WARNING: DO NOT TRANSPORT UNIT IF VISIBILITY IS IMPAIRED.

These conditions may include, but are not limited to:

- Hills or curves that obstruct vision
- Poor weather
- Darkness

Failure to heed these warnings may result in serious injury or death. Use good judgment when transporting. Maintain complete control of unit at all times. Comply with state and local regulations. Read safety procedures before moving units. Always strive to prevent accidents! Watch out for other vehicles.



WARNING: PREVENT EXPLOSION OR FIRE.



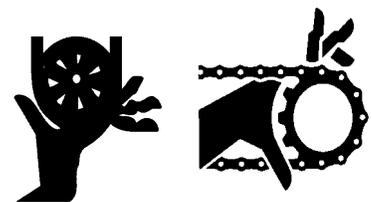
- Carefully review operator's manual.
- Keep dryer clean inside and out, as fines may cause a fire.
- Check for gas leaks. Spray soapy solution on piping and joints.
- Run fan at least half a minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection door open.

Failure to heed these warnings may cause serious injury or death.



WARNING: KEEP CLEAR OF ALL MOVING PARTS.

Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation. Keep away from all moving parts. Entanglement can cause serious injury or death. Keep fan screen guards and all shields in place and in good working condition. Replacement screen guards and shields are available from Sukup Manufacturing Co. at no charge.



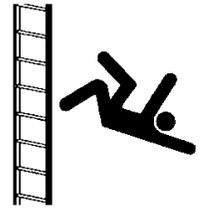
Failure to follow precautions above may result in serious injury or death.



WARNING: USE SAFE CLIMBING PROCEDURES

Inspect ladder carefully before use. Never climb deteriorated, damaged or improperly assembled ladder components. Maintain secure hand and foothold when climbing. Metal is slippery when wet. Never carry items while climbing. Use safety harness and safety line as required by safety regulations.

Failure to heed these warnings may cause serious injury or death.



USE PROPER LOCKOUT PROCEDURES. Facility management needs to proactively train employees to ensure use of proper lockout procedures while working on dryer. Management also needs to inspect this unit for any covers or guards not in proper place. It is everyone's responsibility to report any missing grates, guards, equipment failures or failures to lock out. Make certain that no cover is removed unless power is locked out.

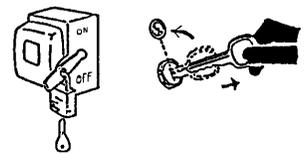


CAUTION: To avoid electrocution, all equipment must be properly wired and grounded according to electrical codes. Have unit wired by qualified electrician.

IMPORTANT: Supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with current editions of BS EN 60204-1.



Mains Isolater must be located outside of bin. It must be easily accessible from ground level and must be lockable in off position. Mark clearly as to equipment it operates. See Mains Isolater decal placement information later in this section.



Always LOCK OUT main power switch (Mains Isolater) whenever equipment is not in use or when servicing unit. Check with voltage meter before servicing unit.

SAFETY QUESTIONS OR CONCERNS

Please contact Sukup Manufacturing Co. with any specific safety questions about dryer or its use!

Good housekeeping practices and correct safety procedures will help protect lives, jobs, property and profits.

EMERGENCIES - KNOW WHAT TO DO

Have emergency numbers and written directions to your location near your telephone in case of emergency. An area to record emergency information is provided below.

Emergency Information	
Ambulance:	_____
Fire:	_____
Address of work site:	_____
Directions to work site:	_____

Risk reduction for servicing dryer

IMPORTANT: Conditions inside dryer plenum may vary greatly from the ambient conditions.

Please follow the safety guidelines before entering the plenum:

- Appoint a responsible individual to oversee the task and remain outside the dryer while servicing.
- Ensure the dryer is isolated and all fuel and power is disabled to the unit.
- Operator is in good physical condition and at low risk of medical problems such as asthma and cardiac problems.
- Unit is empty of grain; avoid entry when unit is full.
- Do not close doors while inside the unit, to ensure proper airflow and vent toxic gasses.
- Have immediate and close access to a lifting device, which can reach the dryer platforms in the event of emergency.
- Have adequate tools on hand for quick removal of ladder in the event of an emergency.
- Carry a communication device to use in the event of an emergency and ensure proper signal is available (mobile phone with adequate signal).
- Wear personal protection equipment such as safety glasses, gloves, dust mask, steel-toe boots, ear protectors, safety harness, and hardhat as required.
- Consider additional risks when performing maintenance that includes cutting or welding (fire, fumes and dust). Ensure quick access to an ABC (dry chemical) fire extinguisher.
- Assess the climatic conditions: If the weather is undesirable (icy platforms, extreme heat) reduce risk by servicing when the climate improves.



Follow additional safety guidelines when servicing top conveyor and wet bin drive on outside of dryer:

- Use a lifting device with a safety cage to safely reach upper areas of dryer.
- Wear relevant personal protective equipment such as hardhat, safety harness and safety glasses when accessing and servicing these areas.

In the event of minor injury (minor cuts and scrapes):

- Ensure first aid kit is available on site and workers are trained in treatment of minor injury.
- Avoid first aid on the platforms due to low available workspace and height.
- Contact emergency services if the injury prevents descending from the dryer platforms.

In the event of serious injury (loss of consciousness or serious cut):

- Contact emergency services immediately.
- In the event of rescue from inside the plenum the ladder may hinder rescue. **The ladder may be removed by cutting or unbolting the bracing brackets from the unit.**

Safety Section

To prevent serious injury or death to people involved in operation of this equipment, it is essential that these safety decals be mounted on dryer. Check that all are in place according to decal placement drawing and are legible when dryer is installed.

IMPORTANT: If suggested locations are not clearly visible, place safety decals in a more suitable area. Never cover up existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com. Please specify number when ordering.

1. **Decal L0281 – WARNING:** To avoid serious injury or death, follow general safety regulations.



2. **Decal L02741 – DANGER:** Keep away from any electrical lines, especially when moving unit.



3. **Decal L0234 – WARNING:** Do not allow rear door to close with someone inside; lock out power; do not bypass interlock switch.



4. **Decal L0166 – WARNING:** Keep guards and screens in place. Disconnect electricity. Check fan blade.



5. **Decal L0271 – DANGER:** Shield missing, do not operate!



6. **Decal L0284 – WARNING:** Keep away from all moving parts.



7. **Decal L0285 – CAUTION:** Not intended for use on public roads. If road travel is required:



8. **Decal L02831 – WARNING:** Lower and secure parking stands before unhitching unit.



Safety Section

9. **Decal L03061 – DANGER:** Keep away when auger is running! Entanglement will cause serious injury or death!



auger is running!
Entanglement will cause serious injury or death!

10. **Decal L0520 – CAUTION:** Failure to keep unit clean may cause fire and serious injury or death.



Failure to keep unit clean may cause fire and serious injury or death.

11. **Decal L0164 – WARNING:** Ladder safety – falling from heights hazard. Overall precautions for ladder safety.



12. **Decal L0512 – WARNING:** Use safety chain when towing unit to eliminate detachment hazard.



13. **Decal L0062 – DANGER:** Never run fan without screen guard; Stay clear from front of fan; Follow correct procedure when installing fan blade.



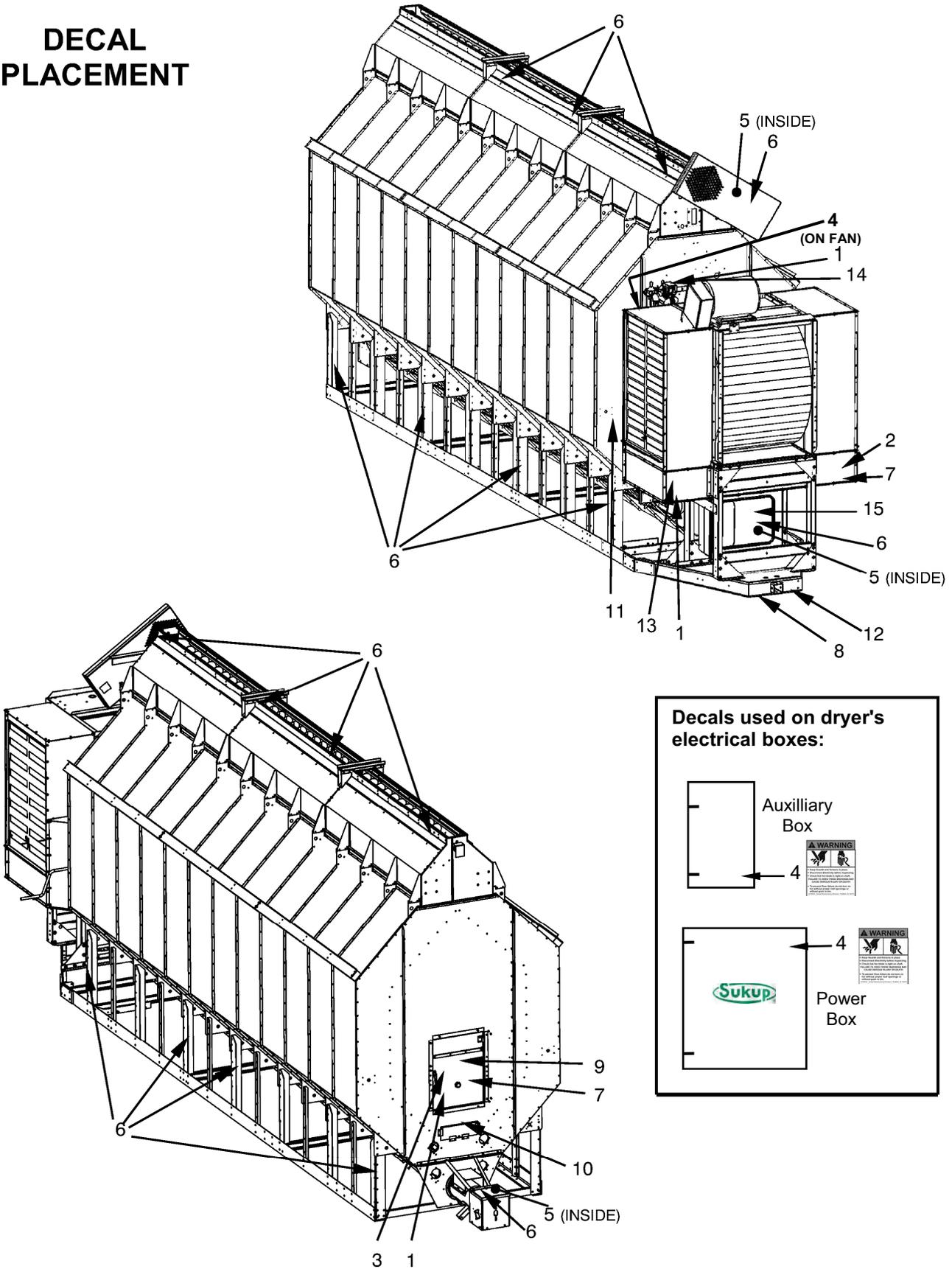
14. **Decal L0165 – WARNING:** Disconnect Electricity; Bleed gas; etc.



15. **Decal L0204 – DANGER:** Do not operate with service door removed.



DECAL PLACEMENT



EU SAFETY LABELS

To prevent serious injury or death to you or your family, it is essential that these safety decals be mounted on your dryer.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at PO Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com. Please specify computer number.



L5100 Sukup Manufacturing Co Sheffield, IA USA

Label #L5100 – Place inside power box of dryer and on dryer where electrical precautions are needed.



L5101

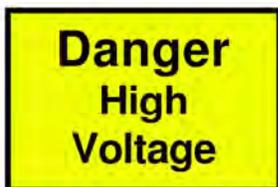


Sukup Manufacturing Company Sheffield, IA USA

Label #L5101 – Place near power disconnect of dryer.



L5102

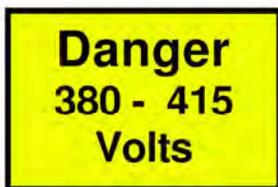


Sukup Manufacturing Company Sheffield, IA USA

Label #L5102 – Place near main power source of dryer.



L5103



Sukup Manufacturing Company Sheffield, IA USA

Label #L5103 – Place near main power source of dryer.



L5104

Sukup Manufacturing Co Sheffield, IA USA

Label #L5104 - Place at dryer rear access door (entrance to plenum).



L5105

Sukup Manufacturing Co Sheffield, IA USA

Label #L5105 – Place at dryer rear access door (entrance to plenum).



L5106



Sukup Manufacturing Company Sheffield, IA USA

Label #L5106 – Place near shut off to power source.



Label #L5107 – Place near main power shut off.



Label #L5109 – Place near main power panel.

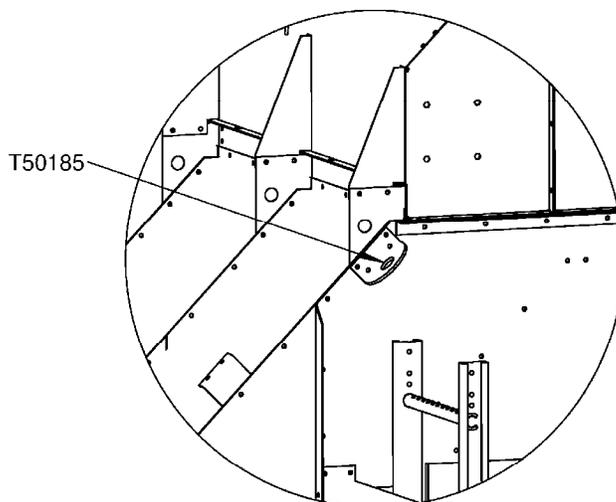
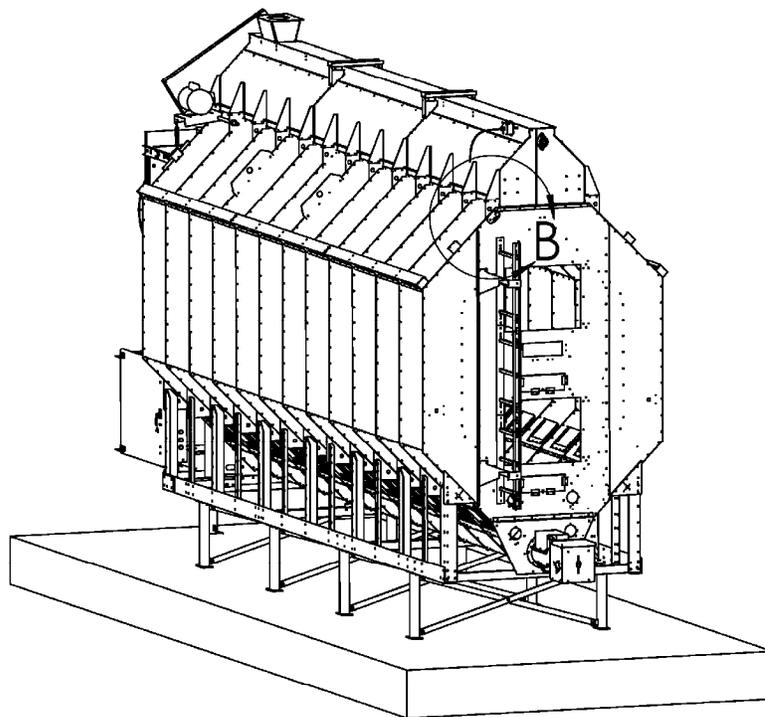


Label #L5108 - Placed on axial fans.



Label #L5111 - Place at dryer rear access door (entrance to plenum).
NOTE: See harness anchor point bracket placement drawing on next page.

HARNESS ANCHOR POINT BRACKET PLACEMENT



INSTALLATION SHOWN
ON SINGLE MODULE
DRYER.

DETAIL B
SCALE 1 : 15

SWCD0077
12/16/2011MCM

Training Register – Continuous Flow Grain Dryer

Training on operation of a Sukup Grain Dryer and related equipment is paramount to ensuring safe and successful use of the dryer.

This training register is to be used in conjunction with the general operation and maintenance instructions to emphasize the importance of safety. Use additional spaces for elements unique to your dryer.

NOTE: It is the owner’s responsibility to give adequate training to employees and to assess their ability to safely use the equipment.

Element	Date	Comments
Check unit prior to start-up		
Power shut off Fuel system shut off		
Action in event of emergency/fire		Use of ABC (dry chemical) fire extinguisher
PPE (Personal Protective Equipment)		
Cleaning/maintenance and safe access to plenum		
Entry into confined spaces Authorized personnel only Safe practice and access		
Maintenance of the dryer - Safe isolation - Problem solving - Authorized personnel only to work on gas train/electrical - Top conveyor and wet bin drive		- Use lifting device with safety cage to access top sections outside of dryer.
Best practices for grain drying		Sunflower seeds require a low temperature setting

Emergency Shutdown Locations



Image 1 – Power distribution box

Power distribution box is located at front of dryer. It contains all main power distribution components. Door lock handle secures door and can be locked with a key. Main safety disconnect prevents opening of power box while power is present in system. Image 1 shows "On" position.



WARNING – High voltage is still present on bottom terminals of main switch in power distribution box (see Item 14 in Image 6) even if main safety disconnect is in "Off" position. To remove this voltage from power box, shut off main breaker ahead of dryer.



Image 2 – Main safety disconnect

Image 2 shows main safety disconnect in "Off" position. Power is not present in system except as noted in warning above.



Image 3 – Emergency stop

Emergency Stop switch is located on side of power distribution box. During operation, switch is pulled out and red knob is illuminated. See Image 3. Pressing Emergency Stop Switch or switching main disconnect switch to "Off" position will shut down power to PLC and backup control system. Main power is still present inside box as noted in warning above.

Centrifugal Dryer Component Identification, Front and Back Views

Images 4 and 5 identify components on front (upper left) and back (lower right) of Centrifugal Dryer.



Image 4 – Front of Centrifugal Dryer

1. Power box
2. Manual control box
3. Service door
4. Auxiliary box
5. Heater box
6. Fan motor
7. Louvers
8. Emergency stop/Control switch



Image 5 – Back of Centrifugal Dryer

9. Wet bin
10. Plenum access door w/viewing port
11. Rear door switch (inset shows EU switch- see Image 14 on page 1-20)
12. Column over-temp capillary
13. Rear junction box
14. Meter roll proximity switch
15. Discharge chute switch
16. Unload proximity switch
17. Discharge chute
18. Access ladder

Power Box Component Location

Image 6 identifies major components of the power box.

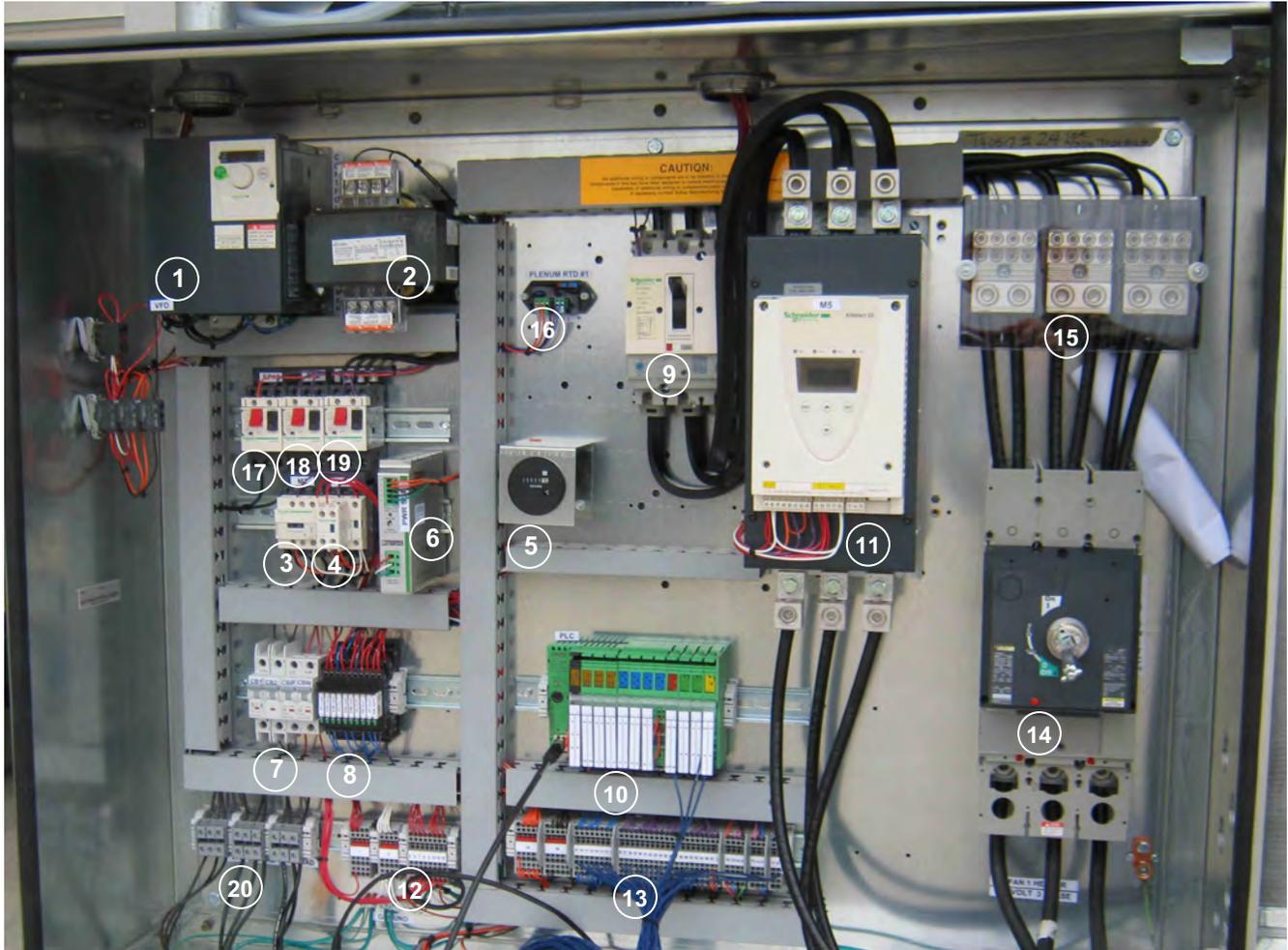


Image 6 – Power box components

- | | |
|--------------------------------------|---|
| 1. Variable frequency drive | 11. Soft start w/ built-in bypass contactor |
| 2. Control transformer | 12. AC feed-through terminals |
| 3. Load contactor | 13. DC feed-through terminals |
| 4. Unload contactor | 14. Main switch |
| 5. Hour meter | 15. Power distribution block |
| 6. 24V power supply | 16. RTD transmitter |
| 7. Control/Heater circuit breakers | 17. Meter roll starter protector |
| 8. 24V DC relays | 18. Load starter protector |
| 9. Fan starter protector | 19. Unload starter protector |
| 10. Programmable logic control (PLC) | 20. Load, unload and meter roll connections |

***IMPORTANT:** During initial setup or after relocation of dryer, it is highly recommended that ALL main power wiring connections be inspected for security and tight connections. Wires are tightened at factory; but connections should be checked after transport.

NOTICE

All power boxes use 24VDC control voltage to minimize EM noise inside of box. AC/DC separation is key to reducing EMI inside of panel. When installing, make sure to practice good wire maintenance to ensure quality operation.

Pipe Train Component Identification

Image 7 identifies components of liquid pipe train (1-6) and vapor pipe train (8-13). (Components will vary for natural gas pipe trains.)



Image 7 – Pipe train components

- | | |
|--|---|
| 1. LP inlet | 10. Main (upstream) gas valve and actuator |
| 2. Shut-off valve | 11. Blocking (downstream) gas valve and actuator |
| 3. Wye strainer | 12. High-pressure gas switch fitting |
| 4. High-pressure pop-off valve | 13. Electronic actuator (under cover) and butterfly valve |
| 5. Liquid solenoid valve | 14. Pressure gauge |
| 6. Liquid vaporizer hose | 15. Pressure gauge |
| 7. LP vaporizer inlet (lower) and outlet (upper) | 16. Valve-proving switch fitting location |
| 8. Vapor hose | |
| 9. Vapor over-temp switch location | |

Heater Component Identification

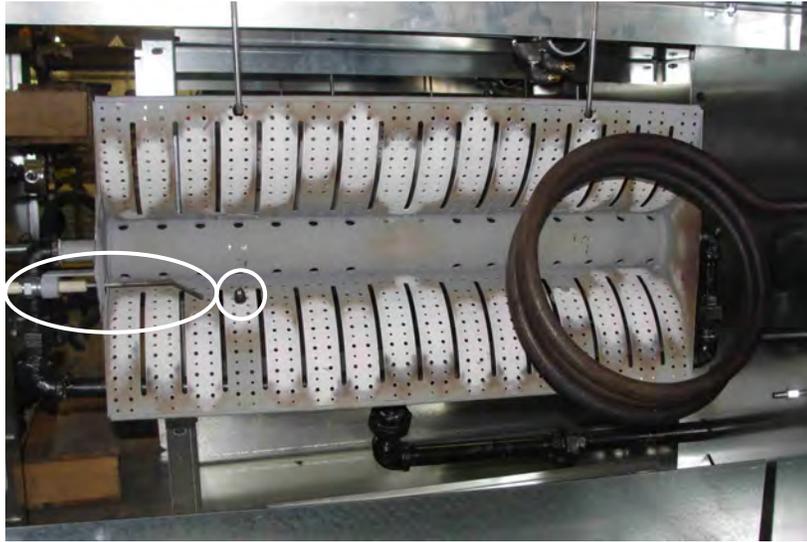


Image 8 – Front view of burner

Image 8 shows front view of burner, with spark plug/igniter in circle and flame rod in oval.



Image 9 – Rear view of burner

Image 9 shows rear view of burners, with spark plug/igniter in circle.



Image 10 – Orifice location

Each burner has an orifice to restrict flow and build pressure. To access orifice, open union circled in Image 10.

Heater Component Identification

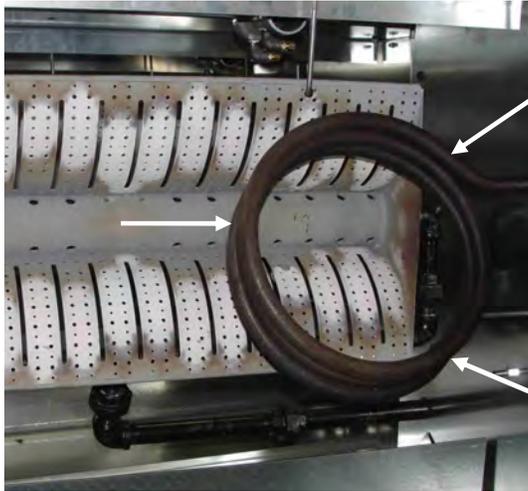


Image 11 – Vaporizer

Image 11 shows vaporizer for LP centrifugal heater.



Image 12 – Plenum RTD and over-temp capillary

Image 12 shows plenum RTD (Resistance Temperature Detector) aluminum tube and plenum over-temp capillary (copper).

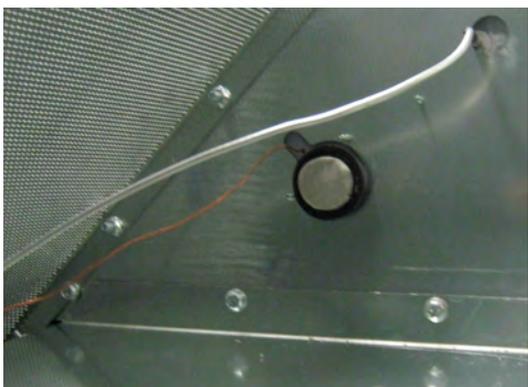


Image 13 – Plenum RTD tube and static air pressure switch

Image 13 shows plenum RTD tube and static air pressure switch.

Switches



Image 14 shows rear door switch

Image 14 – Rear door switch



Image 15 shows unload auger proximity switch (at right in box) and rotating target.

Image 15 – Unload proximity switch



Image 16 shows unload auger proximity switch and rotating target mounted on jump auger

Image 16 – Unload proximity switch mounted on jump auger

Lower Plenum Vacuum Fan Inlet Door, Opening Handle



Image 17 – Vacuum door closed

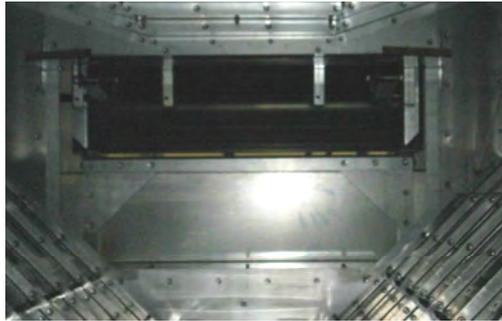


Image 18 – Vacuum door open

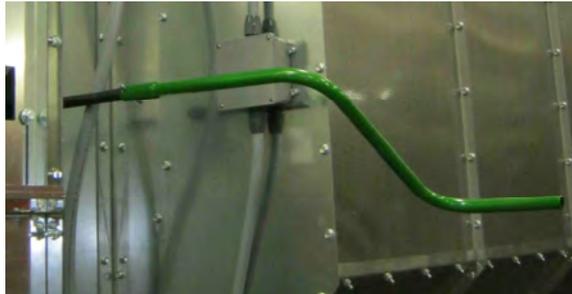


Image 19 – Vacuum door opener

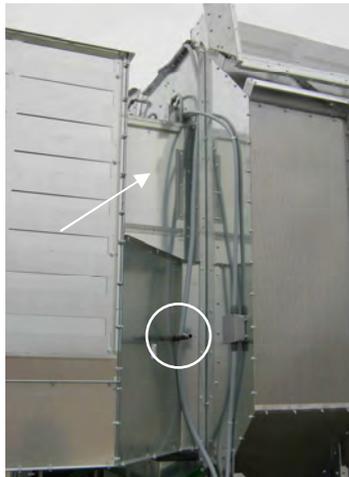


Image 20 – Vacuum door opener, service door locations

Image 17 shows lower plenum vacuum-cool fan inlet door in closed position. Image 18 shows it in open position. Door must be open when vacuum-cool mode is used, and closed in full-heat mode.

Image 19 shows lower plenum vacuum-cool inlet door opening/closing handle. Image 20 shows location on outside of dryer (circled) where removable handle is attached.

Image 20 shows location on outside of dryer (circled) where removable handle is attached. Image 20 also shows removable heater service door. See arrow.

Main Switch, Emergency Stop Button



Image 21 – Latch and switch in “Off” position

Image 21 shows power box latch (upper right) in open position and main switch (lower left) in “Off” position.



Image 22 – Latch and switch in “On” position

Image 22 shows power box latch (upper right) in closed position and main switch (lower left) in “On” position.



Image 23 – Emergency stop button and system control switch

Image 23 shows emergency stop button and system control switch.

Moisture Sensor, Paddle Switch Box



Image 24 – Moisture sensor

Image 24 shows moisture sensor mounted on bottom of discharge chute. It may also be mounted on optional jump auger assembly during dryer operation. Dryers with QuadraTouch™ control system have yellow indicator – circled on cable.



Image 25 – Paddle switch box in shipping position

Image 25 shows paddle switch box in shipping position.



Image 26 – Paddle switch box in operating position

Image 26 shows paddle switch box installed. It is placed on opposite end of dryer from fill hopper.

Cleanouts



Image 27 – Cleanout/inspection door

Image 27 shows lower plenum cleanout/inspection door.

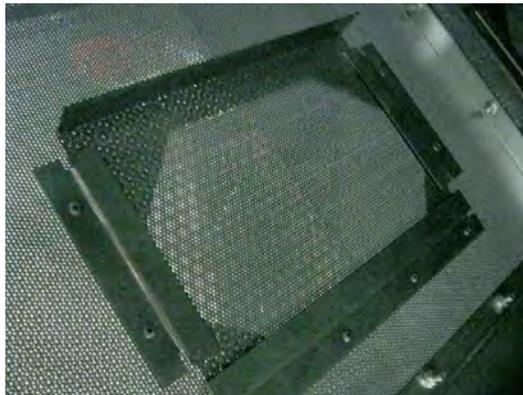


Image 28 – Inner plenum cleanout slide gate

Image 28 shows inner plenum cleanout slide gate.



Image 29 – Unload auger cleanout door cam lock

Image 29 shows handle for unload auger cleanout door cam lock.



Image 30 – Plenum cleanout/blowout door

Image 30 shows partially open rear door for plenum cleanout/blowout.

Cleanout, Plenum Divider Door

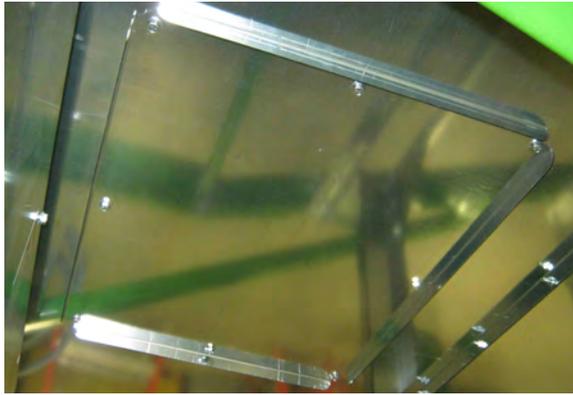


Image 31 – Cleanout door under vacuum-cool duct

Image 31 shows cleanout door under vacuum-cool duct.

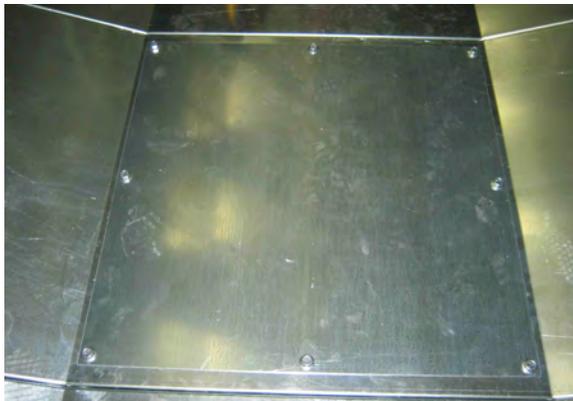


Image 32 – Plenum divider door

Image 32 shows plenum divider door in place (for heat-cool mode) and Image 33 shows door removed (for full-heat mode).

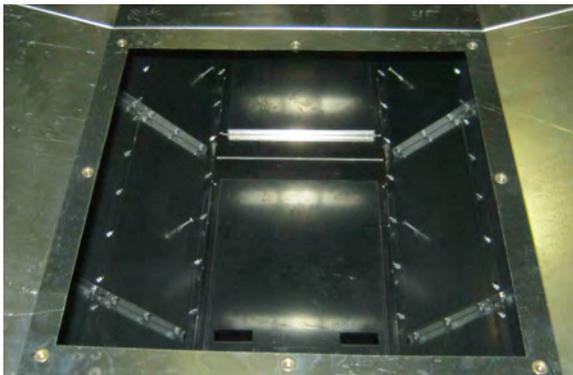


Image 33 – Plenum divider door removed

Take-Away Auger, Meter Roll Motor



Image 34 – Take-away auger

Image 34 shows take-away auger with hanger bearing (circled).



Image 35 – Meter roll motor

Image 35 shows meter roll motor with gear reducer.



Image 36 – Meter roll proximity switch

Image 36 shows meter roll proximity switch.

Control Boxes, Inlet Louvers, Fan Motor

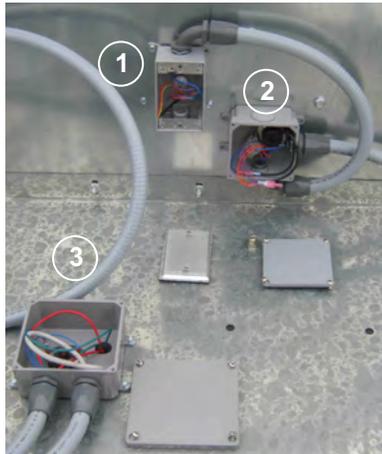


Image 37 – Control boxes on top of heater housing

Image 37 shows:

1. RTD box.
2. Air switch, plenum high limit capillary switch, both inside box 2.
3. Heater housing high-limit switch (manual reset).



Image 38 – Air inlet louvers

Image 38 shows centrifugal fan air inlet louvers in open (full-heat) position.



Image 39 – Fan motor and drive shield

Image 39 shows centrifugal fan motor and drive shield.

Service Doors, Shields



Image 40 – Unload auger/meter roll drive service door

Image 40 shows unload auger/meter roll drive service door. It is located at lower front of dryer, shielding belts for unload auger and chains for meter rolls.



Image 41 – Unload auger service door

Image 41 shows unload auger rear service door. It is located at rear of dryer and also serves as a step (note traction tape) for accessing plenum doors and view ports. Hinged door opens upward.



Image 42 – Load auger shield

Image 42 shows load auger shield. It is installed in field after motor is installed.

Touch Screen Controller Location

QuadraTouch™ Controller



Image 43 – QuadraTouch control screen



Image 44 – Main power switch on



Image 45 – QuadraTouch™ controller

Control box (see Image 43) should be mounted away from dryer and connected by industrial, direct-bury Ethernet cable. Cable is available in 50', 100', 150', and 200' lengths (J8720, J8721, J8722, J8723). Panel needs its own, independent 100VAC – 240VAC power supply.

Main power switch is on bottom right-hand portion of box. See Images 43, 44. When turned "ON," switch will illuminate to a green color. See Image 44. Panel will boot up shortly and connect with PLC inside power box.

To connect, main power must also be supplied to dryer and system control switch should be in "COMPUTER" position. Back of panel becomes accessible by removing screws on bottom left and right-hand corners of swing panel. See Images 43 and 44.

After removing screws, panel may be lifted up to find Compact Flash Type II card located on rear of panel. Door lifts up and swings back. See Image 45. All data logged during dryer operation is stored on this 1 GB compact flash card.

Each QuadraTouch™ controller includes this card. See software manual about accessing CF card's memory.

Installation Guide

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Pre-Installation Requirements

Location

Numerous factors need to be taken into consideration when determining where to install the dryer. Very important factors to consider when selecting your site are:

1. Wet grain supply
2. Dry grain discharge
3. Location of storage bins
4. Other grain handling equipment
5. Minimum of 3 feet (914.4 mm) clearance from other structures on side of dryer and 5 feet (1524 mm) minimum clearance from other structures at fan inlet.
6. Minimal handling distances of load and unload systems
7. Dryer and storage bins should be located in a well-drained area
8. Electrical requirements

 **Warning** Do not install dryer inside a building or any other area where fuel installation regulations and/or electrical codes and/or insurance requirements do not allow.



 **Warning** Do not operate dryer in an area where combustible material can be drawn into fan, or where load and unload augers can come in contact with power lines.



Foundation

A reinforced concrete pad is recommended for dryer stability. The following table is a basic guideline for materials required for each size dryer pad.

Dryer Size In Feet	Concrete Pad Size Centimeters (Feet)	Meters (Yards) of Concrete
16'	366 cm x 853 cm (12' x 28')	6.8 (8.9)
20'	366 cm x 975 cm (12' x 32')	7.8 (10.1)
24'	366 cm x 1097 cm (12' x 36')	8.6 (11.3)

Table 2-1 – Concrete pad dimensions

Quantities are approximate and requirements may vary due to site elevations. See proper support leg locations for 16, 20, and 24-foot dryers beginning on page 5 in this section.

Installation

Foundation

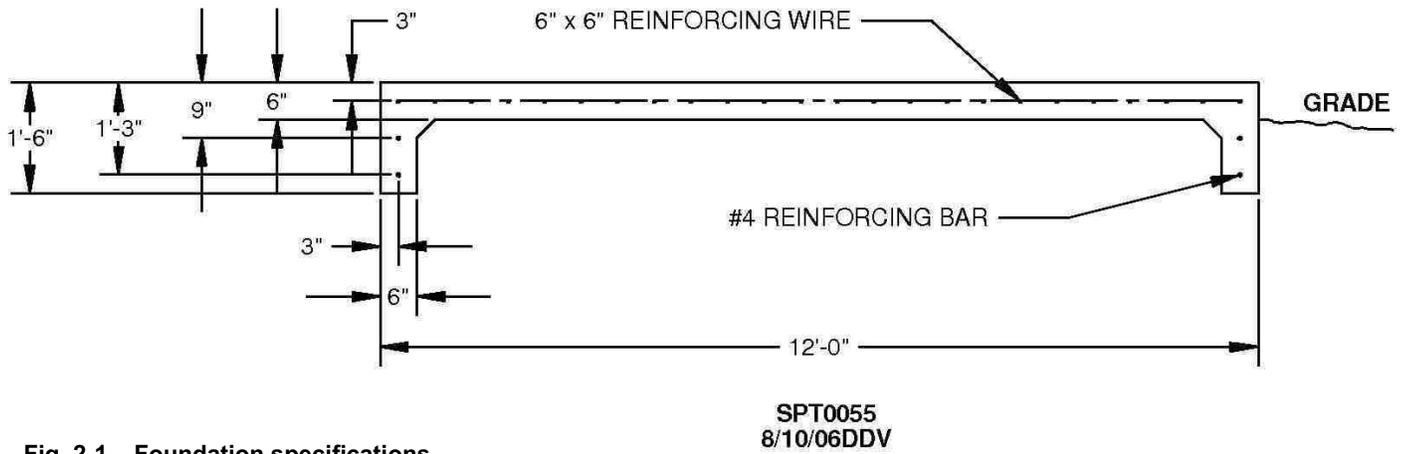


Fig. 2-1 – Foundation specifications

**Plan View
Single Module Dryer**

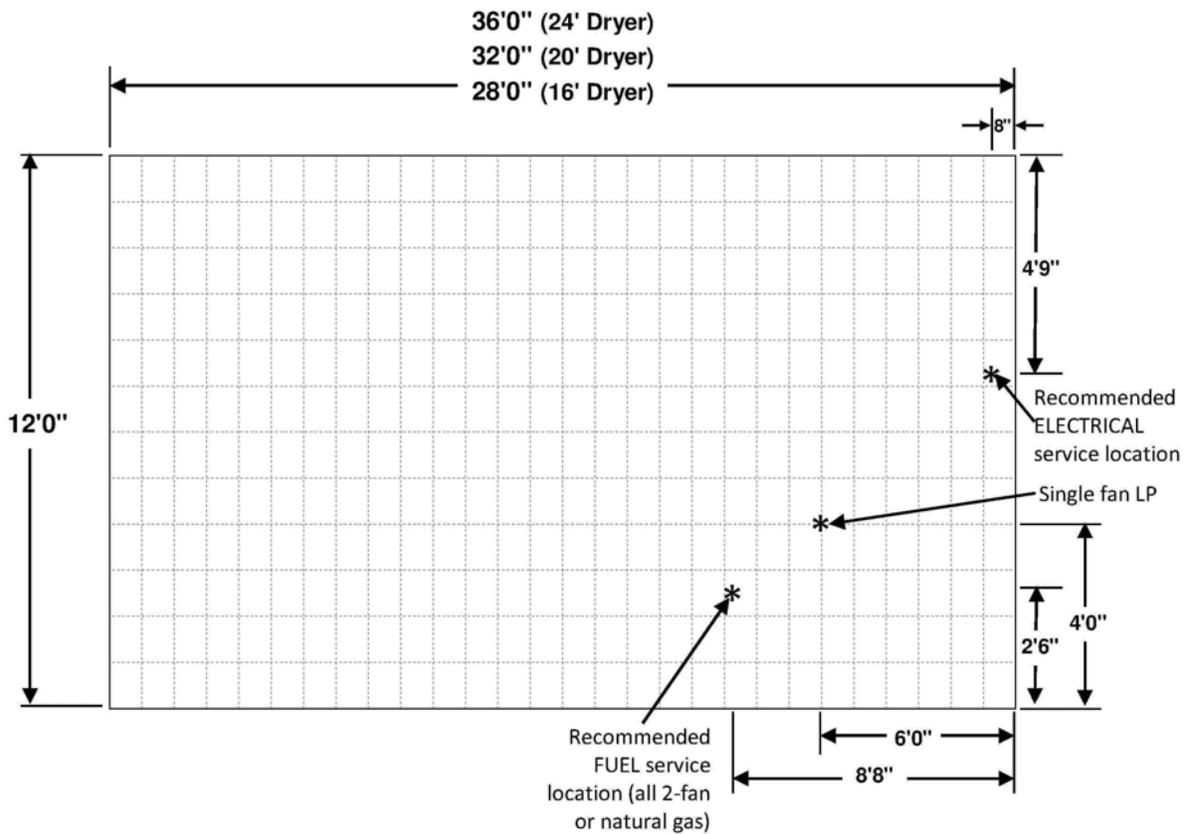
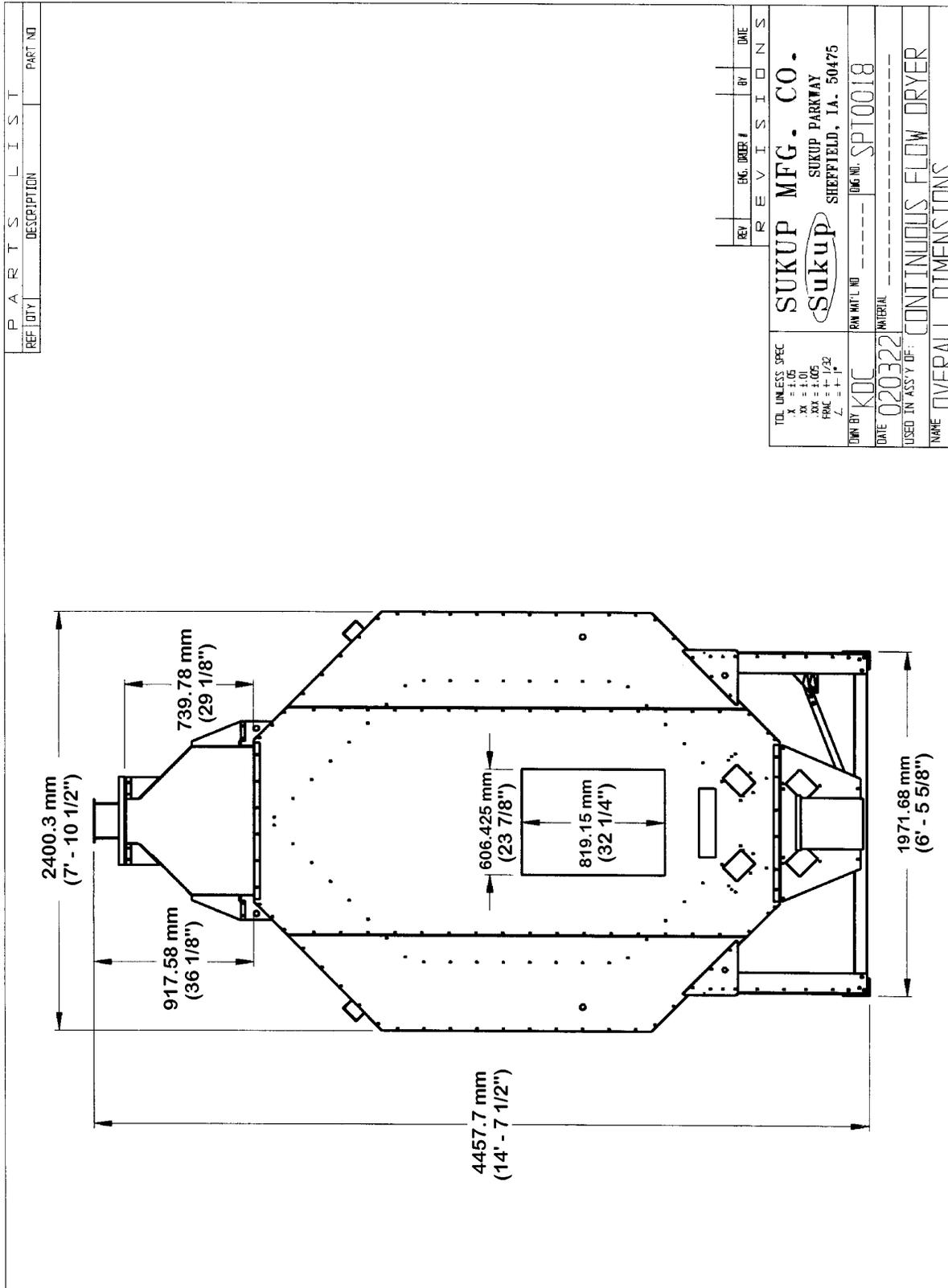
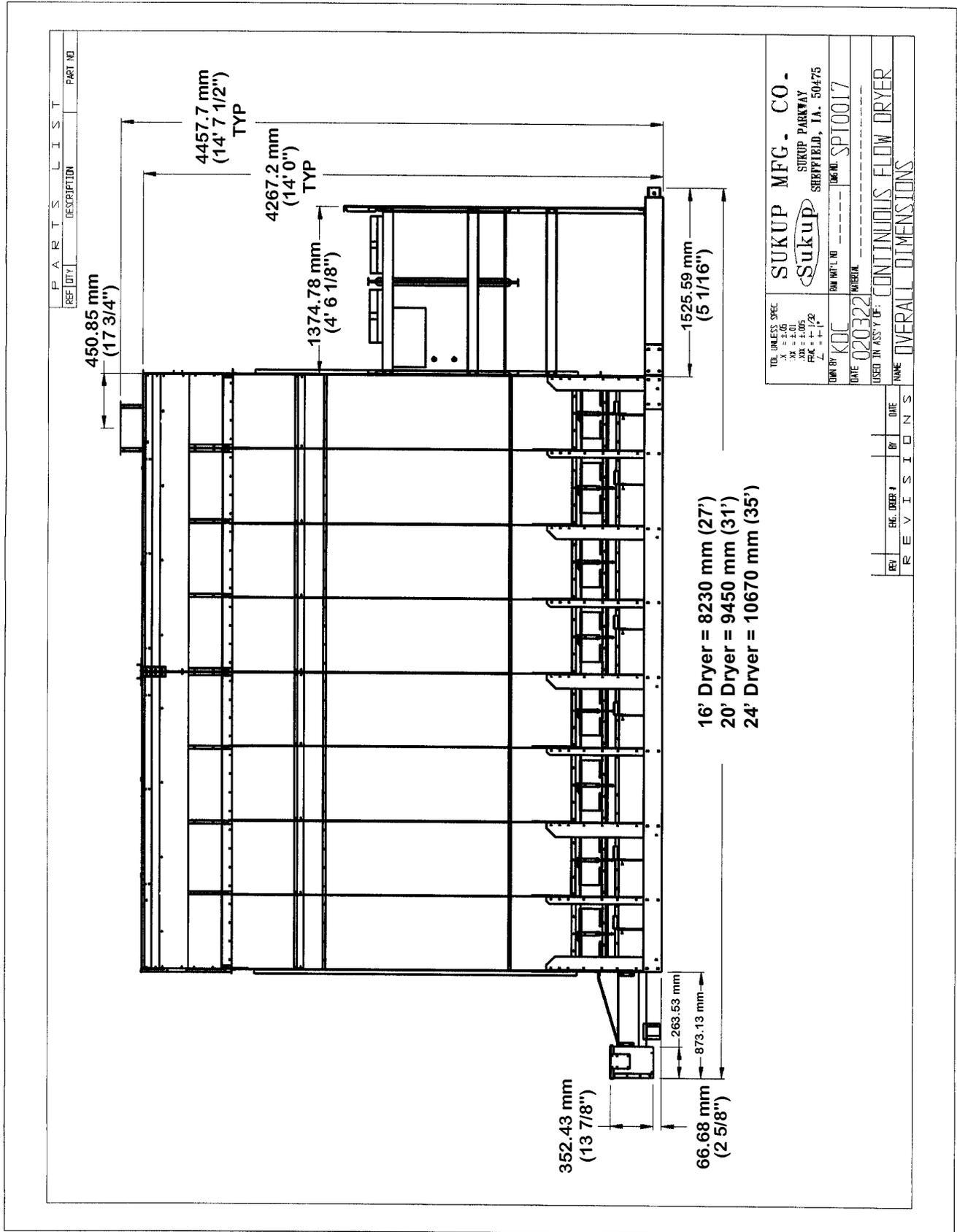


Fig. 2-2 – Recommended fuel and electrical service locations on dryer

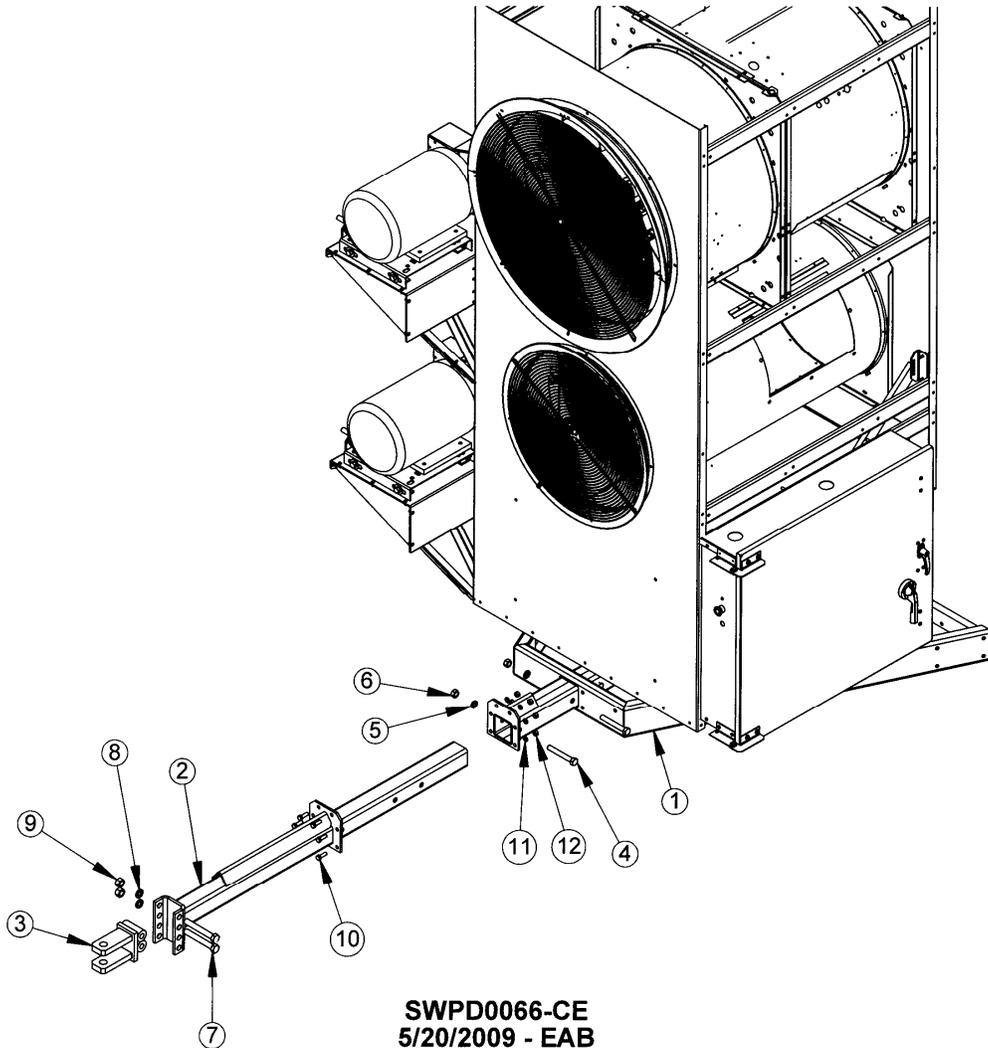
Dimensional Drawings





Dryer Hitch with 24" Extension

Dryers have an extension to compensate for the belt drive distance for easier transport. See below for part descriptions of this extension.



SWPD0066-CE
5/20/2009 - EAB

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T16310D	HITCH RECEIVER WELDMT, JACK
2	1	T43711	HITCH INSERT WELD, 24" EXT
3	1	T4372	CLEVIS WELD
4	3	J0822	SCREW, 3/4"-10 X 5" LG.
5	3	J1220	3/4" LOCKWASHER
6	3	J1051	3/4"-10 HEX NUT
7	2	J08361	BOLT, 7/8-9 X 6 1/2" LG
8	2	J1222	7/8" LOCKWASHER
9	2	J1059	7/8-9 HEX NUT
10	6	J0730	SCREW, 1/2"-13, 1.50,PLT,GR5,HHCS
11	6	J1215	1/2" LOCKWASHER,PLT,SPLIT
12	6	J1040	NUT, 1/2 - 13,PLT,GD5,HEX

Dryer Set-up/Supports

⚠ WARNING Wheel transport kit is for transport only and is NOT to be used when operating dryer. Dryer MUST be mounted and supported in an approved manner.

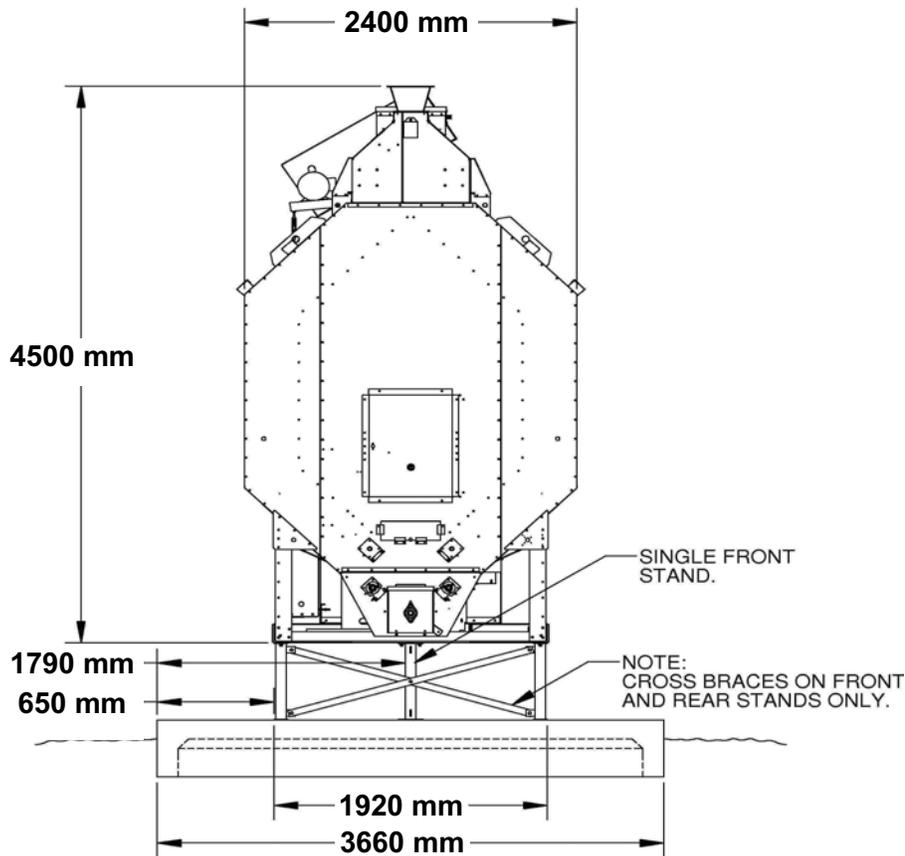


Fig. 2-3 - Cross support braces and rear stand

Dryer must be mounted a minimum of 16 inches (406.4 mm) above surface to allow for clean-out.

- Supports under grain columns must be at least every 6 feet (1828.8 mm).
- Support under front hitch
- Fasten dryer down to foundation using brackets or turnbuckles.

Optional dryer supports are available from Sukup Manufacturing Co. in 2-foot, 3-foot, and 4-foot lengths. Support kits come with necessary hardware to attach supports to dryer frame. Customer must supply hardware to attach to concrete pad. (Required minimum sizes are 1/2" or 5/8" hardware).

Ladder extensions are included with the 0.91M & 1.22M leg extension kit. The same length of ladder extension is supplied with the 1.22M kit as the 0.91M kit. For the 0.91M kit, cut off excess ladder length for your application.

Contact your Sukup dealer to order supports and/or extra ladder extensions.

The following drawings show proper support leg and lift bracket locations for 16, 20 and 24-foot dryers. Lift ONLY with Sukup lift bracket or equivalent.

Support Leg Locations

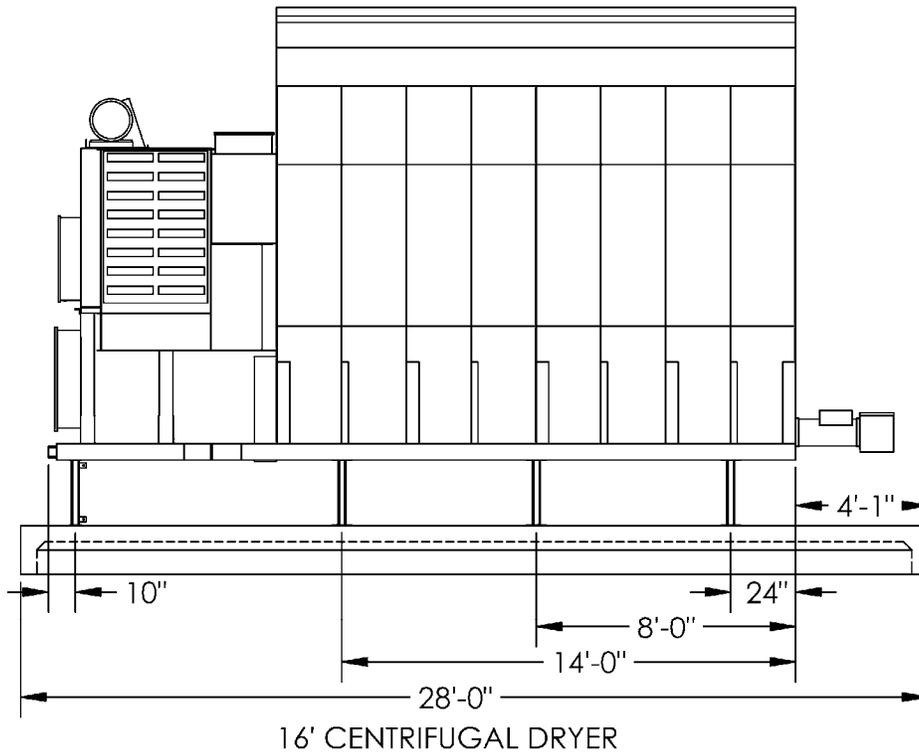


Fig. 2-4 – Support leg locations (16' dryer)

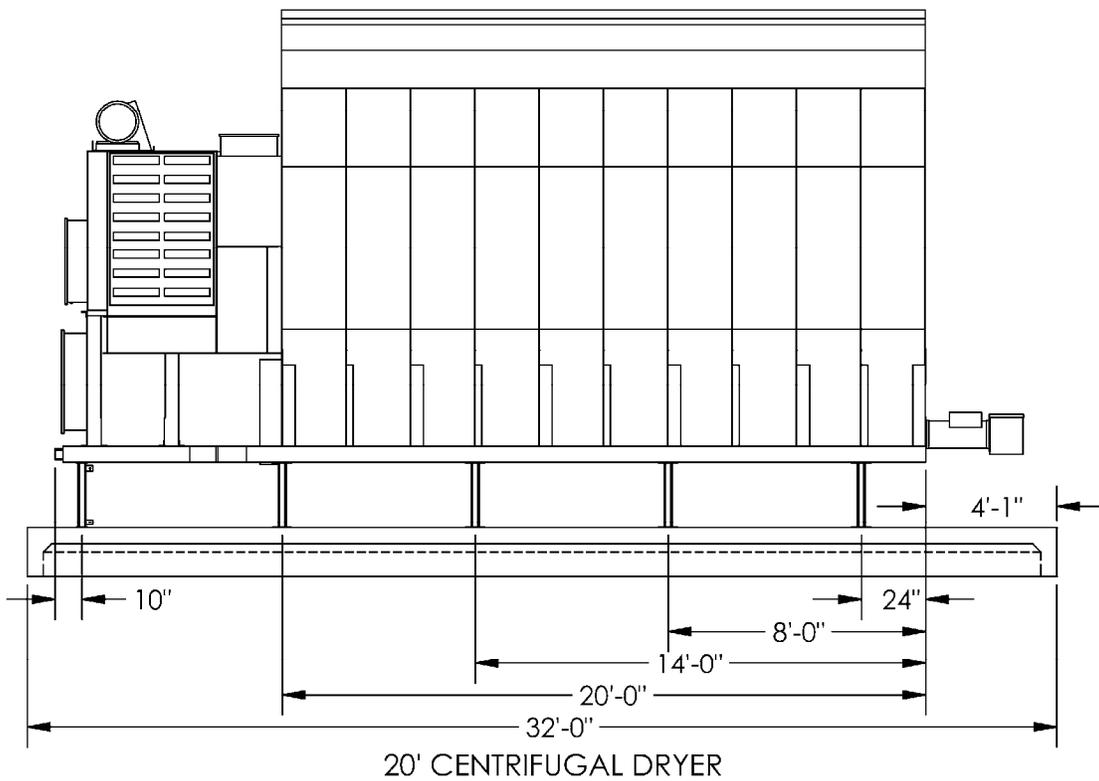


Fig. 2-5 - Support leg locations (20' dryer)

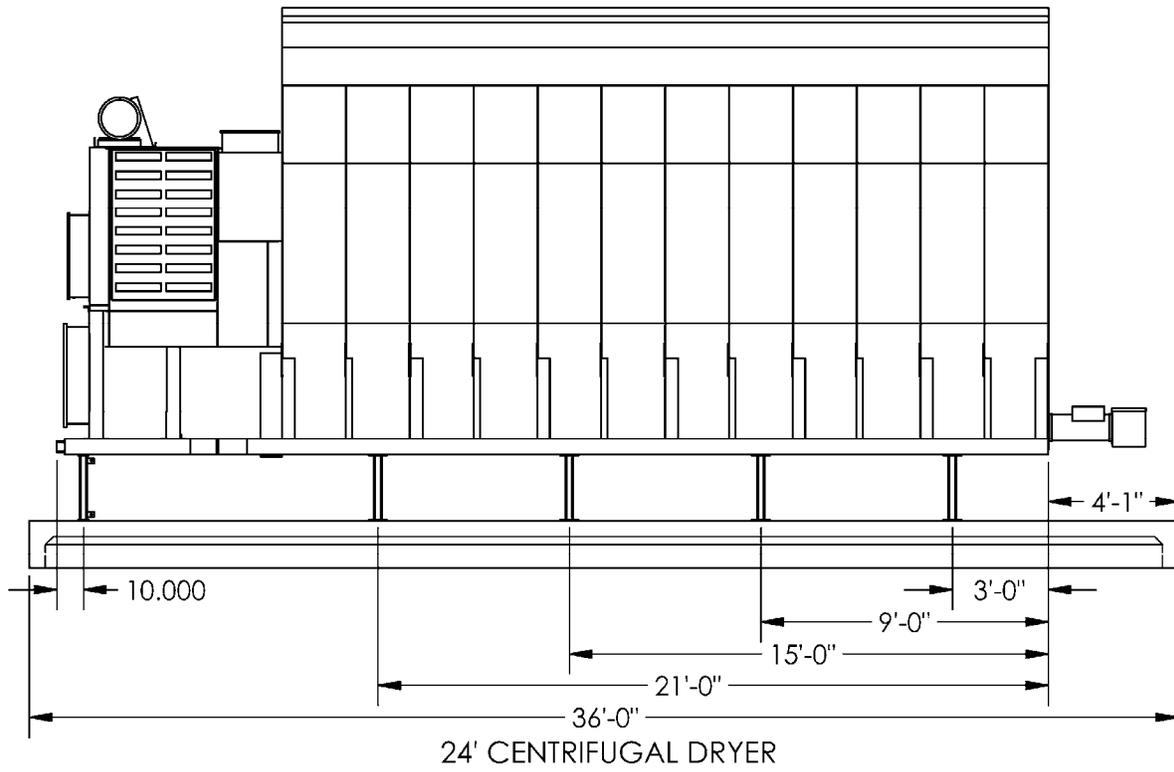


Fig. 2-6 – Support leg locations (24' dryer)

Lift Bracket Locations

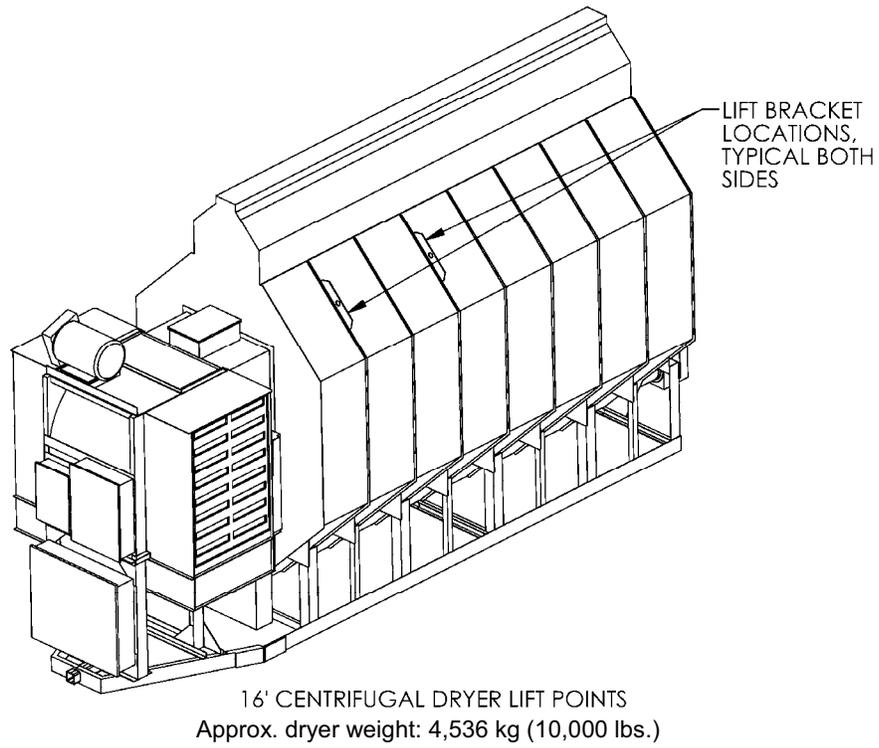


Fig. 2-7 – Lift bracket locations (16' dryer)

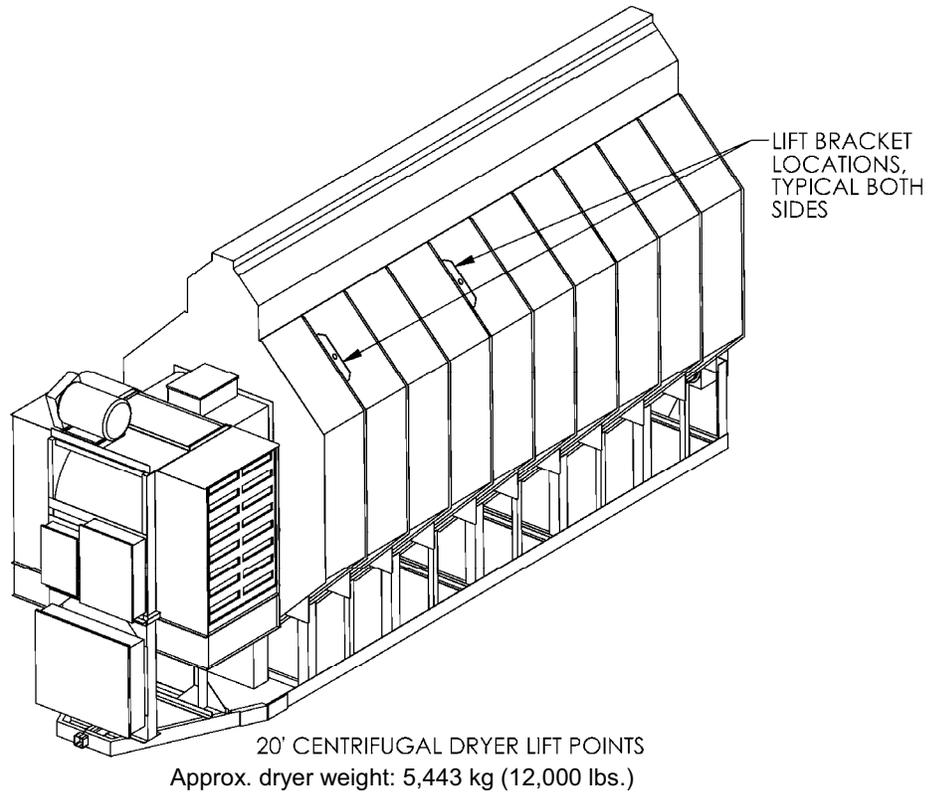


Fig. 2-8 – Lift bracket locations (20' dryer)

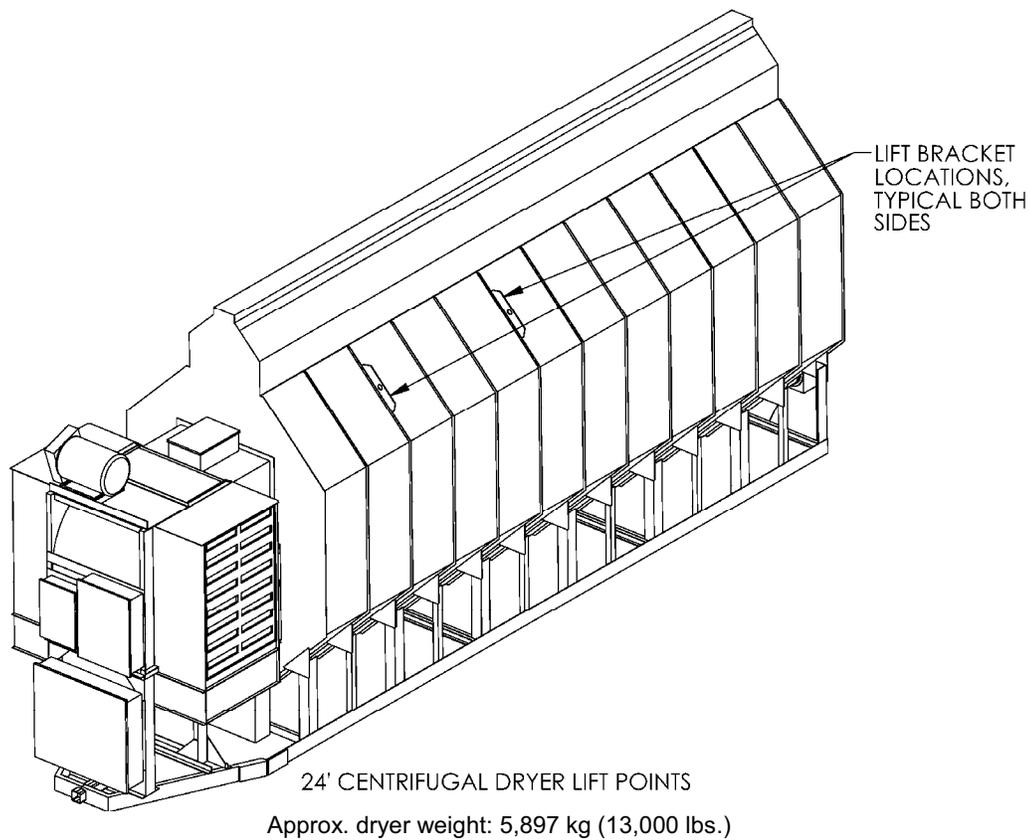


Fig. 2-9 – Lift bracket locations (24' dryer)

Electrical Load Requirements, Three-Phase Centrifugal Dryers (50Hz)

Note: A Service-Rated, Fused Disconnect needs to be installed ahead of the Dryer power distribution box. This disconnect is not included with the dryer and should be installed by a qualified electrician in accordance with local and national standards.

CAUTION: The only device connected to this disconnect should be your Grain Dryer.

The following charts provide information for the electrician wiring the Grain Dryer. It is recommended that you contact your local Power Company and have a representative inspect the installation to see that your wiring is compatible with their system and that sufficient power is supplied to your dryer.

Standard electrical safety practices and codes should be used. **IMPORTANT: Any supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with local and national standards.**

All electrical work should be completed by a qualified electrician.

Dryer Electrical Specifications:

SINGLE MODULE DRYERS

TC1631DW (LP) or TC1632DW (NG) – 16 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, 380Volt, 3 Phase, 50 Hz, Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan	Minimum Amps	Maximum Amps
Motor/Wire Amps	3Kw/ #14 5 FLA	3Kw/ #14 5 FLA	22Kw/ #6 41 Amps	51 Amps	250 Amps

** See Auxiliary Kits section for options

TC2431DW (LP) or TC2432DW (NG) – 24 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, 380Volt, 3 Phase, 50 Hz, Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan	Minimum Amps	Maximum Amps
Motor/Wire Amps	5.5Kw/ #10 13 FLA	5.5Kw/ #10 13 FLA	37Kw/ #4 80 Amps	106 Amps	250 Amps

** See Auxiliary Kits section for options

TWO MODULE DRYERS

TC2451DW (LP) or TC2452DW (NG) – 24 Foot Dryer, 2 Fan, Stacked Module, 380Volt, 3 Phase, 50 Hz, Main Switch = 400 Amps

	Top Auger	Bottom Auger	Fan	FAN	Minimum Amps	Maximum Amps
Motor/Wire Amps	5.5Kw 13 FLA	5.5Kw 13 FLA	37Kw 80 FLA	37Kw 80 FLA	186 Amps	400 Amps

** See Auxiliary Kits section for options

Auxiliary Load and Unload Kit Options

** Dryers may be equipped with auxiliary load and or unload motor starters / overloads. These can only be field installed.

Auxiliary Load and Unload kit specifications:

IMPORTANT: Any supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with current editions of BS EN 60204-1.

Dryers have been pre-configured to handle up to 2 (two) 10 HP kits on **single** module dryers.

NOTE: If additional auxiliaries are required, the Dealer is responsible to determine if the dryer can handle the additional load. If the dryer is not able to handle the extra load, the auxiliary must have its own power source independent of the dryer.

Temperature Compensated Overloads, 3 Phase Units:

All Dryers manufactured as three phase units are equipped with temperature compensated overloads. If installing auxiliary load and unload kits NOT purchased from Sukup Manufacturing Co., it is recommended that **temperature compensated units** be used.

Gas and Electric Hookup

Initial gas and electric hookups should be performed only by qualified gas and electrical service technicians in accordance with all applicable local, state and national code requirements. In conditions of a threaded pipe train, a regulator **must** be installed on the gas tank and limit the pressure to 72 psi (5 bars). **IMPORTANT: Regulator must be in accordance with standard BS EN 88 or BS EN 334.**

Supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with current editions of **BS EN 60204-1.**

Fuel Information

LIQUID PROPANE

Sukup dryers using liquid propane must be connected to a supply tank to draw liquid from bottom of tank. Tank should be 3785.4 liters (1,000 gallons) or larger and have a regulator mounted to it with a maximum 5 bars (72 psi). Connection to dryer should be with a flexible hose designed for LP gas. Have LP gas supplier make proper connections and install safety controls. **IMPORTANT: Regulator must be in accordance with standard BS EN 88 or BS EN 334.**

Do not use tanks that have previously been used for ammonia or fertilizer solutions. These substances are extremely corrosive and can damage fuel supply and burner parts.

Water in supply tank may freeze in pipe train or controls, causing damage. To ensure tank is free of moisture, the best precaution is to purge with methanol. Check with gas supplier if this needs to be done. Do not use tanks with an accumulation of oil or heavy hydrocarbons from long use on a vapor withdrawal system.

If more than one tank is needed to supply liquid propane to dryer, vapor lines of tanks must be connected together to equalize pressure from each tank. Have LP gas supplier make proper connections and install safety controls to meet local codes and national fire protection standards.

Fuel System Recommendations

LIQUID PROPANE

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW L/HR (GAL/HR)	FUEL LINE SIZE (MINIMUM UP TO 100') MM (IN)
16 FT, SINGLE HEATER	6,000,000	246 (65)	12.7 (1/2")
16 FT, 2 MODULE	13,000,000	537.5 (142)	19.05 (3/4")
16 FT, 3 MODULE	20,000,000	825.2 (218)	25.4 (1")
20 FT, SINGLE HEATER	7,000,000	287.7 (76)	12.7 (1/2")
20 FT, 2 MODULE	16,500,000	681.4 (180)	19.05 (3/4")
20 FT, 3 MODULE	25,000,000	1030 (272)	25.4 (1")
24 FT, 2 MODULE	20,000,000	825.2 (218)	25.4 (1")
24 FT, 3 MODULE	30,000,000	1234 (326)	25.4 (1")

Table 2-2 – Liquid propane specifications



1. See fuel specification chart for recommended line size.
2. Use a pressure regulator at supply tank.
3. Open LP shut-off valves slowly to prevent inadvertent closing of excess flow valves.
4. Fuel flow and line size in chart above assume a temperature of 10°F (-12.2°C) or higher.

Connection to liquid manifold on dryer

Image 2-1 - LP-fueled centrifugal dryer

NATURAL GAS

Sukup dryers for natural gas use are designed to function at a heat value of approximately 1000 BTU per cubic foot. A regulated pressure of 1 bar (15 PSI) must be provided for connection to the dryer. **IMPORTANT: Regulator must be in accordance with standard BS EN 88 or BS EN 334.** Ensure also that sufficient volume is maintained for the correct operating pressure.

NATURAL GAS

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW L/HR (CUBIC FEET/HR)	FUEL LINE SIZE Minimum up to 100' MM (IN)
16 FT, SINGLE HEATER	6,000,000	169,901.1 (6000)	38.1 (1 1 / 2")
16 FT, 2 MODULE	13,000,000	368,119 (13,000)	63.5 (2 1 / 2")
16 FT, 3 MODULE	20,000,000	566,336.9 (20,000)	63.5 (2 1 / 2")
20 FT, SINGLE HEATER	7,000,000	198,218 (7000)	50.8 (2")
20 FT, 2 MODULE	16,500,000	467,228 (16,500)	63.5 (2 1 / 2")
20 FT, 3 MODULE	25,000,000	707,921.2 (25,000)	76.2 (3")
24 FT, 2 MODULE	20,000,000	566,336.9 (20,000)	63.5 (2 1 / 2")
24 FT, 3 MODULE	30,000,000	849,505.4 (30,000)	76.2 (3")

Table 2-3 – Natural gas specifications



See fuel specification chart above for recommended line size.

Image 2-2 – Natural gas-fueled centrifugal dryer

Connection to natural gas manifold on dryer

Wet Bin Assembly

Wet Bin Folding Kits (T17699) are available to aid in lifting wet bin.

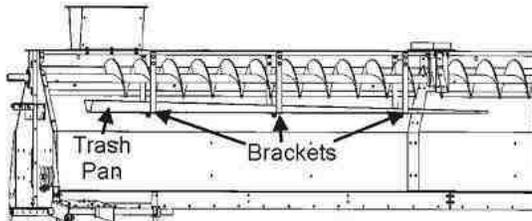


Fig. 2-10 – Trash pan and bracket installation

1. Bolt trash pan brackets into wet bin on filling end of dryer. Bolt trash pan to trash pan brackets. See Fig. 2-10.
2. Position the half of the wet bin without the auger into upright position. Then pivot the side with the auger into upright position. Bolt wet bin together at end plate seams, side seams, pivot seams, and top hanger support.
3. Attach fill auger paddle switch assembly. Locate holes for paddle switch in wet bin on end opposite of filling end.

NOTICE

Holes are pre-punched for mounting paddle switch at either end. Remove desired plastic plugs. Leave plugs in end not being used.

NOTICE

Any open bolt holes in wet bin should be filled with bolts and secured with nuts to prevent grain leakage.

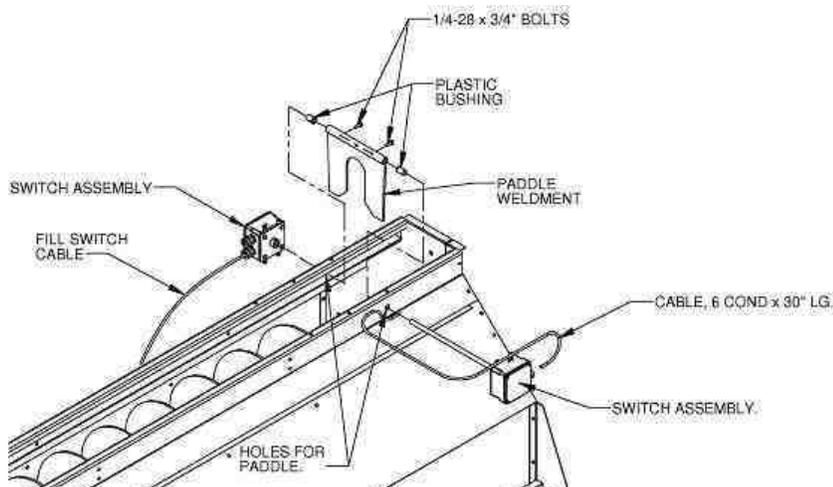


Fig. 2-11 – Paddle switch installation

4. Slide a plastic bushing on each side of wet bin from inside out. Slide shaft with tilt switch box through bushing on one side of wet bin. Position paddle weldment inside of wet bin and slide shaft through pipe of paddle weldment. Slide shaft through bushing on other side of wet bin. Tighten setscrews of paddle weldment onto shaft, making sure paddle and box on shaft are square and paddle can pivot freely. See Fig. 2-11.

Wet Bin Assembly (Continued)

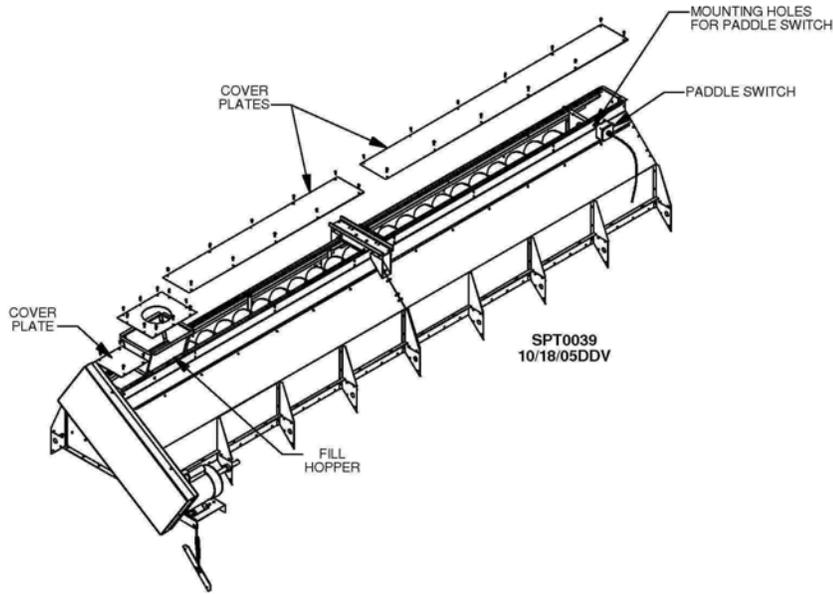


Fig. 2-12 – Fill hopper installation (Front fill)

5. Bolt top fill hopper to top of wet bin on filling end of dryer. Place cover plates on top and attach with 1/4 x 1" self-drill screws. See Fig. 2-12 for front-fill and Fig. 2-13 for rear-fill dryers (16' dryer is shown in Figs. 2-12 and 2-13).

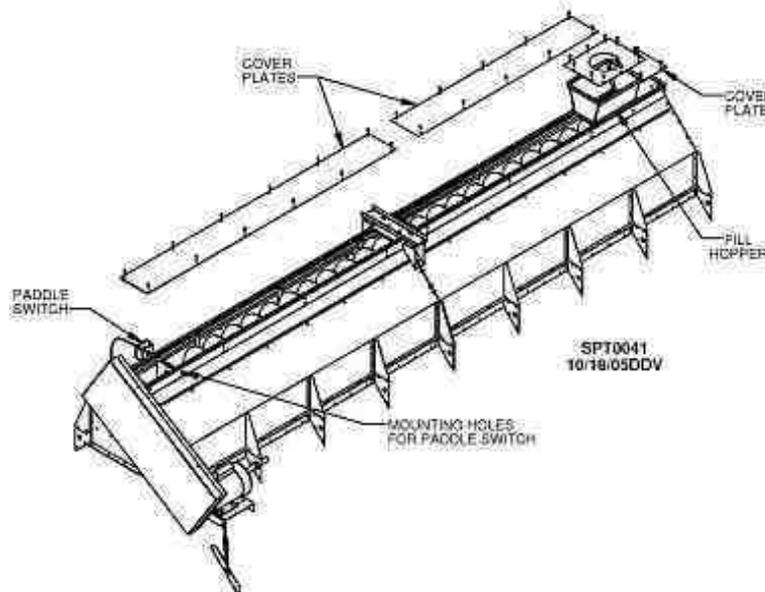


Fig. 2-13 – Fill hopper installation (Rear fill)

Top Load Auger Motor and Shields

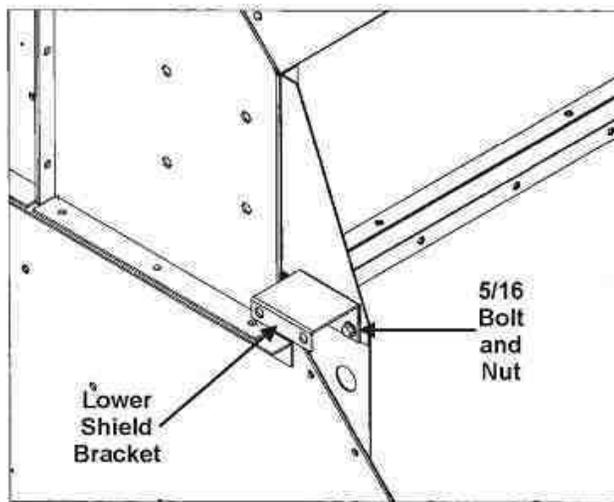


Fig. 2-14 – Lower shield bracket installation

1. Bolt lower shield bracket to end of dryer using 5/16 x 1" bolts and 5/16 nuts. See Fig. 2-14.

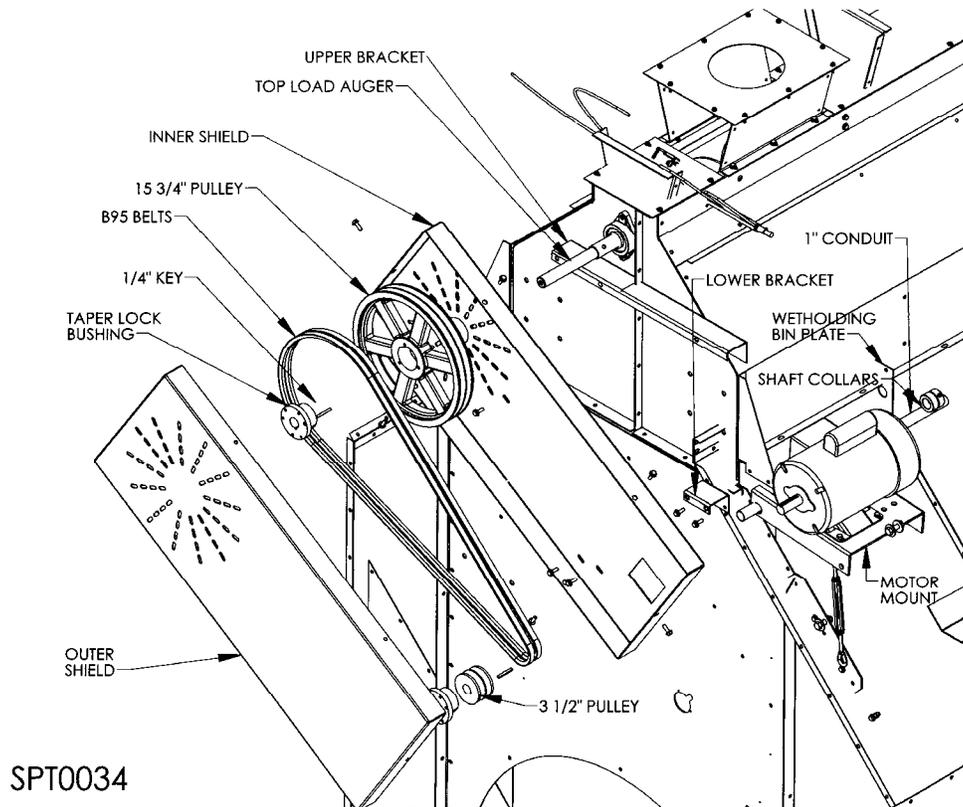


Fig. 2-15 – Top load auger components

2. Hold motor mount up to holes on side of wet holding bin. Slide a 1" conduit tube through motor plate holes of dryer. See Fig. 2-15.

Top Load Auger Motor and Shields (Continued)

3. Slide shaft collars on each side of wet holding bin plate. See Fig. 2-16.

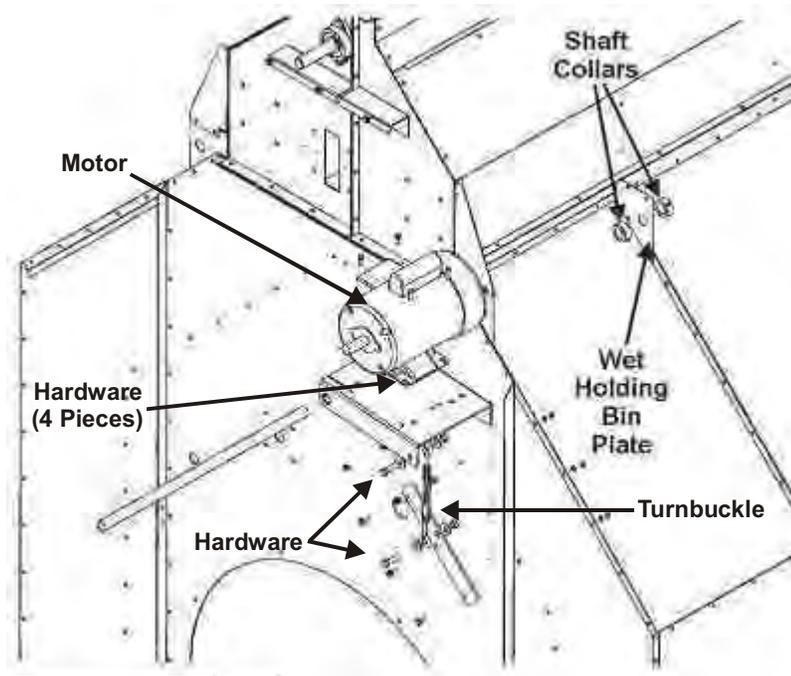


Fig. 2-16 - Motor mount components

4. Tighten shaft collars under motor mount and on each side of wet holding bin plate. Make sure motor mount can pivot. See Image 2-3.

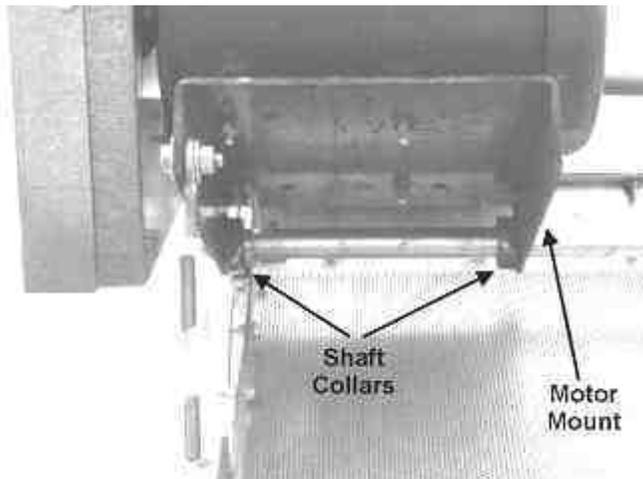


Image 2-3 – Motor mount shaft collars, installed

Top Load Auger Motor and Shields (Continued)

5. Bolt turnbuckle plate to side of dryer. See Fig. 2-16.
6. Bolt turnbuckle between motor mount and turnbuckle plate using 1/2 x 1-3/4" bolts, 1/2" flat washers and 1/2" lock nuts. See Fig. 2-16.
7. Bolt motor to motor mount using 5/16 x 1" bolts and 5/16" nuts and washers. See Fig. 2-16.
8. Bolt inner shield to upper and lower brackets using 5/16" bolts, washers, and nuts. See Fig. 2-15.
9. Attach a 10.8 cm O.D. pulley to motor shaft with a key and attach pulley to top load auger with a taper lock bushing. Use straight edge to align pulleys. Attach two B95 belts between auger pulley and motor pulley. Tighten turnbuckle to tighten belts See Fig. 2-17. Tension belts so it takes about 6 lbs. pressure to deflect belt 1/2" at center of belt span.
10. Final assembly should appear as in Fig. 2-17 (Shown without front shield).

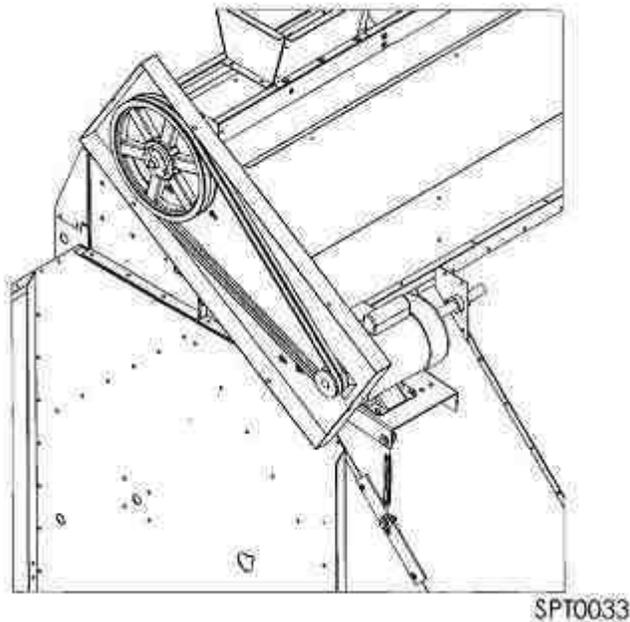
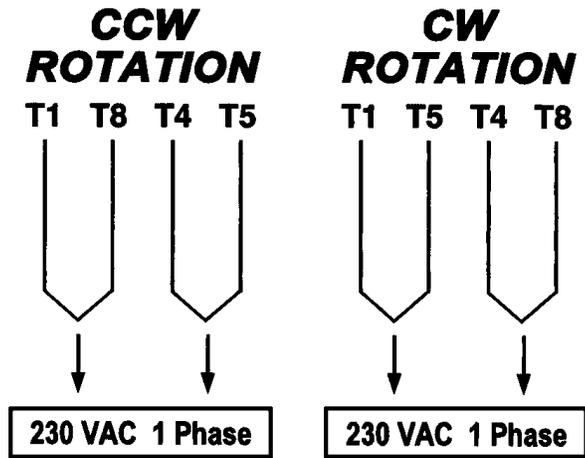


Fig. 2-17 – Final assembly (without front shield)

11. Slide outer shield around inner shield and attach with six (6) 5/16 x 1" bolts. See Fig. 2-15.

Connecting Load Auger Motor



Overload circuit is intentionally disconnected in motor because overload protection (starter protector) is now located in power box on dryer. A sticker, L0903, is attached to motor showing how to make wiring connections. See Fig. 2-18.

NOTE: The thermal overload device used in this motor has been disconnected. The over-current protection for motor is located in the power box.

L0903

Fig. 2-18 – Sticker L0903

QuadraTouch™ Controller

Design of QuadraTouch™ controller allows for easy installation. However, there are a few things to keep in mind when choosing an installation location:



Image 2-4 – QuadraTouch™ controller

1. QuadraTouch™ controller will need its own 100 – 240VAC power source. Choose a location where electricity can be easily accessed. At 120VAC, unit pulls less than 1A. Using an appropriate extension cord is acceptable as long as electrical codes are followed.

2. Industrial Ethernet cable ordered with dryer is available in four (4) lengths:

Cable Length	Comp. #
50'	J8720
100'	J8721
150'	J8722
200'	J8723

Table 2-4 – Ethernet cable lengths and components numbers

Cable length determines how far away controller can be mounted from dryer. Standard length is 50 feet.

3. Although QuadraTouch™ controller is contained in a sealed enclosure, it's a good idea to mount controller in a shed or other shelter.

The QuadraTouch™ controller has an operating temperature of -12°C. to 57°C (10°F to 135°F) and a storage temperature of -20 °C. to 66°C (-4°F to 150°F). Therefore, outdoor placement is acceptable in most locations, however, it is recommended that it be placed indoors during the winter months when not in use.

4. QuadraTouch™ controller comes with pre-installed mounting brackets. These allow controller to be mounted directly onto wall or bench using four (4) screws.

NOTICE

NOTE: If location where controller is mounted is not heated, it is recommended that unit be taken indoors during winter months or anytime controller would be exposed to temperatures outside of limits stated above.

Ground Rod Requirements



Image 2-5 – Ground rod, buried

A ground rod (J5722) and clamp (J5723) are supplied with dryer and can be found in rear of dryer. Rod is copper-coated, 8 feet (2.44 m) long and 1/2-inch diameter.

1. Installation of ground rod and ground wire must conform to local and national electrical code procedures.
2. Bury ground rod (top of rod should be flush with ground) within 2.44 m (8 feet) of dryer and attach it to an unpainted part of dryer frame or main ground lug in power distribution box. The ground rod located at power pole will *not* provide sufficient grounding for dryer.
3. Proper grounding will provide added safety in case of any short or lightning strike.

IMPORTANT: Ground rod **MUST** be installed to validate dryer warranty.

Operation

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Make sure to go through the Dryer Startup Checklist in Appendix E before seasonal operation.

To ensure quality operation, initial gas and electric hookups must be completed in accordance with local and national regulations by qualified service technicians.

Introduction

Your Sukup Grain Dryer is equipped with several advanced features to ensure an effective and hassle-free drying season. However, it's important to understand some of the key features and operating procedures before starting operation.

There are many different ways to run your Sukup Grain Dryer. The QuadraTouch™ and manual backup system both offer dependable ways to dry grain. The QuadraTouch™ system is easy to use, with a menu-driven interface. It guides the operator through each mode of operation with simple, clear instructions. Make sure to read the software manual in the appendix of this manual. Most every question can be answered by consulting this section. Below is a brief description of the automatic and manual modes the QuadraTouch™ system offers.

NOTE: Grain variety, maturity level, cleanliness, weather conditions and operation can all affect performance of dryer. To the extent possible, be aware of different varieties of grain being fed into dryer, as well as other factors that may affect performance.



WARNING: Augers, fans, and heaters will start without warning at appropriate times. Please use caution around dryer.

1. Open power box and ensure that all internal breakers and starter protectors are turned on. Close door to power box, close latch, and turn master disconnect to "ON".
2. On power box, pull Emergency Stop button out. It should illuminate red. If using QuadraTouch™ controller, System Control Switch needs to be turned to "COMPUTER" position. If using manual backup system, "MANUAL" needs to be selected. The switch will illuminate green when power has been applied.
3. Display should show "System Ready". All faults must be cleared before dryer can start. Press "Start" to choose an operation.
4. Display will give the options of selecting Continuous Flow, Autobatch, Grain Transfer, Final Dry, and Manual Operation. Press "Reset" to abort dryer startup or to stop an operation in progress.

NOTE: Please refer to software manual in the appendix of this manual for a detailed description of each operation mode. Software is frequently updated, so screens and images may differ slightly from those pictured.

Dry Fire / Test

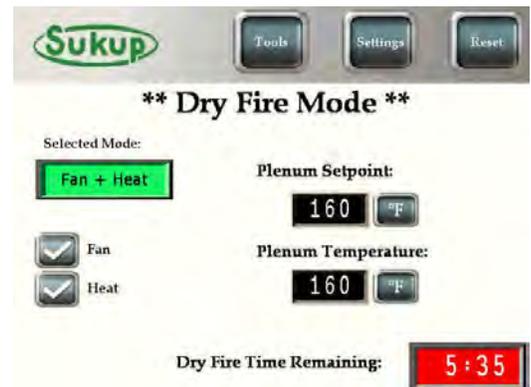
“Dry Fire” mode of operation enables operator a means of running dryer when there is no grain. This provides a great way of testing dryer before seasonal operation. This mode is recommended **EVERY SEASON** before dryer is to be used.

To operate dryer in “Dry Fire/Test” mode, ensure red emergency stop button is pulled out and main power is ON. Emergency stop button should illuminate red, indicating control power is available. In addition to main power switch and emergency stop button, there is a System Control Switch. This switch should be turned to “COMPUTER” when using QuadraTouch™ controller. It will illuminate green when in the “Manual” or “Computer” position.



CAUTION: While dryer is running, excessive noise is present. Hearing protection is strongly recommended.

To access Dry Fire/Test mode, touch “Tools” on main screen and select “Dry Fire/Test”. The following screens will come up:



Fan Only

Selecting “COOL” at prompt will energize fan(s) only. Static air pressure switch is disabled during this test. All other monitored safeties are operational at this time.

Fan and Heater

Selecting “HEAT” will apply power to fan and heater. Fan will come on, followed by heater after a 20-30 second delay. Static air pressure switch will be ignored, but flame sensor will still be active.

Selecting “COOL” or “HEAT” will begin a 10-minute timer countdown followed by fan startup and, if selected, heater startup. After 10 minutes, fan and heater will turn off automatically, giving option of returning to main menu. Heater(s) may not be started independently of fan(s) being started.

NOTICE

For multiple-fan dryers, there will be a “COOL” and “HEAT” option for each fan/burner. There is a factory-set 5- to 10-second delay between fan startups. Fan(s) will start top to bottom as applicable.

Continuous Flow

Continuous Flow mode offers a way to run dryer completely automatically. Dryer is programmed with a list of operator-specified set points and dryer will take over drying operation.

Initial Dry

- Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed.
- A 160°F plenum temperature is required for an Initial Dry.
- It is **HIGHLY RECOMMENDED** that operator is at the dryer to verify grain moisture accuracy once sampling has started, and to calibrate if necessary.
- If an output sensor moisture or temperature calibration adjustment is necessary, press “Tools” while dryer is sampling and select “Calibrate Sensors” to change moisture or temperature. Once calibration adjustment has been entered, dryer will restart moisture sampling. Allow 30 minutes for dryer to stabilize before repeating this procedure.

Restart & Stabilization

- Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed.
- Plenum temperatures and meter roll speed must be accepted or changed.
- Dryer will run through stabilization, discharging grain at a constant unload rate. This option is **recommended** if dryer has been off for longer than three (3) hours and grain in dryer is partially dry.

Restart without Stabilization

- This option will take operator directly to full automatic control.
- If dryer has been off for less than 1 hour and grain has retained some heat from last drying sequence, it is **recommended** that this option be used.
- If dryer is off for more than one (1) hour, operator can choose to use stabilization or can skip that option.

General Dryer Operation

This section briefly describes normal dryer operations. To follow processes step by step, consult the software manual in the appendix of this manual.

Continuous Flow

Continuous Flow dryer operation requires creating a gradient of moisture from top of dryer to bottom and is accomplished by three main functions: Initial Dry, Stabilization, and Continuous Flow. Before drying begins, user must enter moisture of incoming grain and desired moisture of outgoing grain into QuadraTouch™ controller. These moistures are used to calculate the time necessary to perform initial dry at 160°F. No grain is unloaded from dryer during initial dry mode.

After initial dry is complete, user will set desired plenum drying temperatures. Controller then calculates a meter roll speed corresponding to plenum drying temperatures entered. Dryer then performs a stabilization routine. During stabilization, a gradient of moisture is established in dryer by drying and unloading one full load of grain without adjusting meter roll speed.

After stabilization, dryer enters its continuous flow mode. During this phase, dryer adjusts meter roll speed for variances seen in average output moisture compared to desired output moisture.

During continuous flow mode, QuadraTouch™ controller plots a data point every minute of average discharge moisture, plenum temperature, and meter roll speed. Each of these graphs can be accessed while dryer is running. Refer to Software Manual for further instruction.

When wet bin is empty or user is ready to dry final batch of season, the user simply enters the final dry function and follows instructions on control panel screen.

When continuing a drying operation after dryer has run out of grain or has been shut down, it is often desirable to run with settings as before the shutdown. Therefore, quick methods of restarting dryer have been developed. Restarting dryer with or without stabilization, depending upon the particular situation, can be accomplished by following a short series of steps displayed on control screen during normal startup.

Automatic Batch

Automatic Batch is a standard feature of the Sukup Automatic Grain Dryer. Batch operations enable operators to dry grain in a manner they have become accustomed to; enable them to dry extremely wet grain; allow single-fan dryers to be operated in a heat/cool manner; and make it possible to dry grains that require a low plenum temperature.

Two controlling operations of automatic batch drying have been developed. The first method dries batches according to time entries. Operator enters times into control panel for when dryer will heat, cool, and unload grain. During unload, dryer calculates the average moisture of each batch and prints it. Operator can then adjust time entries according to desired output moisture, or have the control system automatically recalculate the time. The second method of operation requires purchasing the temperature control option. Operator enters a desired dry temperature value into control panel. When kernel temperature in column reaches the set temperature, the dryer proceeds to cool the grain, if necessary, and then unload it. The set variables may be changed to operator's choosing at any time during batch operation. New settings take effect on next batch.

Grain Transfer

Increasingly, operators require dryers to transfer grain to storage facilities. Thus, the grain transfer function has been developed to simplify this process. The control panel steps the user through a simple process to begin and end the procedure.

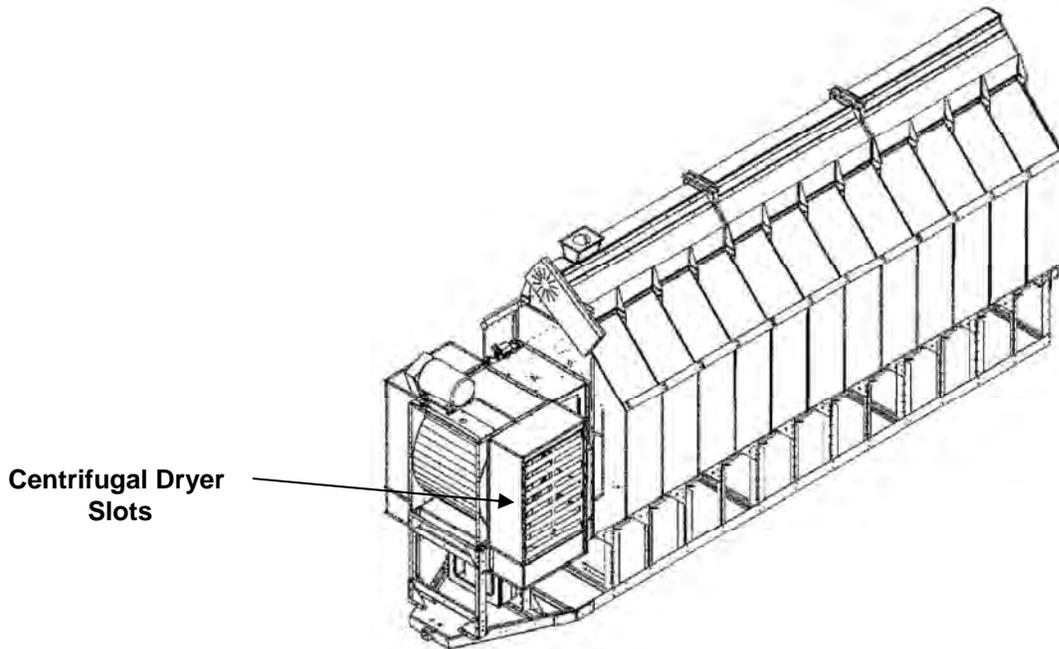
Manual

Manual operation serves many purposes. When operators want complete control of their dryer, manual operation fulfills this need. The Sukup QuadraTouch™ controller incorporates a full manual control into its operation. By pressing "Tools" from the main screen, users can select "Manual Operation" to run dryer in the manner they choose.

Also incorporated into dryer is a completely independent, backup control system, allowing user to operate dryer until dealer is able to perform any needed service. Manual operation is a simple procedure of manually turning on fans, heaters, loads, and unloads. **Dryer uses paddle switches to automatically load the dryer during manual operation while the user has control of meter roll speeds and plenum temperature.**

Operational Information

SLOT OPENINGS ON INTAKE OF SUCTION COOL CENTRIFUGAL DRYERS

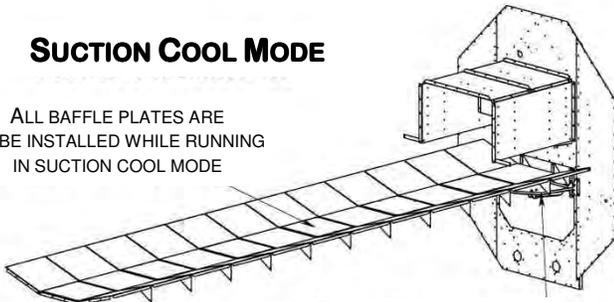


IN SUCTION COOL MODE:

Slots should be narrower to create more suction in the bottom cooling plenum. But slots should not be fully closed.

SUCTION COOL MODE

ALL BAFFLE PLATES ARE TO BE INSTALLED WHILE RUNNING IN SUCTION COOL MODE



FRONT DOOR COVER IS IN THE OPEN POSITION TO RUN IN SUCTION COOL MODE

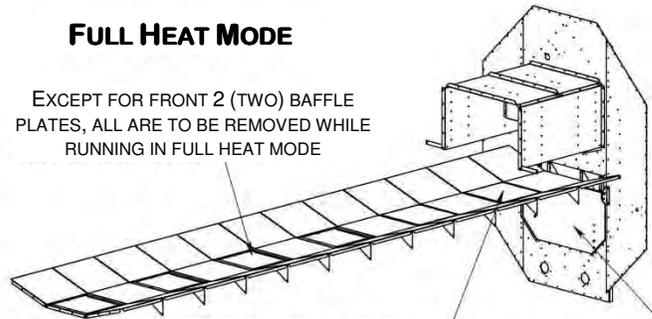
Instructions: Start with a 3/4" to 1" opening on slots and adjust from there. Closing slots more will increase efficiency and pull more heated air into the fan, but will decrease capacity. Opening slots more will increase capacity but will decrease efficiency and less heated air will be pulled into the fan.

IN FULL HEAT MODE:

Slots should be fully opened.

FULL HEAT MODE

EXCEPT FOR FRONT 2 (TWO) BAFFLE PLATES, ALL ARE TO BE REMOVED WHILE RUNNING IN FULL HEAT MODE



FRONT 2 (TWO) BAFFLE PLATES REMAIN IN PLACE

FRONT DOOR COVER IS IN THE CLOSED POSITION TO RUN IN FULL HEAT MODE

Service & Maintenance

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Sensor Removal and Installation Instructions

Discharge Moisture Sensor

F60337X (QuadraTouch™ dryer uses yellow identifier)



Image 4-1 – Discharge moisture sensor

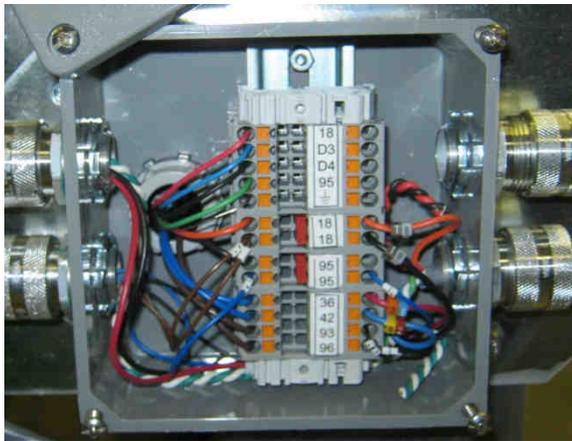


Image 4-2 – Right rear junction box

This sensor is used to monitor grain moisture as it exits dryer.

Removal:

1. Turn power off at power box.
2. Locate discharge moisture sensor on bottom of grain discharge chute. See Image 4-1.
3. Disconnect sensor ground strap connected to dryer.
4. Release sensor-retaining clamp and remove sensor from discharge tube.
5. Remove wire cable retaining clips fastening wire to dryer all the way back to junction box at right rear of dryer. See Image 4-2.
6. Remove junction box cover.
7. Disconnect sensor wires from dryer wiring.

Installation:

1. Place new moisture sensor into grain discharge tube. Secure sensor by tightening holding clamp.
2. Connect ground strap to dryer frame and tighten nut.
3. Route wire cable to junction box. Use clamps to secure cable to dryer.
4. Connect sensor wiring to dryer wiring: red to red; blue to blue; black to black; green to green; shield to shield.
5. Install junction box cover by tightening four screws.
6. Tighten strain relief.

Grain Discharge Chute Switch T17988



Image 4-3 – Grain discharge chute switch

This device is used to detect a plugged take-away system. Should take-away system malfunction, grain would push up discharge chute door, causing a fault condition.

Removal:

1. Turn power off at power box.
2. Locate grain discharge chute switch box. See Images 4-3 and 4-20.
3. Remove cover.
4. Disconnect switch wires from dryer wiring.
5. Remove switch.

Installation:

1. Install new switch onto dryer.
2. Connect two wires from switch to dryer wiring (wire # 18 and wire # 42).
3. Reinstall cover when finished. See Discharge Chute Switch Adjustment in Component Calibration section to calibrate.

Grain Level Switches Fill Switches (Upper – T162441; Lower – T162442)

These devices are used to detect when dryer is full of or needs grain.

Removal:

1. Turn power off at power box.
2. Locate paddle switch junction box, found on right side of wet bin. See Image 26 in Component Identification section.
3. Remove cover of junction box.
4. For either upper or lower switch, disconnect two wires from dryer wiring.
5. Remove switch from retaining clip.

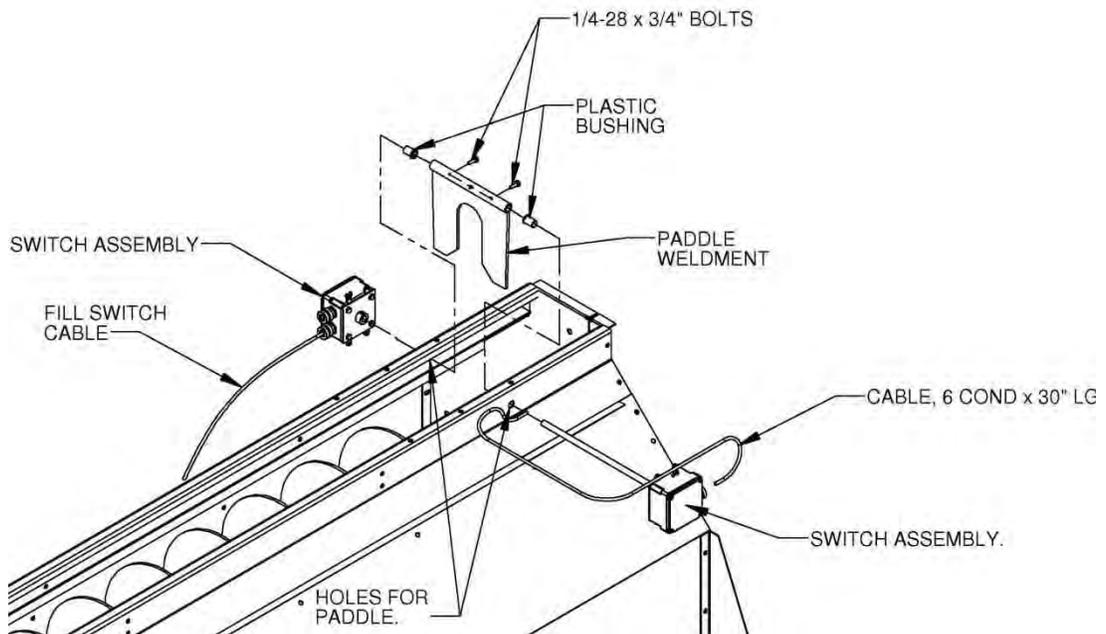


Image 4-4 – Grain discharge chute switch

Installation:

1. Insert new switch into wet bin.
2. **IMPORTANT:** Switches must be installed as shown in Image 4-4. Switch wires must emerge from left of switch. If not installed properly, dryer will not function correctly.
3. Connect wires in following manner: red to red, black to black for power, white to white, and green to green for ground.
4. When finished, reinstall junction box cover.

Unload Auger Proximity Switch

J4493 (Same switch is used for Metering Roll Proximity Switch)



Image 4-5 – Unload auger proximity switch

This device monitors rotation of unload auger. Should unload auger stop turning for 5 seconds, a fault condition will occur.

Removal:

1. Turn power off at power box.
2. Locate unload auger proximity switch on end of grain discharge chute. See Image 4-5.
3. Remove cover.
4. Loosen and remove inside lock nut and remove proximity switch from box.
5. Follow wiring to junction box on side of grain discharge chute (See Image 4-20) and remove cover.
6. Disconnect proximity switch wires from dryer wiring.

Installation:

1. Obtain a new switch and remove first lock nut. Slide switch into hole and secure with lock nut just removed.
2. Adjust gap between proximity switch and rotating target. **IMPORTANT:** Gap between tip of rotating target and proximity switch must be no greater than 1.6mm (approximate width of Kroner or Euro).
3. Route wiring in same manner as before and connect proximity switch wires to dryer wiring: blue to # 95 black; brown to # 18 orange; black to # 96 red.
4. Turn power on at power box and turn system control switch to COMPUTER. Go to Tools → Manual Operation, and press and hold Unload button. Unload auger should now be turning. If installation was NOT successful, a fault message will appear on touchscreen within 5 seconds and unload auger will shut down. See Image 4-3 showing Grain Discharge Chute Switch.
5. Reinstall box covers.

Vaporizer Over-Temperature Switch J5901

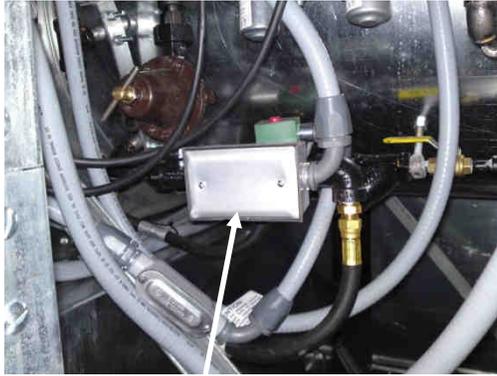


Image 4-6 – Vaporizer over-temp switch

This device monitors vapor temperature as it exits vaporizer coil. If temperature exceeds 60°C (140°F), sensor opens circuit, causing a fault condition.

Removal:

1. Turn power off at power box.
2. Locate vaporizer over-temperature switch on heater pipe train. See Image 4-6.
3. Loosen U-bolt and screws that hold sensor in position.
4. Follow wiring to heater box and remove cover. See Image 4-9 showing heater housing high limit switch.
5. Disconnect red # 18 wire attached to heater housing high limit switch. A new crimp terminal end should be used.
6. Disconnect red # 37 wire, which is also attached to a blue # 37 wire, by removing blue wire nut.

Installation:

1. Put new over-temperature switch in same position as old switch. Secure by tightening switch screws and U-bolt nuts. Be careful not to over-tighten.
2. Route new switch wiring to heater control box.
3. Attach red # 18 wire to heater housing high limit switch where # 18 blue connects. A new crimp terminal end should be used.
4. Attach red # 37 wire to blue # 37 wire using a wire nut.

Rear Door Interlock Switch J4487 Key with chain F6991



The main body of the switch is mounted next to door, with interlock key and chain attached to the door. Key must be removed from switch before door may be opened. If key has been removed from switch, a fault will be displayed and dryer will not start.

Removal:

1. Turn the power off on front of power box.
2. Locate rear door at the back of dryer.
3. Pull interlock key out of switch.
4. Remove a small, gold colored Philips screw which will allow cover to open.
5. Loosen the two wire terminals and remove wires.
6. Remove two 5/16 mounting screws securing switch to dryer.
7. Loosen liquid tight strain relief collar and pull wire from switch. Remove switch from dryer.
8. Remove liquid tight fitting from bottom of switch.

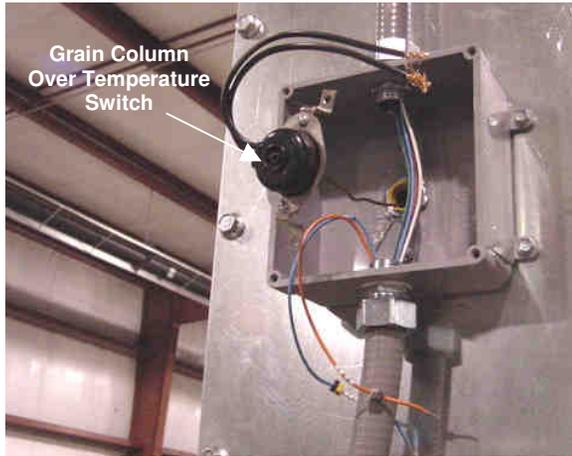


Image 4-7 – Rear door interlock switch

Installation:

1. Obtain a new switch and check the head for proper position.
2. If needed, rotate head 90 degrees to match old switch position.
3. Install liquid tight strain relief collar into bottom of new switch.
4. Remove small, gold Philips screw, which will allow cover to open.
5. Feed wires through liquid tight fitting and up into switch.
6. Attach wires to top two terminals. (N.C.)
7. Close cover and secure with the Philips screw.
8. Attach switch assembly to dryer using the two 5/16 hold down screws.
9. Check interlock key. The key may or may not require changing depending on key design.
10. Insert interlock key into switch.

**Grain Column Over-Temperature Switch
T17289 – 16', T17290 – 24', T17288 – 28'**



There is one on each side of dryer, running horizontally through grain columns to monitor temperature. Junction boxes containing switches are located outside front end of plenum. See Image 4-14 in Troubleshooting section as example.

Junction boxes housing other ends of sensors are shown as Item 12 in Image 5 of Component Identification section.

Procedures for removing and replacing sensors are identical for both grain column over-temperature switches.

Image 4-8 – Grain column over-temperature switch

Removal:

1. Remove junction box cover for appropriate switch.
2. Locate switch wires and remove blue wire nuts connecting switch to dryer wiring.
3. Remove switch by removing 5/16" nuts holding switch to junction box. See Image 4-8.
4. While removing sensor, coil up small copper tube for easy handling.

Installation:

1. Install new switch by carefully feeding small copper sensor into conduit inside of junction box. Be careful not to kink copper sensor.
2. Attach switch to back of junction box using 5/16" nuts.
3. Reconnect wires. There should be an orange # 18 and either a blue # 40 (right side) or blue # 41 (left side) wire, depending upon side of dryer that sensor serves.
4. Reinstall junction box cover when completed.
5. Coil up excess capillary tube and leave in rear junction box.

Heater Housing Hi-Limit Switch J5772



Image 4-9 – Heater housing high-limit switch

Heater housing hi-limit switch is located inside a junction box on top of dryer. See Image 4-9 at left and Image 5-18 in Troubleshooting section for location of box. Switch monitors temperature of heater housing. Switch is set for 93 °C (200 °F).

Removal:

1. Disconnect power to dryer.
2. Open junction box cover.
3. Locate heater housing high limit switch.
4. Remove wires from switch by pulling on crimped connectors.
5. Remove both hold-down screws.
6. Remove switch.

Installation:

1. Position new switch and secure with two hold-down screws.
2. Attach crimped connectors to tabs on switch. There should be a blue # 38 on one side and a red # 18 and blue # 18 on other side of heater housing high-limit switch.
3. Reinstall junction box cover when complete.

Plenum Temperature Sensor RTD (Resistance Temperature Detector)
J5645 – 12', J5642 – 16', J5646 – 20', J5643 – 24', J5648 – 28'



Image 4-10 – Plenum temperature sensor RTD

This sensor monitors temperature of plenum area. If temperature exceeds a value determined by sensor used, a fault condition will exist.

Removal:

1. Turn control switch on control box to OFF.
2. Locate sensor junction box mounted on front of dryer. See Item 1 in Image 5-18 of Troubleshooting section for location of box.
3. Open junction box and disconnect wires from transmitter (T17028).
4. Remove two self-tapping screws on two tabs holding junction box to dryer.
5. Remove conduit fittings from ends of junction box.
6. Remove clips holding sensor tube to inside wall of plenum area. Gently set aside plenum over temperature capillary.
7. Pull sensor out, leaving grommet on dryer. Coil tube from sensor for ease of removal.



Image 4-11 – Plenum temperature sensor (RTD) transmitter in power box. See Item 16 in Image 6 of Component Identification section.

Installation:

1. Uncoil new sensor carefully. Any kinks will damage new sensor.
2. Feed sensor into plenum.
3. Reusing clips inside plenum, attach sensor tube to inside wall of plenum area, similar to way old one was attached.

During installation of sensor tube, reinstall plenum over temperature capillary. Over-temperature capillary and plenum temperature sensor are designed to be mounted to same clip inside plenum area. See Images 12 and 13 in Component Identification section.

4. Attach junction box to outside of dryer after reattaching conduit.
5. Wire transmitter (T17028) to wires from conduits and install junction box cover. Make sure to cut off braided shield wires.

Metering Roll Proximity Switch

J4493 (Same switch is used for Unload Auger Proximity Switch)

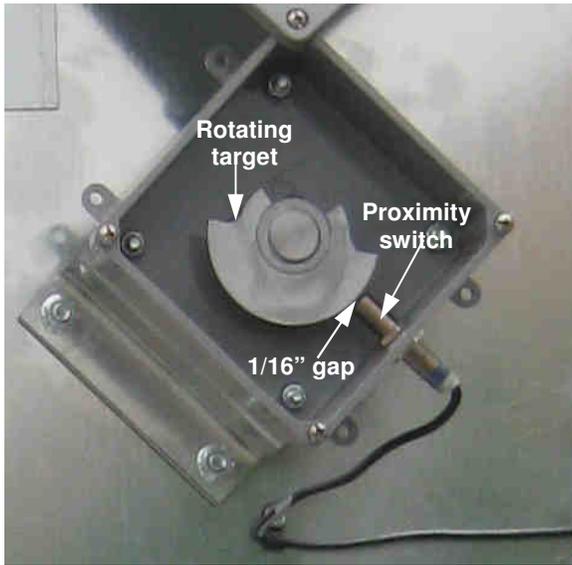


Image 4-12 – Metering roll proximity switch

This device monitors rotation of meter rolls. During operation, light on proximity sensor and # 93 input on PLC will flash to indicate rotation. Due to slow rotation of meter rolls, lights may flash slowly. If removal of target is necessary, install using fresh anti-seize compound.

Removal:

1. Remove cover to metering roll junction box at rear of dryer.
2. Remove inner lock nut on proximity switch.
3. Remove switch from box.
4. Remove hold-down clamps for wires and remove cover to right rear junction box.
5. Disconnect wiring from right rear junction box.
6. Loosen liquid-tight strain relief collar connector, freeing wires
7. Remove wires from junction box.

Installation:

1. Install new proximity sensor by reversing steps used to remove old one.
NOTE: Adjustment of proximity switch is critical. See Proximity Sensor Calibration in Component Calibration section. Gap between tip of switch and rotating target must be no greater than 1.6mm or 1/16". See Image 4-12. **Damage to proximity switch may occur if it comes into contact with rotating target.**
2. Reinstall box covers.

**Static Air Pressure Switch
J5862 & J6019**

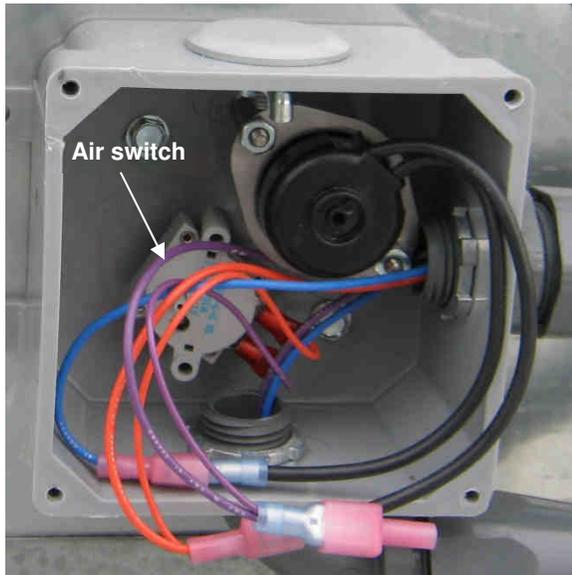


Image 4-13 – Air pressure switch

Static air pressure switch ensures that during operation there is enough static air pressure in plenum area to dry grain properly and to use heater safely.

Removal:

1. Locate junction box on front plenum area. See Item 2 in Image 5-18 of Troubleshooting section for location of box.
2. Remove cover and disconnect orange and purple wires from switch by removing spade terminals at switch.
3. Remove screen filter (J6019) from backside of sensor (J5862) from inside plenum area of dryer.
4. Remove air switch.

Installation:

1. New switch should be pre-calibrated and ready for installation.
2. Install new switch by reversing steps used to remove old one.

Plenum Over-Temperature Switch
J6795 – 16', J6796 – 24', & J67961 – 28'

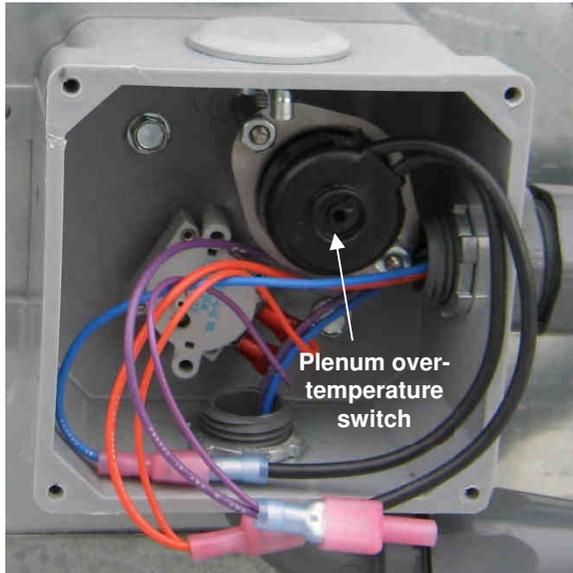


Image 4-14 – Plenum over-temperature switch

Plenum over-temperature switch trips when temperature of plenum area rises above 163 °C (325 °F). Removal of plenum over-temperature switch is similar to removal of plenum RTD.

Removal:

1. Locate sensor junction box mounted to front of plenum area on front of dryer. See Item 2 in Image 5-18 of Troubleshooting section for location of box.
2. Remove junction box cover and disconnect blue and orange wires from sensor.
3. Remove clips holding sensor capillary to inside wall of plenum area. Gently set aside plenum temperature indicator tube.
4. Pull sensor free. Coil copper capillary from sensor for ease of removal.

Installation:

1. Uncoil new sensor carefully to avoid kinks.
2. Feed new copper capillary through junction box and into plenum.
3. Attach sensor capillary to inside wall of plenum, similar to way old one was attached. See Images 12 and 13 in Component Identification section.
4. Reusing clips from inside of dryer, install new sensor capillary to inside wall of plenum area. Over-temperature capillary and plenum temperature sensor are designed to be mounted to same clip inside plenum area.
5. After installation, reconnect blue and orange wires and replace junction box cover.

Component Calibration

Moisture Sensor Calibration

F60337X QuadraTouch™

QuadraTouch™ Moisture Settings

To enter input and output moisture set points using the touch screen, follow instructions in Appendix G - Software Manual, found in Appendices of this manual.

Manual Calibration

Output moisture sensor is factory-calibrated so voltage between black wire and ground wire reads 9.95 VDC (while in tube). If voltage becomes out of adjustment and exceeds reading of 10 VDC, a RED fault screen indicating "Analog Sensor Not Found" will appear. Sensor will need to be calibrated manually by following steps below.

Manual calibration of sensor is also necessary if installing a new moisture sensor on dryer. Follow steps below for calibration.

Installing New Sensor

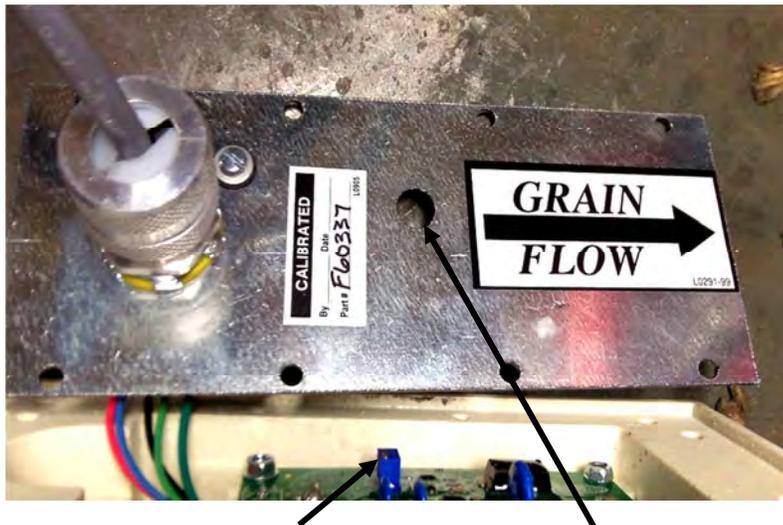


Image 4-15 – Adjustment screw and adjustment screw hole

Removal of back plate is not necessary for calibration. Sensor is photographed disassembled to reveal adjustment screw.

1. Press and hold Sukup logo at upper left quadrant of touch screen until analog screen appears.
2. With sensor clean and inside of tube, MST voltage reading should be 9.95 VDC. If not, continue with following steps.

3. Locate hole in metal plate of sensor, as shown in Image 4-15.
4. Using a small straight-blade screwdriver, put screwdriver blade into hole, pushing through gel sealing material (if necessary) and into screw head.
5. Rotate adjustment screw until a reading of 9.95 VDC is displayed (while inside of tube).

Air Switch Adjustment Calibration J5862 & J6019

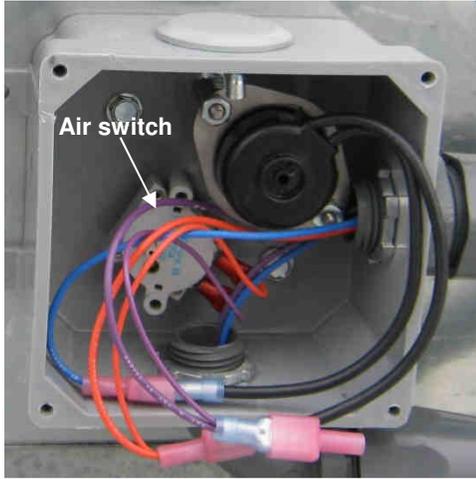


Image 4-16 – Air pressure switch in junction box

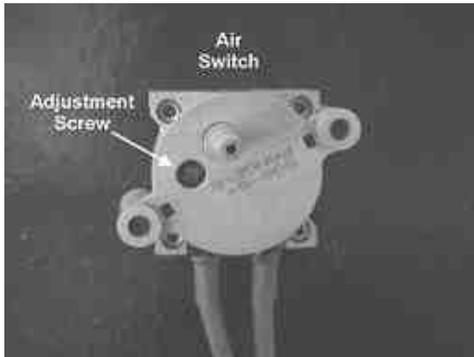


Image 4-17 – Air switch (J5862)

It may become necessary to adjust static air pressure switch. Follow these instructions:

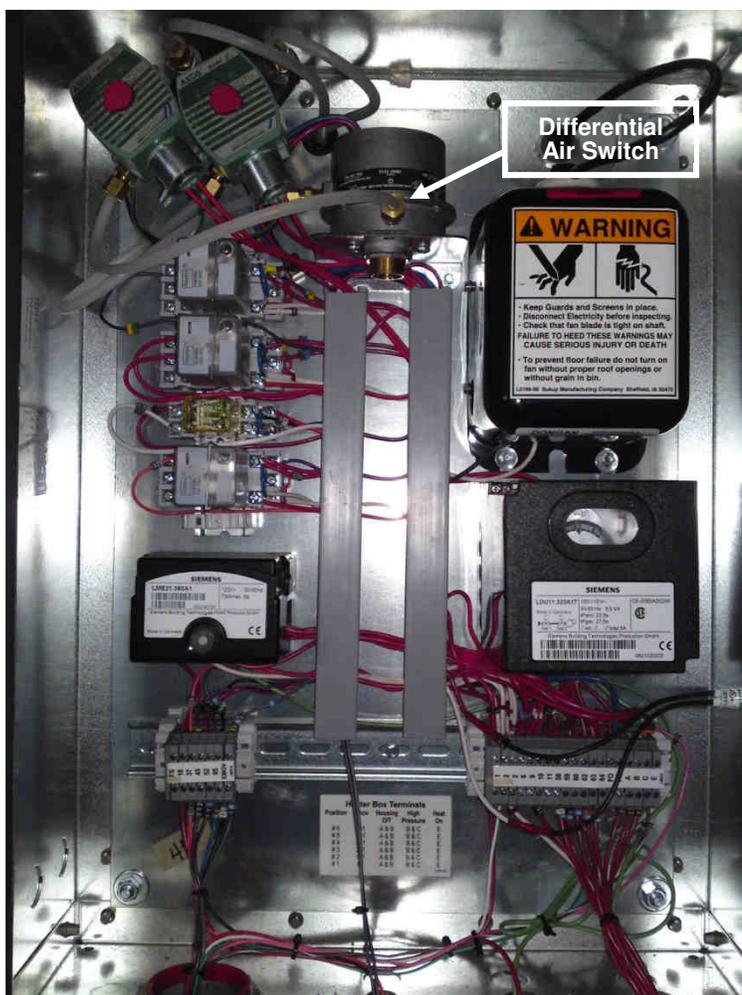
1. Find switch in junction box located on upper front of plenum. For general location, see Image 5-18 in Troubleshooting section of manual. See Image 4-16 for specific location of switch.
2. Switch is adjustable between 0 to 3 inches of static pressure. It is factory-set to 0.5" of water column pressure. It is a normally open switch that closes when set pressure is reached.
3. To increase pressure set point, turn adjustment screw **counterclockwise**. See Image 4-17.
4. To decrease pressure set point, turn adjustment screw **clockwise**.

Differential Air Switch Calibration

This switch is adjusted to maximum sensitivity by turning the screw counter-clockwise.



J5863 - Differential Air Switch



Meter Roll Proximity Switch Adjustment



Image 4-18 – Meter roll proximity switch box

1. Locate proximity switch box at end of discharge chute on back of dryer. Proximity sensor and rotating target will be located inside this box. See Image 4-18.
2. Once box is opened, a galvanized rotating target and proximity switch can be found inside.
3. To calibrate proximity switch, loosen locking nut on switch.
4. Adjust switch so it is no more than 1.6mm or 1/16” from target. This distance is important for reliable sensing.
5. After switch is in place, tighten locking nut and replace cover on box.

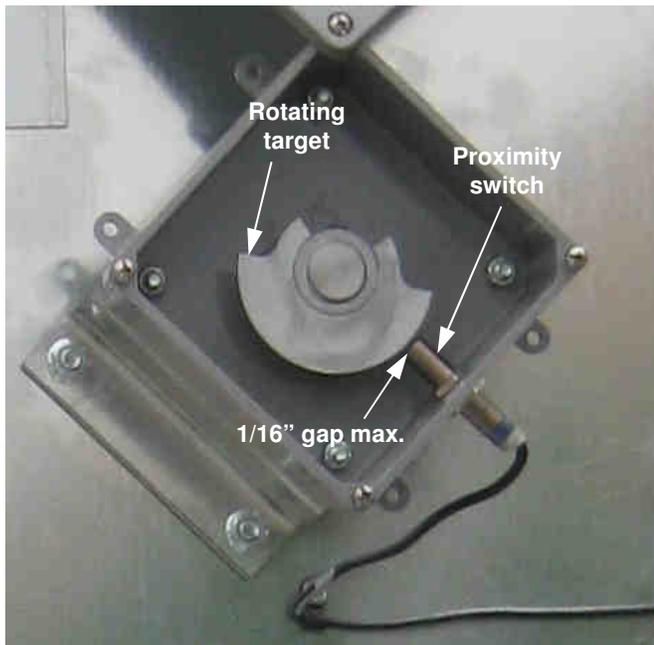


Image 4-19 – Metering roll proximity switch

Make sure target will not strike or contact end of proximity sensor during normal operation.

Grain Discharge Chute Switch Adjustment

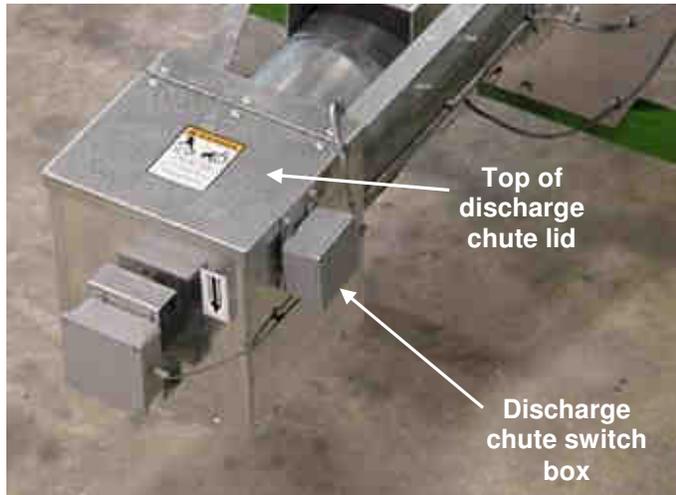


Image 4-20 – Discharge chute switch box

When adjusting Grain Discharge Chute switch, a 7/16 socket wrench will be needed.

1. Locate box on discharge chute at rear of dryer and open discharge chute lid. Remove bottom cover. See Image 4-20.
2. Attached to lid of discharge chute is a metal bracket with this box fastened to it. Using a 7/16 socket wrench, loosen screw holding box in place. See Image 4-21.

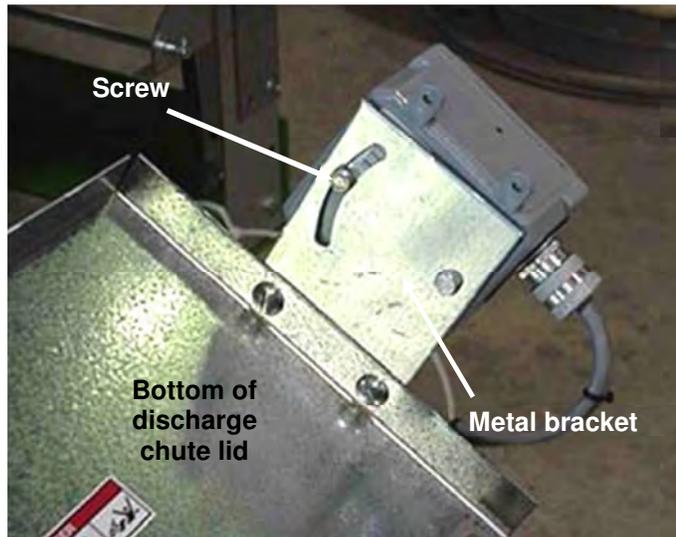


Image 4-21 – Screw and metal bracket

3. Adjust box so that when discharge chute lid is opened 2" to 3" (51mm-76mm), a fault occurs. Box can be adjusted by rotating it. Once position has been found, tighten screw to hold box in place.

Preventive Maintenance

Preventive maintenance is very important. It can help ensure dryer will perform well throughout drying season. Maintenance steps presented here are minimum procedures to be performed.

IMPORTANT: See Appendix F - Parts Assemblies for part numbers.



CAUTION: When using ladder attached to dryer, make sure ladder is dry before climbing. Ladder may be slippery when wet.

All bolts used to keep enclosures locked **MUST** be tightened after dryer maintenance to prevent undesired access.



WARNING: Lock out electrical power before removing any safety shields.

Physical Inspection

1. Remove fan inlet screens. Check for foreign material on fan blades. Ensure fan rotates freely.
2. Check ventilation openings in motor for any blockage. Pay close attention to inside of fan hub. Reinstall fan inlet screens.



WARNING: NEVER run fan without screen guard securely attached to fan housing!

3. Check wiring of fan and heater. Look for loose connections, bare wires or rodent damage. Be sure to check ignition wire and flame sensor wire for damage or short to ground.

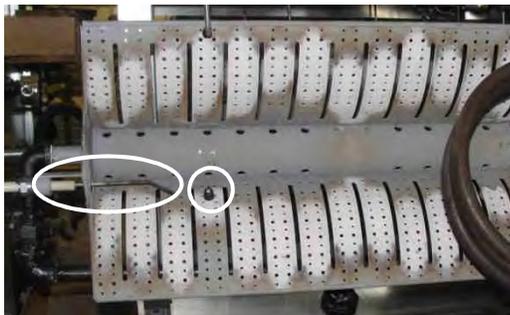


Image 4-22 – Flame rod



Image 4-23 – Spark plug/igniter

4. Examine flame rod (J5747) for cracked porcelain insulation and verify it is not touching metal burner. See Image 4-22.
5. Examine spark plug (J5739) for proper gap. Clean electrodes if required. Gap should be 3.2mm (1/8"). Spark plug and flame rod should be examined periodically throughout drying season. See Image 4-23.
6. Remove and clean gas strainer as shown in Fig. 4-1.

7. Inspect all pipe train components for physical integrity. See Pipe Train Components Identification page elsewhere in this manual.

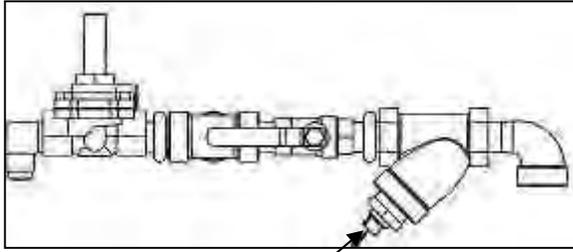


Fig. 4-1 – Remove gas strainer/filter at hex nut

8. Inspect all pipe train connections for tightness and leaks. Spraying soapy water on connections and looking for bubbles is a good way to detect leaks.
9. Be sure to check vaporizer coil yearly. Vaporizer should be replaced every five (5) years.

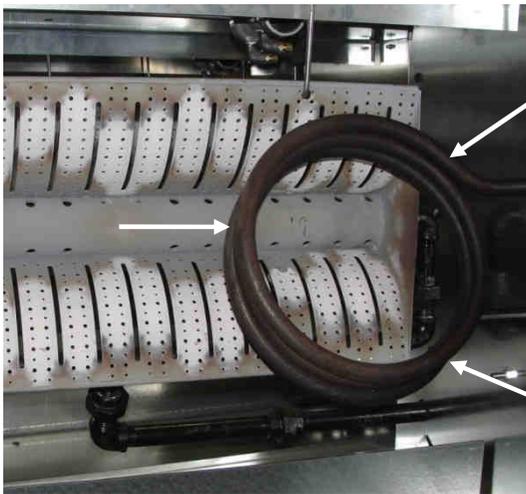


Image 4-24 – Vaporizer coil



CAUTION: One drop of liquid propane will expand 270 times as it converts to vapor. It is very dangerous to have vaporizer coil develop a leak during heater operation.

Daily Maintenance Requirements

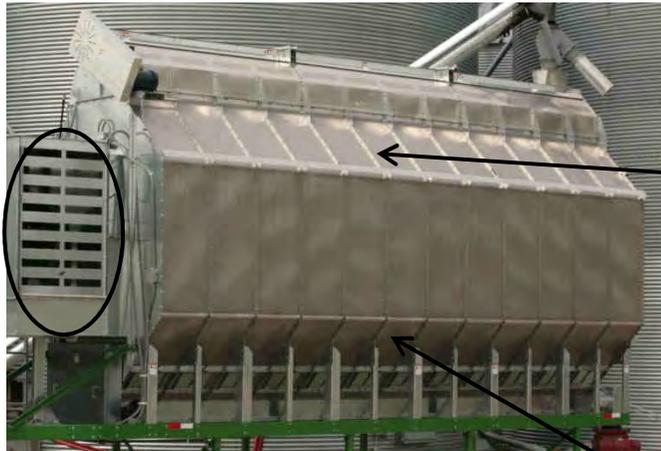


Image 4-24 – Fan inlet, top exhaust slope and lower grain column slope

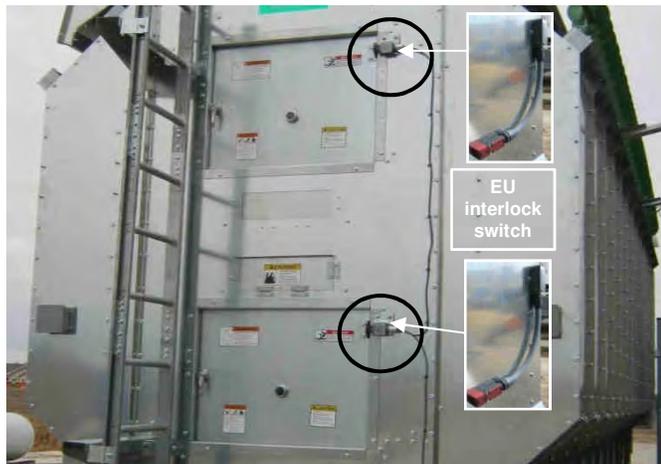


Image 4-25 – Rear access doors, interlock switches

This assumes 24-hour per day operation during harvest.

1. Clean foreign material from fan air inlets (in oval).
2. Sweep off top of exhaust slope where fines may have accumulated on outer perforated skins. Pay particular attention to area directly under wet holding portion of dryer, where excessive amounts of fines and foreign material can accumulate.
3. Visually inspect for an even grain movement along all grain columns. If grain in one column is not moving or is moving slower than grain in other columns, check for obstructions in flow gate area or columns.
4. **Shut dryer down** and clean out any fines and foreign material in plenum. Open rear access door. Sweep all fines and debris from front of plenum to rear of plenum. Close rear access door. Be sure that tip of rear door interlock switch is depressed.



Image 4-26 – Rear clean-out door

5. Open rear clean-out door. See Image 4-26.
6. Operate fan by running it in Dry Fire mode or in Manual mode. Continue running fan until no more debris comes out of rear clean-out.
7. Turn fan off.
8. Close rear clean-out door.
9. Sweep fines/debris off discharge chute screen. See Image 4-27.



Image 4-27 – Grain discharge chute screen



Image 4-28 – Discharge moisture sensor installed

10. Remove discharge moisture sensor located under discharge tube as shown in Image 4-28 or on optional jump auger assembly (not shown). Clean sensor flag and tube. See Image 4-29. Reinstall moisture sensor.
11. Inspect temperature sensor wire (RTD) as shown in Image 4-30. Clean if necessary.
12. Restart dryer operation per automatic control or manual control.



Image 4-29 – Discharge moisture sensor flag and tube



Image 4-30 – RTD Temp sensor wire

Semi-weekly Maintenance Requirements

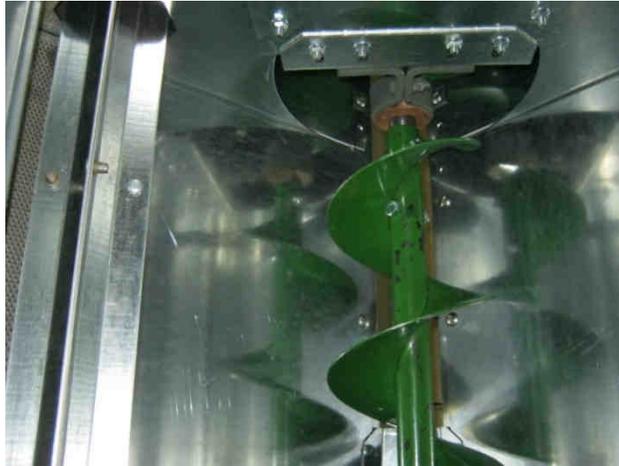


Image 4-31 – Unload auger inside access/cleanout door removed



Image 4-32 – Unload auger outside access/cleanout door handle

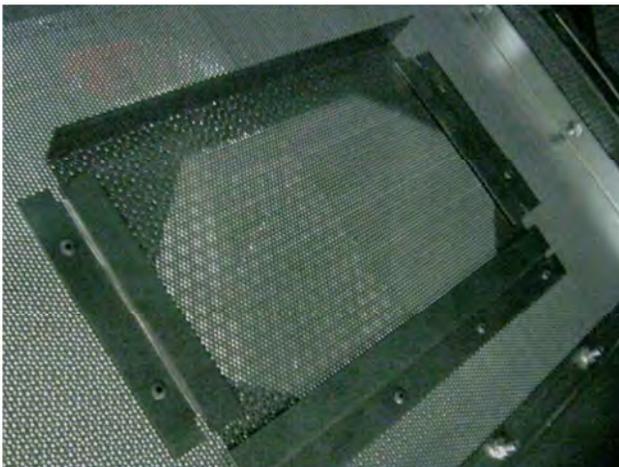


Image 4-33 – Grain column inside cleanout sliding door

1. Perform all steps of daily maintenance requirements as listed in previous section except Step 12, restarting dryer.

2. Remove floor plate and inspect unload auger area for obstructions, fines, and debris. Clean as necessary. Close inner and outer unload auger cleanout/access doors. See Images 4-31 and 4-32.

3. Open inner and outer grain column Clean-out/access doors and remove debris. Close doors. See Images 4-33 and 4-34.



Image 4-34 – Grain column outside cleanout door handle

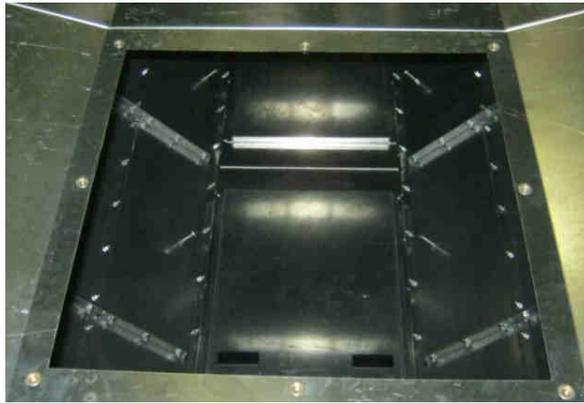


Image 4-35 – Plenum divider door removed

4. Remove plenum divider door and clean out any debris. Replace door. See Image 4-35.

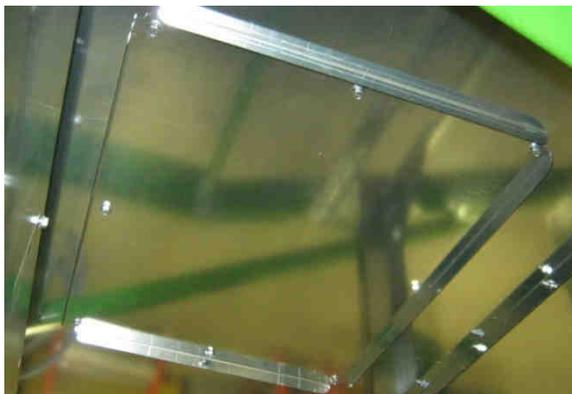


Image 4-36 – Vacuum-cool duct cleanout door

5. Remove vacuum-cool duct door and clean out any debris. Replace door. See Image 4-36.
6. Restart dryer operation per automatic control or per manual control.

Weekly Maintenance Requirements

1. Unload grain from dryer by performing Final Dry in automatic mode.
2. Perform all steps from Daily and Semi-weekly requirements except for restarting dryer.
3. Thoroughly inspect grain columns for accumulation of trash and fines, at peak of inner perforated grain walls and above meter roll flow gates.
4. Check tension of load and unload auger drive belts.
5. Restart dryer per automatic control (Initial Load, Initial Dry).

End-of-Season Maintenance Requirements

1. After dryer is unloaded for last time, open all access doors and panels. Thoroughly clean entire dryer by sweeping and using compressed air. Ensure cleaning of wet bin trash pan.



CAUTION: Do not blow compressed air directly into static air pressure switch.

2. Perform all steps listed under Preventive Maintenance.
3. **Leave Unload Auger clean-out doors open for water drainage.**
4. Lock out electrical power.
5. Install a cover on fan inlet screen to keep debris from entering fan. Never place obstacles in way of fan to stop rotation.
6. Remove discharge moisture sensor from grain discharge chute and put into sensor holder (sensor could be damaged by standing water if left inside tube).

Troubleshooting Guide

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Safety Section

General Safety Practices



On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety. They indicate potential hazards and levels of intensity.



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



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



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



NOTICE alerts you to practices unrelated to personal injury, such as messages related to property damage.

IMPORTANT: To prevent serious injury or death to you or your family, it is essential that safety decals are clearly visible, in good condition, and applied to the appropriate equipment.

Follow Manual Instructions and Safety Decal Messages

Observe safe operating practices. Carefully read this manual and all safety decals on your equipment. Decals must be kept in good condition. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at PO Box 677, Sheffield, Iowa USA 50475-0677; by phone at 641-892-4222; or by e-mail at info@sukup.com.



It is the responsibility of the owner/operator to know what specific requirements, precautions, and work hazards exist. It is also the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of the hazards and safety precautions that need to be taken to avoid personal injury or death. **An example training register is printed in this section to assist in that process.**

Basic Safety Rules

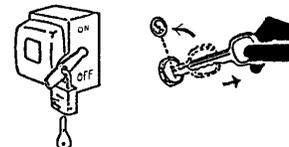
1. Learn how to use controls and operate equipment.
2. Do not let anyone operate unit without thorough training of basic operating and safety procedures. **Always follow a proper lockout procedure.**
3. Do not modify or redesign equipment without first obtaining written approval from Sukup Manufacturing Co. Unauthorized modifications to the equipment may impair the function and/or safety and affect machine life.
4. Periodically check all mechanical and electrical components. Keep unit in good working condition.
5. Handle equipment and parts with care. **Wear protective clothing** to avoid injury from sharp metal edges.
6. Wear Personal Protective Equipment (PPE) such as safety glasses, gloves, hardhat, steel-toed boots, ear protection and dust mask as required.

Keep unit well maintained according to the procedures in the maintenance section beginning on page 1-19 of this Owner's Operation Manual.



CAUTION: To avoid electrocution, all equipment must be properly wired and grounded according to electrical codes. Have unit wired by qualified electrician.

IMPORTANT: Supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with current editions of BS EN 60204-1.



Mains Isolater must be located outside of bin. It must be easily accessible from ground level and must be lockable in off position. Mark clearly as to equipment it operates. See Mains Isolater decal placement information later in this section.

Always LOCK OUT main power switch (Mains Isolater) whenever equipment is not in use or when servicing unit. Check with voltage meter before servicing unit.

TRANSPORT SAFETY WARNING: TRUCKER-TRANSPORTER IS TO PROVIDE APPROVED SAFETY CHAIN WHEN TOWING DRYER.



WARNING: Transporting this equipment on farm sites requires precautionary measures in order to prevent serious injury or death. If transport is required it is essential that all of the following procedures be adhered to:

- Read and understand operator's manual.
- Check and comply with state & local regulations.
- Use required emblems or lights.
- Keep away from overhead electrical lines.
- Reduce speed and/or use lower gear on rough ground or slopes.
- Stop gradually.
- Use mirrors. Have extended rear angle mirrors on vehicles.
- Signal & check behind you when turning.
- Use safety chain when towing dryer.
- Use break-away kit (available from Sukup Mfg Co - Computer #T4366).
- Be sure to have clear visibility
- Use signal lights

Failure to heed these warnings may result in serious injury or death. Use good judgment when transporting. Maintain complete control of unit at all times. **Comply with state and local regulations.** Read safety procedures before moving units. Always strive to prevent accidents! Watch out for other vehicles.



WARNING: TO PREVENT EXPLOSION OR FIRE



- Carefully review operator's manual, **including all safety instruction.**
- Keep dryer clean inside and out, as fines may cause a fire.
- Check for gas leaks, (spray soapy solution on piping and joints.)
- Run fan at least a half-minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection door open.

Failure to heed these warnings may cause serious injury or death.

Please refer to applicable sections of this operation manual for detailed instruction.



WARNING: KEEP CLEAR OF ALL MOVING PARTS

Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation. Keep away from all moving parts. Entanglement can cause serious injury or death. Keep fan screen guards and all shields in place and in good working condition. Replacement screen guards and shields are available from Sukup Manufacturing Co. at no charge.



Failure to follow the above precautions may cause serious injury or death.

EMERGENCIES - KNOW WHAT TO DO

Have telephone numbers and written directions to your location near your telephone in the event of emergency. A place to record information is provided here.

Emergency Information	
Ambulance:	_____
Fire:	_____
Address of work site:	_____
Directions to your location:	_____

Risk reduction for servicing dryer

IMPORTANT: Conditions inside dryer plenum may vary greatly from the ambient conditions.

Please follow the safety guidelines before entering the plenum:

- Appoint a responsible individual to oversee the task and remain outside the dryer while servicing.
- Ensure the dryer is isolated and all fuel and power is disabled to the unit.
- Operator is in good physical condition and at low risk of medical problems such as asthma and cardiac problems.
- Unit is empty of grain; avoid entry when unit is full.
- Do not close doors while inside the unit, to ensure proper airflow and vent toxic gasses.
- Have immediate and close access to a lifting device, which can reach the dryer platforms in the event of emergency.
- Have adequate tools on hand for quick removal of the ladder in the event of an emergency.
- Carry a communication device to use in the event of an emergency and ensure proper signal is available (mobile phone with adequate signal).
- Wear personal protection equipment such as safety glasses, gloves, dust mask, steel-toe boots, ear protectors, safety harness, and hardhat as required.
- Consider additional risks when performing maintenance that includes cutting or welding (fire, fumes and dust). Ensure quick access to an ABC (dry chemical) fire extinguisher.
- Assess the climatic conditions: If the weather is undesirable (icy platforms, extreme heat) reduce risk by servicing when the climate improves.



Follow additional safety guidelines when servicing top conveyor and wet bin drive on outside of dryer:

- Use a lifting device with a safety cage to safely reach upper areas of dryer.
- Wear relevant personal protective equipment such as hardhat, safety harness and safety glasses when accessing and servicing these areas.

In the event of minor injury (minor cuts and scrapes):

- Ensure a first aid kit is available on site and workers are trained in first aid to treat minor injury.
- Avoid first aid on the platforms due to low available workspace and height.
- Contact emergency services if the injury prevents descending from the dryer platforms.

In the event of serious injury (loss of consciousness or serious cut):

- Contact emergency services immediately.
- In the event of rescue from inside the plenum the ladder may hinder rescue. **The ladder may be removed by cutting or unbolting the bracing brackets from the unit.**

Safety Section

To prevent serious injury or death to you or your family, it is essential that these safety decals be mounted on your dryer.

Check that all safety decals are in place according to the decal placement drawing and in good legible condition when dryer is installed.

IMPORTANT!! If suggested locations are not clearly visible, place safety decals in a more suitable area. Never cover up existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at PO Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com. Please specify computer number.

1. Decal L0281 - WARNING: To avoid serious injury or death.



2. Decal L02741 - DANGER: Keep away from any electrical lines, especially when moving unit.



3. Decal L0234 - WARNING: Door interlock switch. Switch resets when door is closed.



4. Decal L0166 - WARNING: Guards & screens in place. Disconnect electricity. Check fan blade.



5. Decal L0271 - DANGER: Shield missing, do not operate.



6. Decal L0284 - WARNING: Keep away from all moving parts.



7. Decal L0285 - CAUTION: Not intended for use on public roads. If transporting is required:



Safety Section

8. Decal L02831 – WARNING: Lower and secure parking stands before unhitching unit.



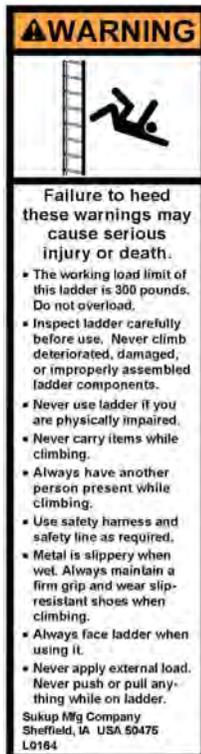
9. Decal L03061 - DANGER: Keep away when auger is running! Entanglement will cause serious injury or death!



10. Decal L0520 - CAUTION: Failure to keep unit clean may cause fire and serious injury or death.



11. Decal L0164 - WARNING: Ladder safety – falling from heights hazard. Overall precautions for ladder safety.



12. Decal L0512 – WARNING: Use safety chain when towing unit to eliminate detachment hazard.



13. Decal L0062 – DANGER: Never run fan without screen guard; Stay clear from front of fan; Follow correct procedure when installing fan blade.



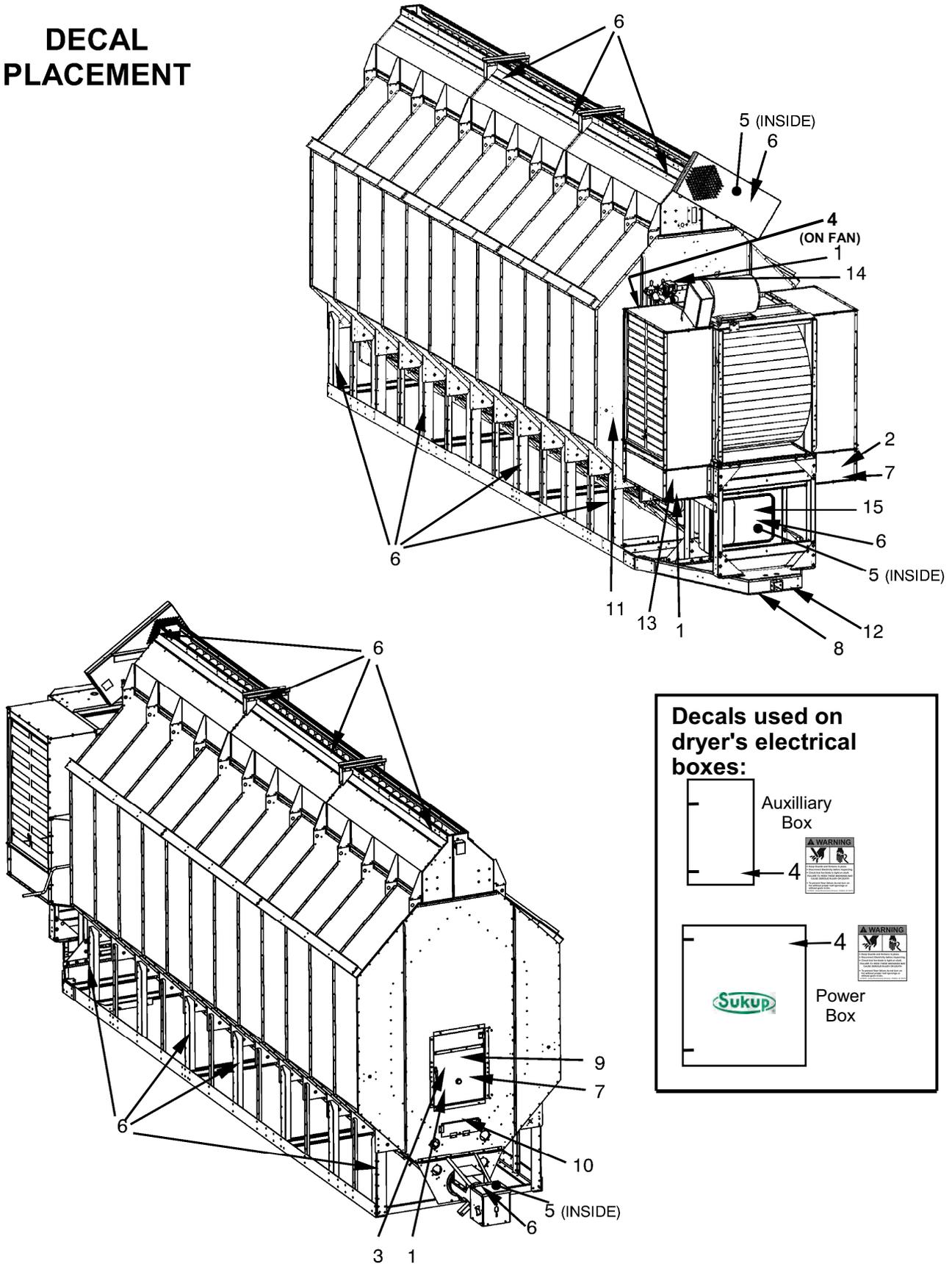
14. Decal L0165 - WARNING: Disconnect Electricity; Bleed gas; etc.



15. Decal L0204 - DANGER: Do not operate with service door removed.



DECAL PLACEMENT



EU SAFETY LABELS

To prevent serious injury or death to you or your family, it is essential that these safety decals be mounted on your dryer.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. Replace missing or damaged safety decals or shields free of charge by contacting Sukup Manufacturing Co. by mail at PO Box 677, Sheffield, Iowa 50475; by phone at 641-892-4222; or by e-mail at info@sukup.com. Please specify computer number.



L5100 Sukup Manufacturing Co Sheffield, IA USA

Label #L5100 – Place inside power box of dryer and on dryer where electrical precautions are needed.



L5101

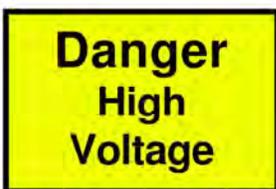


Sukup Manufacturing Company Sheffield, IA USA

Label #L5101 – Place near power disconnect of dryer.



L5102

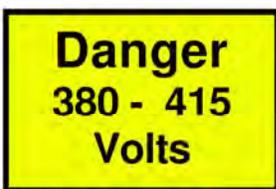


Sukup Manufacturing Company Sheffield, IA USA

Label #L5102 – Place near main power source of dryer.



L5103



Sukup Manufacturing Company Sheffield, IA USA

Label #L5103 – Place near main power source of dryer.



L5104

Sukup Manufacturing Co Sheffield, IA USA

Label #L5104 - Place at dryer rear access door (entrance to plenum).



L5105 Sukup Manufacturing Co Sheffield, IA USA

Label #L5105 – Place at dryer rear access door (entrance to plenum).



L5106

Sukup Manufacturing Company Sheffield, IA USA



Label #L5106 – Place near shut off to power source.



Label #L5107 – Place near main power shut off.



Label #L5109 – Place near main power panel.



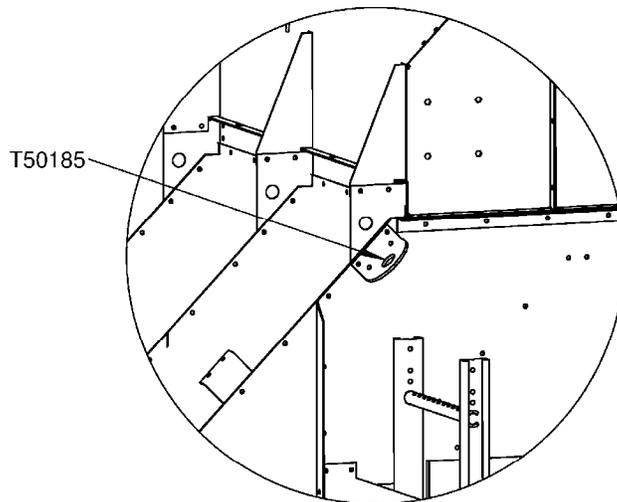
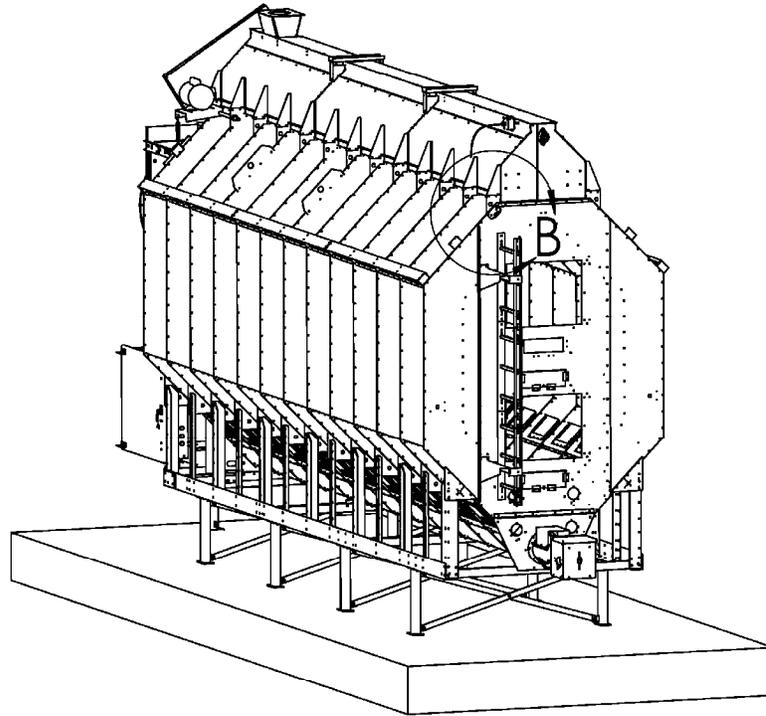
Label #L5108 - Placed on axial fans.



Label #L5111- Place at dryer rear access door (entrance to plenum).

NOTE: See harness anchor point bracket placement drawing on next page.

HARNES ANCHOR POINT BRACKET PLACEMENT



INSTALLATION SHOWN
ON SINGLE MODULE
DRYER.

DETAIL B
SCALE 1 : 15

SWCD0077
12/16/2011MCM

Fault Troubleshooting

Grain Discharge Chute Sensor

The Grain Discharge Chute Sensor is present on dryer to detect Discharge Chute opening during operation. This fault usually indicates a problem with take-away system.



Image 5-1 – Grain discharge chute switch

placing door at height you wish fault to occur. fault occurs.

3. If unable to adjust sensor and turn on PLC input light, a voltmeter will be used to determine if sensor is malfunctioning.
4. At Discharge Chute, find junction box fastened to lid. This box contains sensor. Remove cover and locate two wires coming from sensor. One of the wires should be labeled # 18. Measure for 24VDC from wire #18 to ground. (On older dryers, a jumper may need to be installed in control box from wire # 95, found on the PLC, to ground bar at bottom of control box).

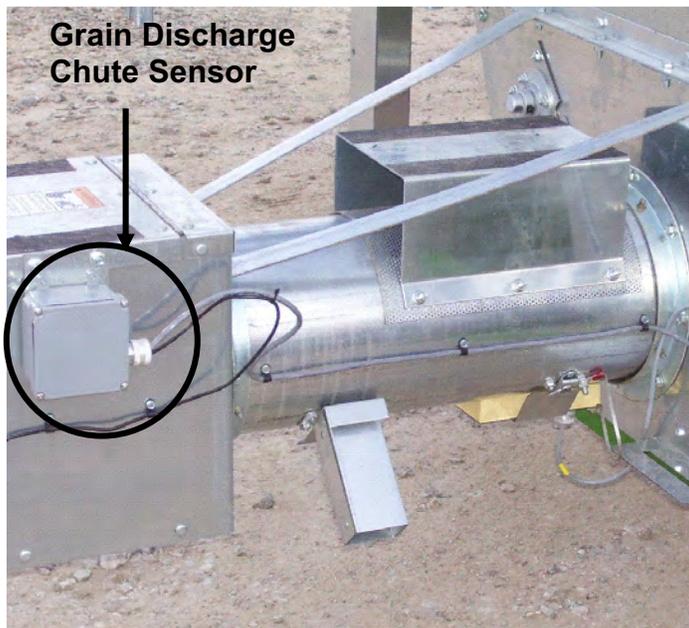


Figure 1.1c: Placement of sensor on dryer



Fault Condition

Discharge Chute is Open

All dryer models use wire #42

1. Is Discharge Chute open?
Determine cause of door being opened and return door to closed position.
2. Is sensor out of adjustment?
This can be determined by watching input light on PLC or by observing System Diagnostics screen in the Tools Menu. Adjust angle of switch after
The PLC input light turns off when a
5. If 24VDC is measured on wire # 18, check for voltage on wire # 42. If 24VDC is not present, tilting sensor may be necessary to allow mercury to make contact with switch contacts. If unable to measure 24VDC on wire # 42, sensor is bad and must be replaced.
6. If 24VDC is present on wire # 42, but the PLC input light is still off, proceed to Power Box and measure terminal # 42 for 24VDC. If unable to measure 24VDC on terminal # 42, check connections between Discharge Chute Sensor and Power Box.
7. If 24VDC was measured on terminal # 42 in Power Box, measure PLC input where 42 goes into PLC. If 24VDC is present on input on PLC but light is OFF, PLC is malfunctioning.

Grain Level Ball Switch

The Grain Level Ball Switch is located on side of the dryer connected to paddle switch. This is used to indicate when dryer is running low or out of grain. A fault will be displayed when this occurs.



Figure 1:2b: Grain Level Ball Switch



Fault Condition

10-Minute Load Attempt Timeout
All dryer models use wire #44

1. Is the wet bin out of grain?
If this is last load for season, press Reset and Start →Final Dry.
2. Has an auxiliary load malfunctioned?
Repair the cause of the load failure and press Reset.
3. If wet grain is available and the load auxiliaries are functioning, is the paddle switch bound up?
If so, free the paddle switch and repair the cause.
4. Are both PLC input lights off? (Both lights should be off when the dryer is calling for grain – paddle down)
Are both PLC input lights on? (Both lights should be on when the dryer is full – paddle up)

If not, remove the cover from the junction box on the paddle switch assembly and visually check sensors for proper placement in their respective holders.

5. Observe the PLC input lights (#44-Lower; #53-Upper) while someone moves the paddle switch from the down position to the up position.

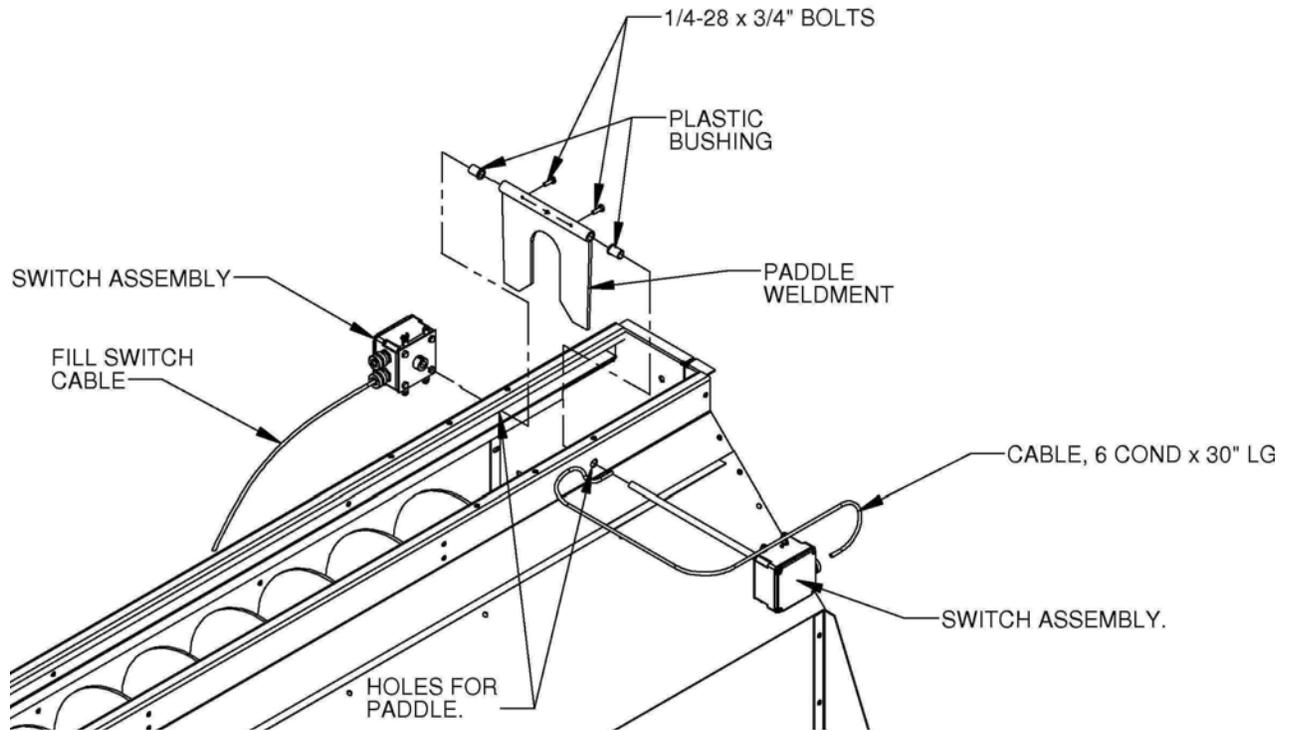
Lower-Input 1.1.1; Upper-Input 1.2.3

If either PLC input light does not turn on, measure for 24VDC on wire #18 to ground. (Touch the black probe from the meter to the dryer frame.)

6. If 24VDC is measured on wire #18, measure for 24VDC on the other wire going to the sensor.
 - a. With the paddle switch in the up position, 24VDC should be measured on wire #44 and #53.
 - b. If not, replace the respective sensor and recheck for voltage.
7. If the paddle switch is in the up position and 24VDC is present on both sensors, but one or both of the PLC input lights are off, voltage will need to be measured on the respective terminal on the Power Box terminal strip.

If 24VDC is not measured on the respective terminal, check the wiring connections between the Paddle Switch junction box and the Power Box terminal strip.

8. If 24VDC is measured at the Power Box terminal strip and the PLC input lights are not on, the PLC may be malfunctioning.



Grain Level Ball Switch positioned on dryer

Unload Auger Proximity Sensor



Figure 1.3b: Unload Auger Proximity Sensor

The Unload Auger sensor is located on the discharge bin on the end of the unload auger. This sensor monitors the unload auger and will give a fault and stop the dryer if the unload auger stops turning.



Fault Condition

10-Minute Load Attempt Timeout

All dryer models use wire #44

1. Visually inspect the load auger for a problem.
 - a. Are the belts tight and in good condition?
 - b. Does the motor smell or feel hot?
 - c. Is a Motor Overload fault being displayed along with the Unload Auger fault? If so, do not restart the Unload motor until a definite cause for the overload has been determined. After repairing the cause of the fault, reset the motor overload. Then press RESET on the keypad.
2. If no fault is being displayed, go to Manual and turn on the Unload and check for rotation.
 - a. While the auger is rotating, check the PLC Input light, this light should be flashing at a regular rate, indicating rotation. **Input-1.3.2**
 - b. If the PLC Input light is not flashing, check auger for rotation. If the auger is not rotating, find the cause and repair.
3. If rotating, look at the back of the sensor itself. A small, orange light should be visible and flashing on and off.
4. If the light on the back of the sensor is not flashing, find the junction box attached to the discharge chute and remove the cover.
 - a. Locate the Brown, Black, and Blue wires coming from the Unload Auger Sensor. Measure for 24VDC on wire # 18 (brown), with respect to wire # 95 (blue).
 - b. If 24VDC is not measured on wire # 18, go to the Power Box terminal strip and measure for 24VDC on the bottom terminal strip.
 - c. If 24VDC is not measured on wire # 18 in the Power Box, go to the Control Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is not measured on wire # 18 in the control box, go to the PLC and measure for 24VDC on the topside of the PLC.
5. If possible, position the flag over the sensor so that the sensor will be in the ON condition.

Unload Auger Proximity Sensor (continued)

- a. With the sensor in the ON condition, the light on the back of the sensor should be on. Measure for 24VDC on the output wire (black).
If the light is on but 24VDC is not measured on the output (black) sensor wire, the sensor is malfunctioning.
- b. If 24VDC is measured on the output (black) sensor wire, go to the PLC in the Power Box and check the PLC Input light. This light should be on when the sensor is in the ON condition.
- c. If 24VDC is measured on the output (black) sensor wire but the PLC input light is not on, measure for 24VDC on the Power Box terminal strip. If 24VDC is not measured, in the Power Box, check wiring connections between the junction box and the Power Box.

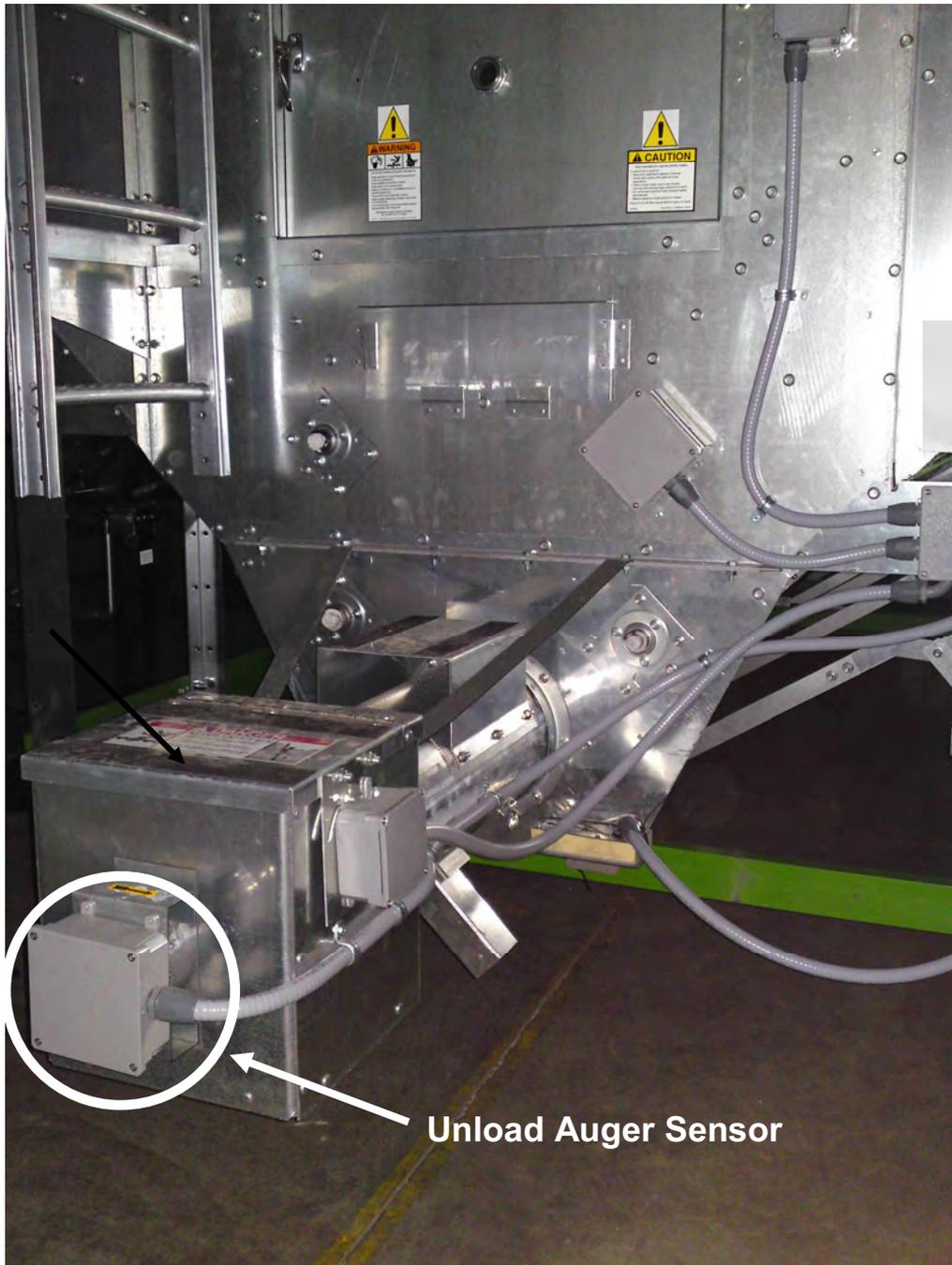


Figure 1.3c: Unload Auger Proximity Sensor Installed on Dryer

Vapor Over-Temperature Switch

The Vapor Over-Temperature Switch is located on pipe train for the heater(s). It is provided to prevent gas from over heating vaporizer and causing vapor to vaporize.



Figure 1.4b: Vapor Over-Temperature Switch



Fault Condition

Vapor Over-Temp

2nd module uses wire #102

1st module (bottom) uses wire #37

This fault indicates when output of vaporizer coil has become too hot (above 60 C.)

- a. The tubing near fault device should be fairly warm to the touch but not hot.
 - b. Check fuel supply - is tank low on fuel?
 - c. Air inlet obstruction – clean debris from fan grill.
 - d. Vaporizer coil is too close to flame. Adjust vaporizer coil.
1. Has the Vaporizer Coil had sufficient time to cool down?
This device will automatically reset when the device has cooled down.
 2. Is the PLC Input light on?
 - a. After the device has cooled down and reset, the PLC Input light should now be ON.
 - b. If not, follow the wiring from the coil to the heater box and measure for 24VDC on wire # 18.
 3. If 24VDC is not measured on wire # 18, go to the Power Box and measure 24VDC on the terminal strip.
If 24VDC is measured on wire # 18 on the Power Box terminal strip, check the wiring connections from the Heater Box to the Power Box.
 4. With 24VDC now being measured on wire # 18 on one wire of the vaporizer O/T switch, and the device has cooled down to ambient temperature, measure for 24VDC on the other wire (not # 18) coming from the O/T switch.
 - a. If 24VDC is NOT measured on the other wire, the O/T switch is bad.
 - b. If 24VDC is measured on the other wire coming from the O/T switch, take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the Power Box and the Heater Box.
 - d. If 24VDC is measured on the Input terminal, and the Input light is NOT on, and the fault message is still being displayed (after pressing RESET), the PLC is malfunctioning.

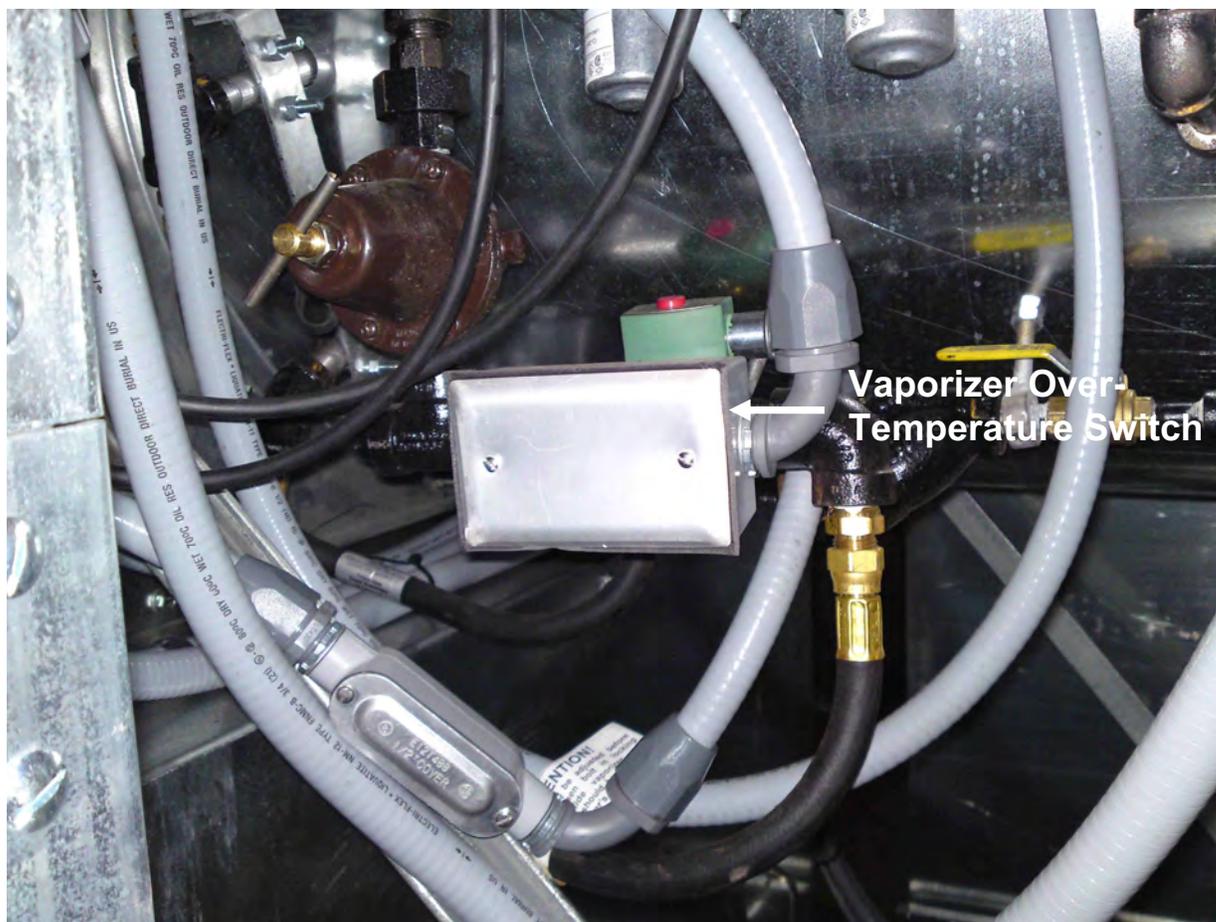


Figure 1.4c: Vapor Over-Temperature Switch Installed on Dryer

Rear Door Interlock Switch

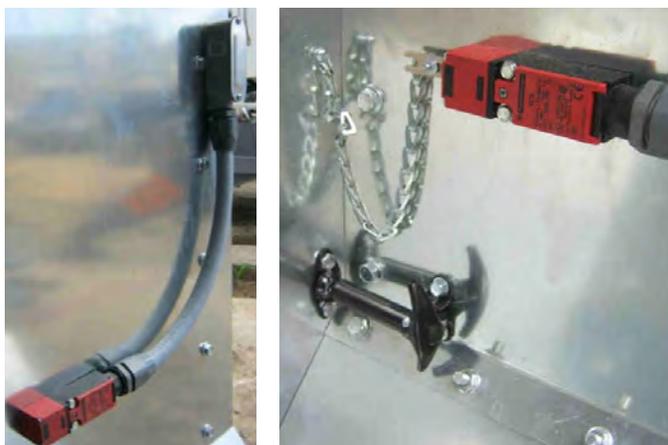


Figure 1.5b: Rear Door Switch

The Rear Door Interlock Switch is located to the left of each rear door on the dryer. This device is used to keep the dryer from running when the rear door is open and a person may be in the plenum of the dryer.

! Fault Condition
Rear Door is Open
 All dryer models use wire #36

1. Check the rear door or doors to be sure that the doors are closed.
2. If all doors are closed, check that the PLC input light is ON.

If the light is not ON, go to the junction box on the back of the dryer containing the wire from the switches. Remove the cover and locate and measure 24VDC on input wire.

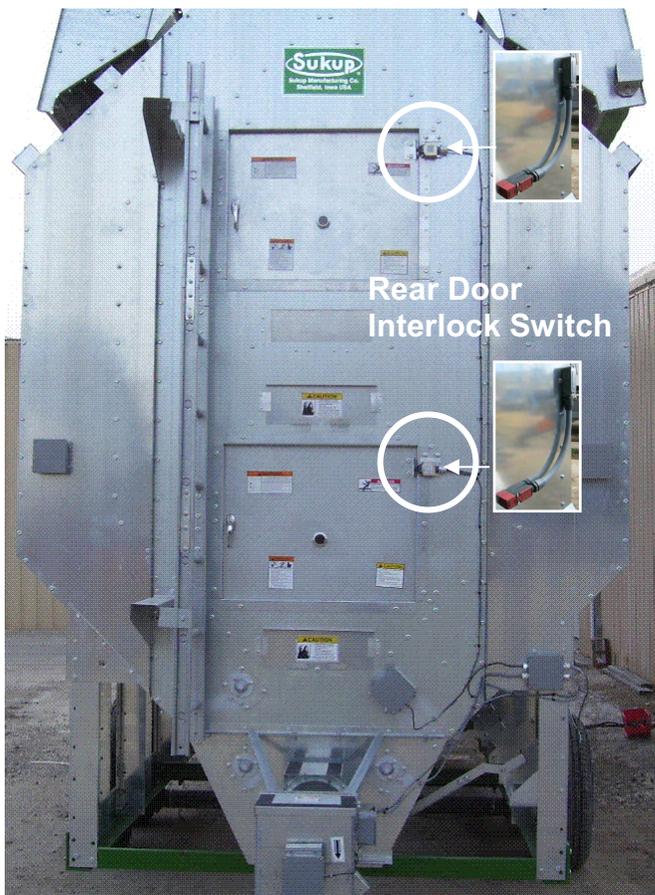


Figure 1.5c: Rear Door Interlock Switch Installed on Dryer

NOTE: On ALL dryers, wire # 18 feeds into the door switch and out of the push-button switch. If more than one plenum, the switches are connected in series and then routes back to the PLC input.

3. If 24VDC is not present on input wire, check that 24VDC is measured on wire #18.
 - a. If 24VDC is present on input wire, but the PLC input light is not ON, check for 24VDC returning from all the switches. Generally, each additional door switch adds a letter to the wire number after coming out each successive key switch. 36 – 36A – 36B – etc.
 - b. If 24VDC is not returned from the door switches, a voltage check on the wire coming from each switch may be required. (Rear Door key switches are in SERIES)
4. If 24VDC is being returned from the last switch, measure for 24VDC on the appropriate wire on the Power Box terminal strip.
 - a. If 24VDC is not measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - b. If 24VDC is measured on the Power Box terminal strip, check #36 on the PLC for 24VDC
5. If 24VDC is measured on the PLC input terminal but the input light is not on, and you have a Rear Door fault, the PLC is malfunctioning.

Grain Column Over-Temperature Sensor

There are two grain column over-temperature switches on dryer. Each has a sensor in a conduit running horizontally through grain columns. These sensors monitor temperature in grain columns. Switch will turn dryer off if columns reach 149°C.



Figure 1.6b: Grain Column Over-Temperature Sensor

Fault Condition
Right Column Over-Temp
 All dryer units use wire #40 for right side

Fault Condition
Left Column Over-Temp
 All dryer units use wire #41 for left side

1. Check all of the grain columns for an obstruction, which would prevent the grain from flowing through the grain column.

If an obstruction is found, do not restart the dryer until the obstruction has been cleared.

2. If no obstruction is found and grain is flowing freely through each column, the plenum temperature may need to be reduced.

NOTE: To check for an obstruction, go to Manual Operation and turn the Unload to ON. Run Unload long enough for grain level in columns to drop at least 1 foot. Stand back from dryer and look through screens to observe grain level in each column. Any column with an obstruction will be readily visible.



Figure 1.6b: Grain column over-temp switch (left side) [Referenced from rear (discharge end) of dryer.]

3. If the column temperature has cooled down and the RESET button has been pressed on the keypad, and the fault message is still being displayed, remove the junction box cover and measure for 24VDC on wire # 18.
4. Allow time for the Columns to cool down.
5. At this point, 24VDC should be measured on wire # 18 at the O/T sensor.
 Measure for 24VDC on the other wire (not # 18) coming from the sensor.
 - a. If 24VDC is NOT measured, the O/T sensor is defective.
 - b. If 24VDC is measured on the wire coming from the O/T sensor but
 The PLC Input light is NOT on, note the wire number and go to
 The Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is NOT measured on the terminal strip in the Power Box, check the wiring connections between the junction box and the Power Box.
 - d. If 24VDC is measured on the terminal strip in the Power Box, go to the PLC and measure for 24VDC on the Input terminal.

- e. If 24VDC is measured on the PLC Input terminal, the Input light is not on, and the fault message is still being presented (after pressing RESET), the PLC is malfunctioning.

Heater Housing Hi-Limit Switch

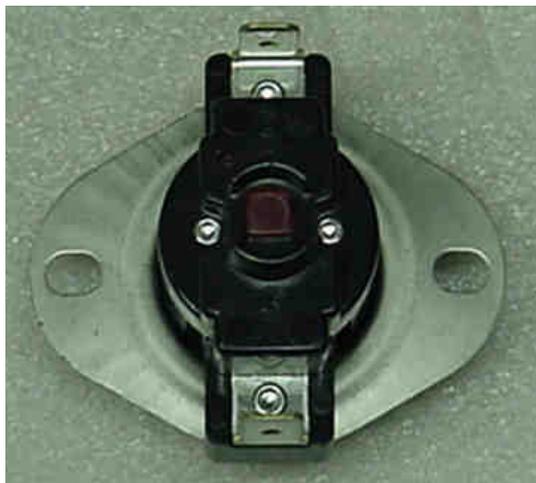


Figure 1.7b: Heater Housing Hi-Limit Switch

Heater Housing Hi-Limit switch is the reset button located in the 5x5 box mounted on the top side of the fan barrel. This switch trips when the heater reaches a temperature of 93°C.

! Fault Condition

Housing Over-Temp

2nd module uses wire #103
1st module (bottom) uses wire #38

1. Check for proper fan operation and airflow.
 - a. Check the ignition harness for burned wires. Replace as necessary.
 - b. Check for a plugged fan grill and remove any debris.
 - c. Remove cover from faulted Heater Box and push the RED reset button located at the center of the Heater Box.
 - d. Go to manual and turn on the fan. Insure that the fan is running at the proper speed.
 - e. Turn the burner switch to ON and observe the burner for proper operation.
2. After allowing time enough to cool, the RED reset button on the hi-limit switch should push in and latch.
 - a. If the reset button will not latch, the hi-limit switch is defective.
 - b. If the reset button will latch but the fault remains after RESET is pressed, voltage measurements will need to be taken.
3. Locate the two wires plugged in to the hi-limit switch. Measure for 24VDC on wire # 18.
 - a. If 24VDC is not present on wire # 18, go to the Power Box and check for 24VDC on the terminal strip.
 - b. If 24VDC is measured on the terminal strip, check wiring connections between the Heater Box and the Power Box.
4. At this point, 24VDC should be measured on wire # 18 at the hi-limit switch.
 - a. Measure for 24VDC on the other wire connected to the hi-limit switch. With the RED reset button latched in, 24VDC should be present.
 - b. If 24VDC is NOT measured, the hi-limit switch is defective.



Figure 1.7c: Heater Housing Hi-Limit Switch Installed on Top of Fan Barrel

- c. If 24VDC is measured but the PLC Input light is not ON, take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
- d. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the Heater Box and the Power Box.
- e. If 24VDC is measured on the Power Box terminal strip, go to the PLC Input terminal and measure for 24VDC.
- f. If 24VDC is NOT measured on the PLC input terminal, check the wiring connections from the PLC Input terminal to the Power Box terminal strip.
- g. If 24VDC is measured on the input terminal on the PLC but the input light is NOT on, and the fault message is still being displayed after pressing RESET on the keypad, the PLC is malfunctioning.

Metering Roll Proximity Switch



Figure 1.8b: Metering Roll Proximity Switch

The Metering Roll Proximity Switch is located in junction box at the back of the dryer. This device is used to monitor the metering rolls for rotation. If the rolls cease to turn, the fault will be displayed and the dryer will shut down.



Fault Condition
Metering Roll Prox Failure
 All dryer models use wire #93

1. Go to Tools → Manual Operation.
2. Turn the manual Meter Roll Speed control to 15%.
3. Press and Hold the Unload OFF button until it turns bright green and the unload starts.
4. Observe the chain on the Meter Rolls DC Motor for movement.

- a. If the chain is moving than check to see if the Meter Rolls are turning.
- b. If the Meter Rolls are not turning, check for a broken chain.
5. If the Meter Rolls are turning, go to the back of the dryer and look at the back of the Meter Roll sensor for the light turning on and off.
 - a. Check PLC Input for the light turning on and off.
 - b. After determining which Meter Roll Input signal is missing, go to that Meter Roll box which houses the proximity switch and remove the cover. Make sure that the flag is within 1/8" of the sensor head when passing over the sensor. If not, this adjustment will need to be made before proceeding. Turn the Unload OFF at a point where the Meter Roll flag is positioned above the proximity sensor. The orange light on the back of the proximity sensor should now be on.
 - c. If the orange light is not on, follow the wire from the proximity sensor to the junction box. Remove the junction box cover.
 - d. Measure for 24VDC on wire # 18.
 - e. If 24VDC is not measured on wire # 18 go to the Power Box and measure for 24VDC on the terminal strip.
 - f. If 24VDC is measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power box.
6. At this point, 24VDC should be present on wire # 18 in the junction box on the back of the dryer (brown sensor wire). This voltage is referenced to ground (blue sensor wire).
7. Make sure the flag is over the proximity sensor head and adjusted to 1/8th inch or less.



Figure 1.8c: Metering Roll Proximity Switch Installed on Dryer

8. The light on the back of the proximity sensor should be on, and 24VDC should be measured on the output (black sensor wire). If not, the sensor is defective.
9. If 24VDC is measured on the output (black) wire, go to the Power Box and check the PLC Input light. The input light should be ON when the sensor is in the ON condition.
 - a. If 24VDC is measured on the black sensor wire but the PLC Input light is not ON, take note of the wire number and go to the Power Box terminal strip and measure for 24VDC.
 - b. If 24VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - c. If 24VDC is measured on the Power Box terminal strip, go to the PLC and measure for 24VDC on the PLC Input terminal.
 - e. If 24VDC is measured on the PLC Input terminal but the light is NOT ON, the PLC is malfunctioning.

Static Air Pressure Sensor

The Static Air Pressure sensor is located in the junction box with the air switch (see below). It monitors the amount of static pressure in the plenum and will shut down the dryer if there is not enough present.



Figure 1.9b: Static Air Pressure Sensor Apart

Dryer must be full of grain to satisfy this sensor!!!

Fault Condition

No Static Air Pressure

2nd module uses wire #105
1st module (bottom) uses wire #43

1. To develop static air pressure in the plenum, the dryer must be full of grain. Check the grain level in the columns.
If columns are not full, check for the out of wet grain cause, and correct.



Figure 1.9c: Differential Air Switch (Located in Heater Box)

2. Using Tools → Manual Operation, turn the Fan ON. Check the fan for proper operation and airflow.
3. If a fault message is displayed, the air switch may not be adjusted correctly.
 - a. Remove the junction box cover containing the air switch.
 - b. With the dryer full of grain, and the fan switch turned to ON, check the PLC Input light. The input light should be ON at this time.
 - c. If the input light is NOT on, using a small straight screwdriver, turn the adjustment screw counter-clockwise until the input light turns on.
 - d. Once the input light is on, turn the fan off and observe the PLC Input light. The light should turn OFF as the fan slows down.
 - e. If the light remains ON after the fan has slowed, turn the adjustment screw clockwise very slowly until the input light turns off.
 - f. While watching the PLC Input, turn the fan ON and then OFF, making sure that the input light is turning on and off with the fan.



Figure 1.9c: Static Air Pressure Sensor

4. If, after going through the above procedure, the PLC Input light remains in either the on or the off position without changing, voltage measurements will be necessary.
 - a. Locate wire # 18 in the junction box and measure for 24VDC.
 - b. If 24VDC is NOT measured, go to the Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is measured on the terminal strip, go to the PLC and measure for 24VDC.
 - d. If 24VDC is measured on this wire, use a small screwdriver and turn the adjustment clockwise until the 24VDC is no longer present.
 - e. If turning the adjustment screw clockwise fails to turn OFF the Air Switch, the switch is defective.

Fault Troubleshooting

- f. If 24VDC is NOT measured on the wire coming from the Air Switch, use a small screwdriver and turn the adjustment screw counter-clockwise until 24VDC is measured.
- g. If turning the adjustment screw counter-clockwise fails to turn ON the Air Switch, the switch is defective.
5. After replacing the Air Switch, follow the previous instructions on switch adjustment for proper operation.
 - a. If the PLC Input light is not turning on when the Air Switch is on, voltage measurements will need to be taken.
 - b. Adjust the Air Switch to the ON position. Measure for 24VDC on the wire coming from the Air Switch.
 - c. Take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the junction box and the Power Box terminal strip.
 - e. If 24VDC IS measured on the terminal strip, go to the PLC Input terminal and measure for 24VDC.
 - f. If 24VDC is NOT measured on the input terminal, check wiring connections between the terminal strip and the PLC.
 - g. If 24VDC is measured on the PLC Input terminal but the input light is not on, but the fault message is still being displayed after pressing RESET, the PLC is malfunctioning.

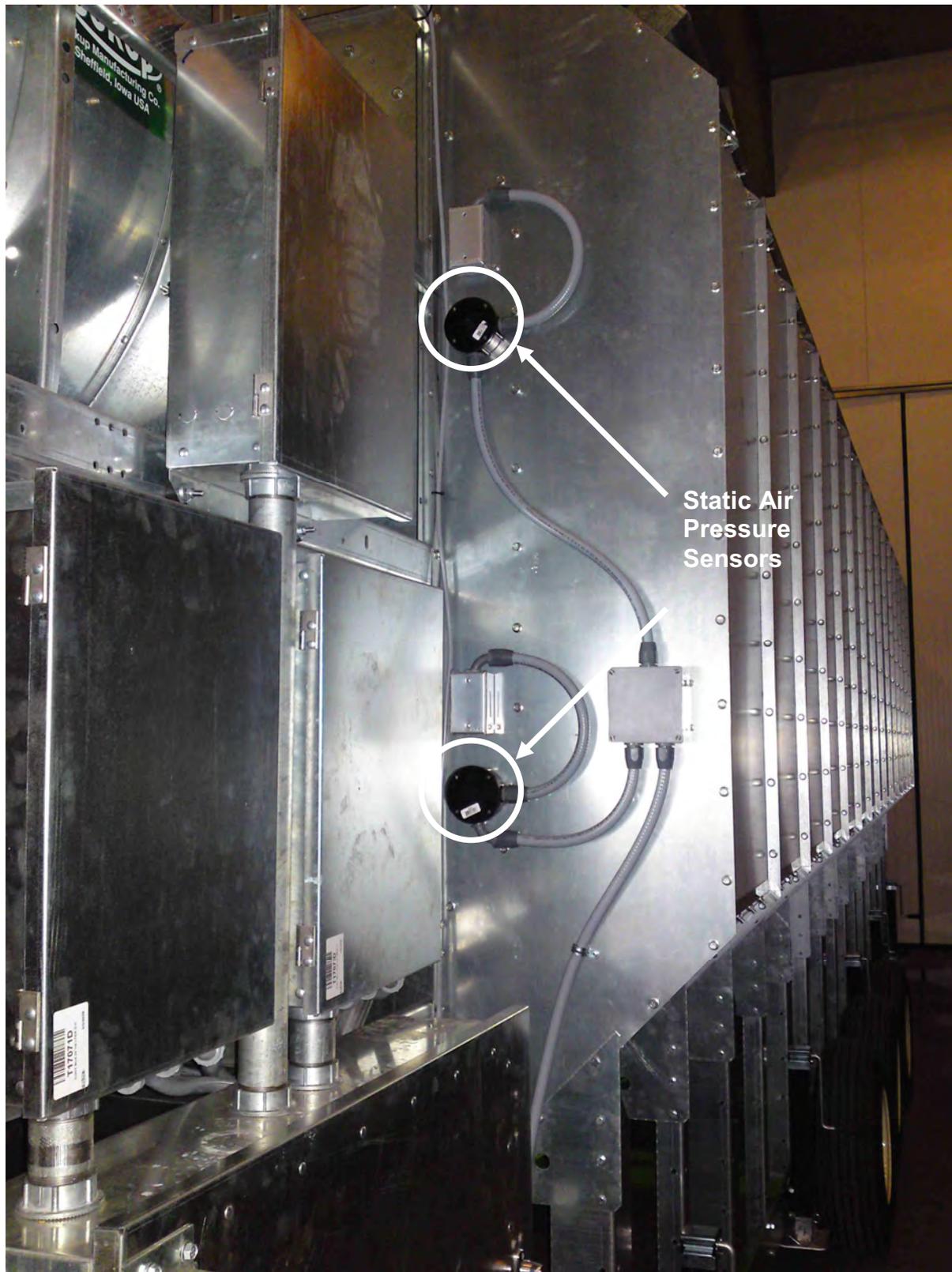


Figure 1.9d: Static Air Pressure Sensors Installed on Dryer
(Located in same box as Plenum Over-Temp Sensor.)

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Plenum Over-Temperature Sensor



The Plenum Over-Temperature Sensor is located inside the plenum of the dryer. It is provided to protect from the plenum over heating.



Fault Condition

Plenum Over-Temp

2nd module (upper) uses wire #104

1st module (lower) uses wire #39

Figure 1.10b: Plenum Over-Temperature Sensor

1. Check the fan grill for obstruction and remove any accumulated debris.
2. With the dryer shut down, remove the key from the key-lock switch at the plenum access door. Open the door and inspect the plenum for any problems.
3. After the plenum has cooled down, press the RESET, and the fault should be cleared.
4. If the fault has not cleared, remove the cover from the junction box containing the Plenum O/T sensor and measure for 24VDC on wire # 18.
If 24VDC is NOT measured, check the connection with the bank of terminal 18 in the Power Box.
5. At this point, 24VDC should be measured on wire # 18 on the Plenum O/T switch.
6. Measure for 24VDC on the other side of the switch.
 - a. If the O/T switch is cooled down and 24VDC is NOT measured on the other wire, the sensor is defective.
 - b. If 24VDC is measured on the other wire coming from the sensor, Go to the PLC and check the input light. If the input light is ON, press RESET, and the fault should clear.
 - c. If the input light is not ON, take note of the wire number coming out of the O/T sensor and go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - e. If 24VDC is measured on the Power Box terminal strip, measure for 24VDC on the PLC Input terminal.
 - f. If 24VDC is measured on the PLC terminal, and the input light is OFF, but the fault message is still being displayed, the PLC is malfunctioning.



Figure 1.10c: Plenum Over-Temperature Sensors Installed on Dryer
(Located in same box as Static Air Pressure Sensor.)

Device Troubleshooting

Discharge Moisture Sensor



The Discharge Moisture sensor is found under the discharge chute at the rear of the dryer. It is used to calculate the moisture and temperature of the grain as it is discharged from the dryer.



Fault Condition
Moisture Sensor Not Found

Figure 2.1b: Discharge Moisture Sensor

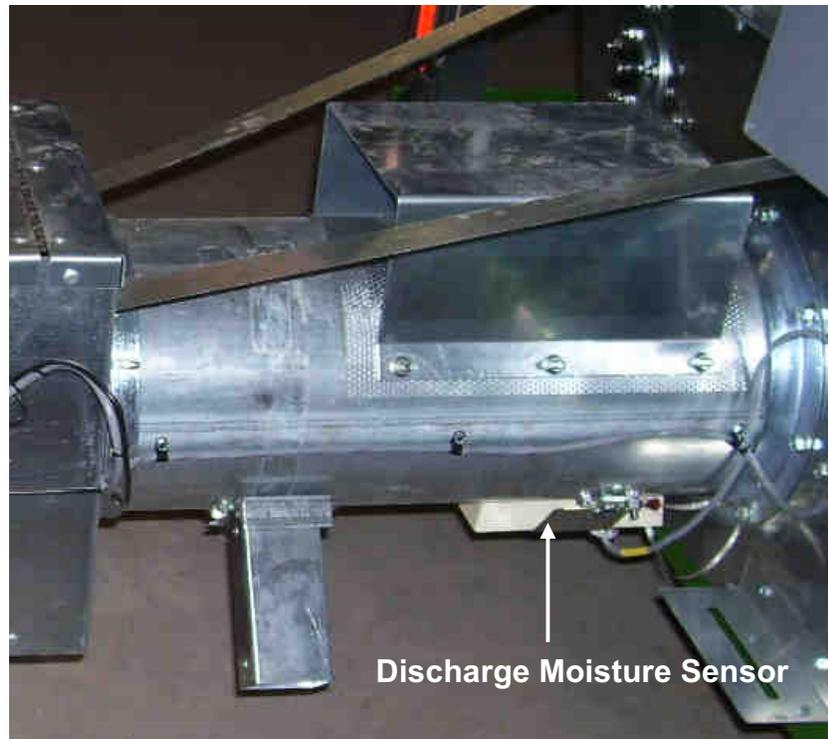


Figure 2.1c: Discharge Moisture Sensor Installed on Dryer

Discharge Moisture Sensor (continued)

1. If you see the red “Input Sensor Not Found” screen, it means that at least one analog input sensor is missing from the PLC. In this case we’ll describe the “Moisture Sensor Not Found” error.
 - a. Using a screwdriver, remove the cover on the junction box on the rear of the dryer.
 - b. Find the four (4) wires used by the moisture sensor. They are red, blue, black, green + shield.
 - c. Using a voltmeter, measure for DC voltage between the red and green + shield. Confirm 24VDC. If 0VDC is measured, check the connection between the power box and the junction box.
 - d. Assuming the red wire has 24VDC on it, measure for DC voltage between the black and green + shield wires. You should measure something between 1 and 10VDC. If you measure this voltage, check the connection between the junction box and the power box. The black wire is labeled D4 on the power box terminal strip. If 0VDC is measured, the sensor is malfunctioning and will need to be replaced.
 - e. If you measure the same voltage on the D4 terminal in the power box as back in the junction box, measure between the D4 terminal on the PLC and 95. If 0VDC is found, there is a connection problem between the power box terminal strip and the PLC. If the same voltage (1-10VDC) is present on the PLC D4 input as the junction box at the rear of the dryer, the green analog input PLC card may be malfunctioning.

QuadraTouch™ Controller

In the event that the connection between the QuadraTouch™ controller and the PLC is lost, the following screen will come up. Depending on where you are in the program, this screen may be coupled with a gray, horizontal error bar on the bottom of the screen. It describes for the user that it can no longer find the IP address of the PLC and it's unable to communicate.



Fixing a Communication Error

1. Make sure power is ON to both the QuadraTouch™ controller and the PLC. This means making sure the Emergency Stop switch is pulled out to its normal operating position, and the system control switch is in the "COMPUTER" position. Also, the green rocker switch on the QuadraTouch™ controller needs to be ON.
 - a. If you turn both devices on at the same time, the QuadraTouch™ controller will boot up slightly faster than the PLC. You will most likely see the main screen with the gray, horizontal error bar on the bottom of the screen. It will take a brief period (up to 15-20 seconds) before both realize that they are talking to each other. You will know when you've cleared this error because the gray, horizontal error bar will disappear.
 - b. When you see this screen without the gray, horizontal error bar, simply press reset, and the system will take you to the main screen.
2. If both devices have power, then the problem lies in the connection cable.
 - a. Make sure the cable is securely fastened into the side of the QuadraTouch™ controller → Ethernet coupler in the box → Ethernet coupler in the Power Box → PLC
 - b. If you want to make sure the connection is available, connect the Ethernet cable directly between the QuadraTouch™ controller and the PLC. Thus eliminating the couplers.

Plenum Temperature Sensor (RTD)



Figure 2.3b: Plenum Temperature Sensor & RTD

Averaging RTD – Resistive Temperature Device

The averaging RTD is a device, which measures the average resistance over the length of the tube. The dryer commonly uses 16ft. and 24ft. lengths.

The RTD is used in conjunction with a transmitter which converts the resistance into a 1.0VDC – 5.0VDC signal.

This voltage is then fed into the Plenum Temperature Display, which will be located on the Control Panel and near the pipe train of each heater.

If the RTD is in question, a voltage and resistance comparison can be made to determine if the unit is defective.

1. Begin by locating the junction box containing the RTD transmitter. This is a rectangular box approximately 4in. by 2 1/2in. The transmitter is attached to the inside of the cover.
2. A white label should be attached to the transmitter. Also, two terminal strips, each with three terminals will be located on the top of the transmitter.



Figure 2.3c: Plenum Temperature Sensor Installed

3. Next to the terminal strips is a small adjustment screw. NEVER adjust either of these screws. These are calibration adjustments and once moved, the transmitter will not work correctly until a factory calibration is performed.
4. Locate the terminal strip with the output, +, and – connections. Measure for 24VDC on terminal #2 and #3.
5. If 24VDC is not present, note the wire numbers and go to the Power Box and check for voltage on the terminal strip.

6. With 24VDC present at the transmitter, measure the output voltage (#1 and #3). A voltage between 1.0VDC and 5.0VDC should be measured.
7. With 24VDC present on terminals #2 and #3 but no voltage is measured between terminals #1 and #3, the transmitter is defective.
8. If a voltage is measured, use the chart on the next page to determine if the voltage is reasonable.
9. If a voltage is measured between terminals #1 and #3, go to the other terminal strip and remove the two wires coming from the RTD (red and yellow).
10. A jumper should be connected between terminals #2 and #3.
11. Take a resistance reading with the meter. The resistance of the RTD is directly related to the temperature of the RTD.

NOTE: This reading should be taken with the dryer cooled down and at ambient temperature.

Plenum Temperature Sensor (RTD) (continued)

12. If the reading shows infinite (open) resistance, the RTD is defective. Compare the resistance reading to the following table to determine if the resistance is reasonable.

Temperature	Resistance	Voltage
10F (-12C)	952	1.16
15F (-9C)	963	1.24
20F (-7C)	974	1.32
25F (-4C)	984	1.40
30F (-1C)	995	1.48
35F (2C)	1006	1.56
40F (4C)	1017	1.64
45F (7C)	1028	1.72
50F (10C)	1039	1.80
55F (13C)	1049	1.88
60F (16C)	1060	1.96
65F (18C)	1071	2.04
70F (21C)	1082	2.12
75F (24C)	1093	2.20
80F (27C)	1103	2.28
85F (29C)	1114	2.36
90F (32C)	1125	2.44
95F (35C)	1136	2.52
100F (38C)	1146	2.60
105F (41C)	1157	2.68
110F (43C)	1168	2.76
115F (46C)	1178	2.84
120F (49C)	1189	2.92
125F (52C)	1200	3.00
130F (54C)	1211	3.08
135F (57C)	1221	3.16
140F (60C)	1232	3.24
145F (63C)	1243	3.32
150F (66C)	1253	3.40
155F (68C)	1264	3.48
160F (71C)	1275	3.56
165F (74C)	1285	3.64
170F (77C)	1296	3.72
175F (79C)	1306	3.80
180F (82C)	1317	3.88
185F (85C)	1328	3.96
190F (88C)	1338	4.04
195F (91C)	1349	4.12
200F (93C)	1359	4.20
205F (96C)	1370	4.28
210F (99C)	1380	4.36
215F (102C)	1391	4.44
220F (104C)	1402	4.52
225F (107C)	1412	4.60
230F (110C)	1422	4.68
235F (113C)	1433	4.76
240F (116C)	1443	4.84
245F (118C)	1454	4.92
250F (121C)	1464	5.00

13. If the resistance compares to the ambient temperature around the dryer, and the voltage on the output wire is close to the ambient temperature, then the transmitter and the RTD are functioning correctly.

Go to the Plenum Temperature Display troubleshooting page to continue.

Burner Operations

3-Wire Air Switch without Low Pressure Switch

The following parts will be found on either the gas pipe train or in the heater box.

- Automatic Valve Proving Control – LDU11 – heater box
- Valve Proving Pressure Switch – low and high – between the upstream and downstream valves on the pipe train
- EU Gas Burner Control – LME21.350A1 – heater box
- High Pressure Switch – pipe train – after downstream valve
- Housing High Temperature Switch – 5 x 5 box on fan barrel
- Differential Air Switch – heater box
- Vapor Over-Temp Switch (on LP systems) – pipe train
- Ignition Transformer – heater box
- Main – Upstream Gas Valve – pipe train
- Blocking – Downstream Gas Valve – pipe train
- Electronic Modulating Gas Valve (EMOV) – pipe train

Burner Operation

On heaters *not* requiring the LDU11 valve proving control (28" heater), once the burner control relay is energized, 120VAC must flow through the housing O/T, and the high-pressure switch, before being applied to the EU heater control unit (LME21.350A1).

On heaters requiring the LDU11 (valve proving control), once the main power is being supplied to the dryer, 120 VAC is supplied directly to the LDU11.

The LDU11 valve proving control goes through two valve tests. During TEST 1, the **downstream** valve is energized for 4 seconds, evacuating all of the gas pressure between the upstream and the downstream valves. This test is used to determine if an increase in pressure is detected between the two valves by the valve proving pressure switch. If an increase in pressure is detected, TEST 1 will FAIL, and lockout will occur. The valve proving control can be reset by pressing the clear plastic on top of the unit, or by pressing the reset button on the control box keypad. During TEST 1, a voltage is output from terminal 15 of the LDU11. If no leaks are present, pressure will remain low and the voltage will pass through the N.C. contacts and be present on terminal 16 of the LDU11. If TEST 1 has not failed, TEST 2 will begin.

In TEST 2, the **upstream** valve is energized for 4 seconds, which pressurizes the piping between the two valves. If a decrease in pressure is detected by the valve-proving pressure switch, TEST 2 will fail and lockout will occur. The valve proving control can be reset by pressing the clear plastic on top of the unit, or by pressing the reset button on the control box keypad. During TEST 2, a voltage is again output from terminal 15 of the LDU11. If no leaks are present, pressure will remain high and the voltage will be present on terminal 17 of the LDU11. The valve-proving test will be initiated each time main power is supplied to the dryer (not when turning the control system on and off, or going between automatic and manual).

If both test 1 and 2 pass, 120 VAC is output from terminal # 6 of the LDU11. If no faults have been detected by the dryer control system, then, at the proper time, the control system will call for burner operation by closing a set of N.O. contacts. This voltage must flow through the housing high temperature switch, and the high-pressure gas switch.

This voltage is then supplied to terminal # 12 of the EU Burner Control Unit (LME21.350A1).

Upon supplying voltage to the CEBC, the following ignition sequence takes place.

Ignition Sequence

- 1) 120 VAC is supplied to terminal # 12 of the LME21.350A1 (CEBC).
- 2) A 2.5 second wait time begins.
- 3) The fan ON control signal is enabled. This voltage is output on terminal # 3 of the LME21.350A1, which checks for this same voltage on terminal # 6, which comes from a N.C. contact in the differential air switch. This verifies that the fan is off and no airflow is being detected.
- 4) Within 5 seconds of the fan ON signal being enabled, the differential air switch must close a set of N.O. contacts, which applies this same voltage to terminal # 11. This indicates that air movement has been detected. If this signal is not detected, the unit will go into a fault mode.
- 5) Upon receiving a voltage on terminal #11, the unit goes into a 30 second pre-purge time delay.
- 6) Following the purge time, the ignition transformer is energized. After a 2 second pre-ignition time, the fuel valve is opened.
- 7) The ignition transformer remains energized for an additional 4 seconds. (total of 6 sec.)
- 8) Flame must be detected within 5 seconds, or the unit will go into a fault mode.
- 9) The flame signal must be maintained for an additional 10 seconds before opening other fuel valves.

Loss of flame will cause the CEBC to lockout. The unit may be reset by pressing the small clear plastic button on the front of the unit for approximately 2 seconds, or the reset button may be pressed on the side of the power box. 3 attempts will be allowed for burner ignition. On the 4th attempt, the unit will be locked out and power must then be cycled to the unit before the ignition sequence may be re-initiated.

The electronic modulating valve is in the low fire position for the ignition sequence. After flame has been established, the main control system on the dryer will send a control signal to the valve, which will open or close the valve to maintain a desired temperature set point, which is set by the user.

Note

CEBC = EU Burner Control Unit

This is a general description of burner operation. For specific details of the LME21.350A1, please refer to the Siemens technical bulletin CC1N7101en. 14.11.2011.

EU Heater Troubleshooting Guide

38" / 44" Heaters

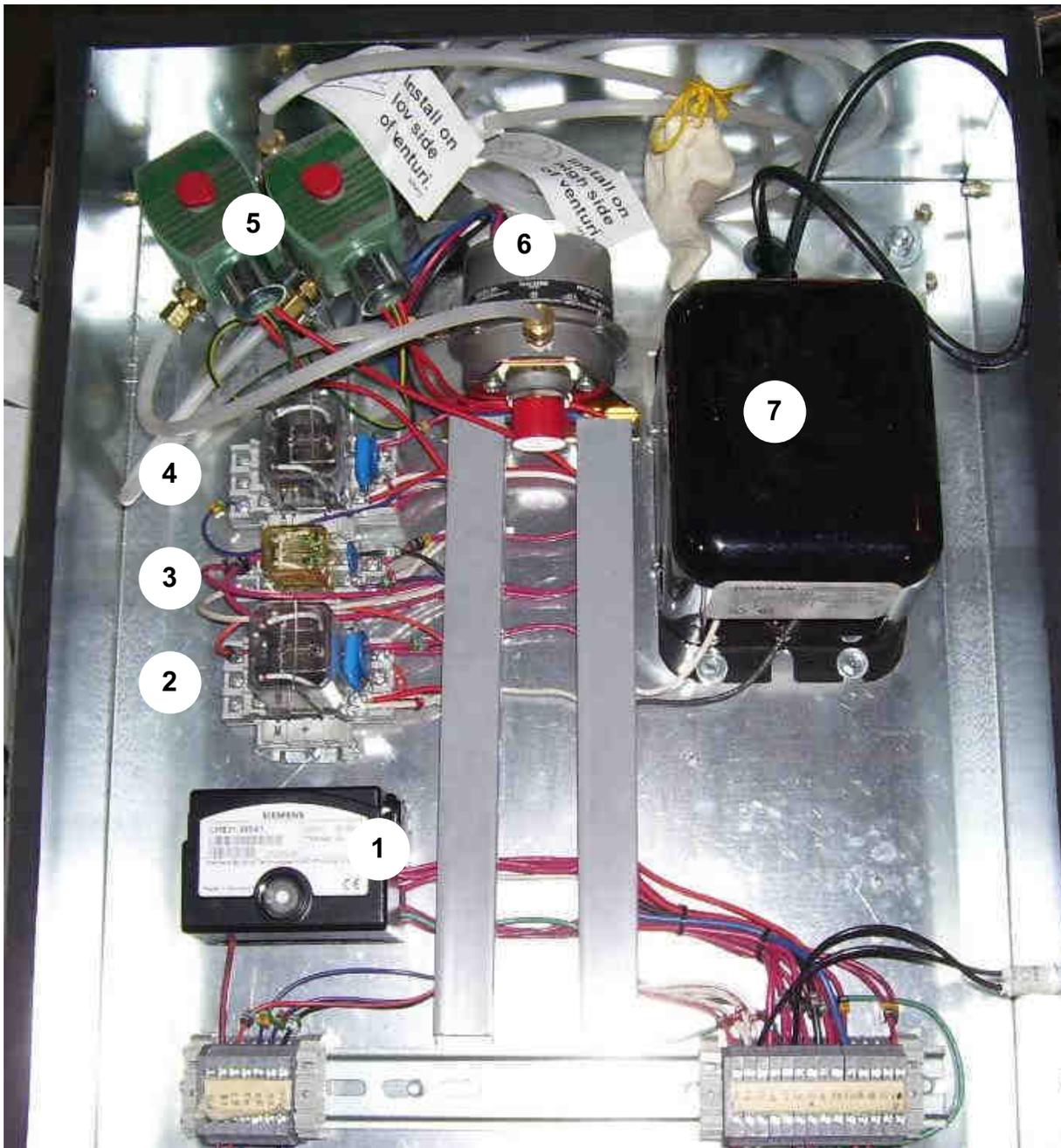
- 1) Turn on the main power. The LDU11 (valve proving) should begin rotating.
- 2) Test 1 releases pressure between the upstream (main) valve and the downstream (blocking) valve.
- 3) During test 1, the yellow light on the downstream (blocking) actuator will turn on for 4 seconds. If the test fails, the orange light on the front of the LDU11 will turn on. The test failure is most likely due to a leak. If a leak is not found, a pressure gauge may need to be installed to verify. After being repaired, press the clear plastic window on the front of the LDU11, or press reset button on the side of the power box, and the next test will begin after rotating to the test 1 starting position.
- 4) Test 2 pressurizes the piping between the upstream (main) and the downstream (blocking) valve.
- 5) During test 2, the yellow light on the upstream (main) valve will turn on for 4 seconds. The liquid valve will also be energized at this time. If the test fails, the orange light on the front of the LDU11 will turn on. The test failure is probably due to a leak. If a leak is not found, a pressure gauge may need to be installed to verify. After being repaired, press the clear plastic window on the front of the LDU11, or press reset button on the side of the power box, and the next test will begin after rotating to the test 1 starting position.
- 6) If the valve proving test was successful, 120 VAC should now be present on terminal # 6 of the valve proving unit. On the 38" / 44" heaters, this wire number will be 1E. (28" heaters do not use the valve proving unit)

All Burners

- If this is a 38" / 44", the LDU11 valve proving - test 1 & 2 - must have been successfully completed before proceeding.
 - Wire numbers for both the 28" heater, and the 38" / 44" heater are listed in the following paragraphs.
 - 1) If the EU burner control unit (LME21) does not display an orange or red light, measure for 120 VAC at the housing O/T switch on terminal #1 (if 28"), or terminal # A (if 38" / 44"). An orange light indicates the burner sequence has begun – red indicates a fault condition.
 - 2) If 120 VAC is not present, measure both sides of the housing O/T switch. Wires 1 and A (on 28"), A and B (on 38" / 44"). If voltage is present on one side of the housing O/T switch, but not the other side, the housing O/T switch is tripped out or defective. Try pushing the reset button and re-check for voltage.
 - 3) Once 120 VAC is present on both sides of the housing O/T switch, measure wire # A (on 28") or B (on 38" / 44") at the high pressure switch. If 120 VAC is not present, check the wiring between the housing O/T switch and the high pressure switch. If 120 VAC is present on wire # A (on 28") or B (on 38" / 44"), measure wire B (on 28") or C (on 38" / 44") for 120 VAC. If voltage is not present, the high pressure switch is not adjusted properly or is defective. (the contact remains closed, unless the gas pressure exceeds the setting of the pressure switch).
 - 4) If 120 VAC is measured on B (on 28") or C (on 38" or 44"), but not measured on wire # C (on 28") or D (on 38" / 44"), go to the power box and check the heater control relay (CR3 – Lower CR6 - Upper) and the circuit breaker for 120 VAC through both components. Be sure that the control system is calling for heat, and the circuit breaker has not tripped.

All Burners (continued)

- 5) If voltage is measured on terminal # D (on 28"), or E (on 38" / 44"), the LED on the front of the EU burner control unit will turn on. If the unit had not previously locked out, then the LED should be orange in color. If the indicating light is red, press the clear plastic reset button on the front of the unit (for 2 seconds) or press the reset button on the side of the power box. The red light will go out for a few seconds and come back on with an orange color.
- 6) The fan should be running at this time.
- 7) When the orange light comes ON, use a voltmeter to measure 120 VAC on terminal #3 (FO) of the LME21 burner control unit.
- 8) If 120 VAC is present on terminal # FO, both air switch solenoids should energize. If the air switch solenoids do not energize, and the light on the front of the LME21 burner control unit is orange, the most likely cause would be the differential air switch contact not being in the closed position when the air switch solenoids were first energized.
- 9) Shortly after both air switch solenoids energize, the 120 VAC will shift (on the air switch contacts) from terminal # 6 to terminal # 11. After the air switch contact has closed, measure for 120 VAC on terminal # 11. If no voltage is present and the fan is running, the venturi is connected backwards, or the air switch needs to be adjusted. (turn the adjustment screw all of the way out – counter-clockwise)
- 10) The yellow light will remain ON (steady) while waiting for the air switch to activate. After approximately 20 seconds, the light will change to red and will not attempt burner ignition. If the air switch did close the contact, 120 VAC can be measured on terminal # 11.
- 11) After a short purge time (and after 120 VAC was measured on terminal # 11), the yellow light will now begin to flash. At this time, the ignition transformer will energize, followed by the gas valve. Within 1 – 2 seconds, if flame is sensed, the LED will turn green and remain ON.
- 12) If flame is not detected, check for ignition, and gas supply to the burner. Also, a bad ground will prevent flame from being detected.



Burner Control Panel for a 38"/44" heater. Components for a 28" heater are the same minus the LDU11 flame proving unit.

Ref #	Description	Comp #
1	EU Burner Control Unit – LME21	J57131
2	Flame Safe Relay – FSR	J3880
3	Reset Relay – RR	J38806
4	Isolation Relay – IR	J3880
5	Air Switch Solenoid	J6032
6	3 - Wire Air Switch	J5863
7	Ignition Transformer	J5710

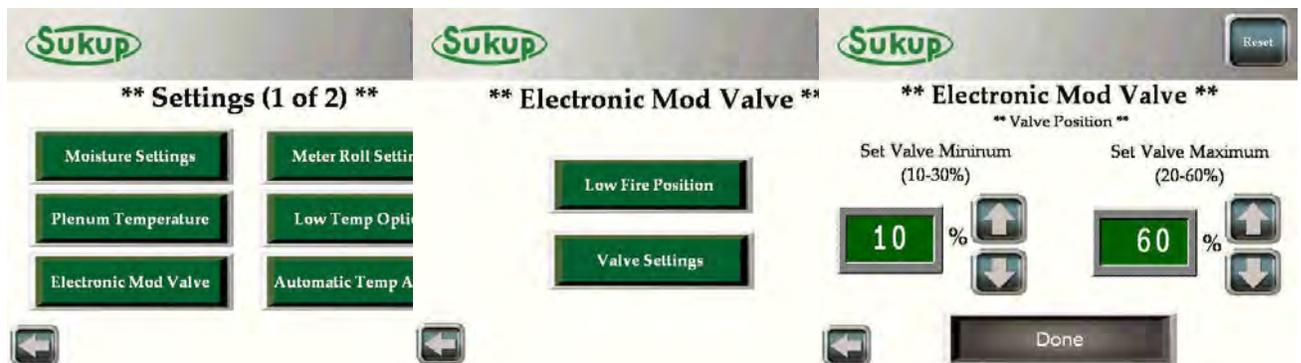
Electronic MOD Valve

General Information

1. A plenum RTD and Transmitter are required. The transmitter generates a 1 – 5 VDC signal that is sent to the processor board and the EMOV board.
2. A Belimo actuator is connected to a butterfly valve, which opens or closes to control the temperature of the plenum. The Belimo actuator requires a 24 VDC power source and accepts a 2 – 10VDC control signal. This signal comes from the PLC or backup system (via the EMOV board).
3. Trouble shooting the Belimo valve requires a familiarity with the software being used to control the valve. The following covers software information:

QUICK REFERENCE:

- a. SETTING ELECTRONIC MOD VALVE POSITION



1. Press Settings → Electronic Mod Valve
2. Select Valve Settings
3. Make both numbers 25 % and select Done
4. Press the back arrow or press Reset to return to the main screen.
5. Press Tools → Dry Fire / Test and select HEAT for each fan available.
6. Upon heater ignition, verify that each heater is operating at a pressure of 4 – 5 PSI. If the pressure is less than 4 PSI, or exceeds 5 PSI, loosen the nuts on the U-bolt that connect the actuator to the butterfly valve shaft and rotate the valve shaft until the gas pressure is reading between 4 – 5 PSI.
7. When finished adjusting all valves, press Reset to turn off all fans and heaters and return to the main screen.

Fault Troubleshooting

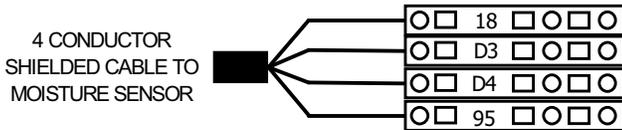
1. The first step in troubleshooting an EMOV problem is to determine whether or not the problem is with just one heater or with all of the heaters.
2. If the problem is with all of the heaters, check for 24 VDC coming from the power supply. This is the supply voltage to all of the Belimo actuators.
3. If the 24 VDC is present, check for a voltage on each actuator's signal wire. If the actuator is not receiving a 2-10VDC volt reference signal, go to the power box.
4. Measure the DC voltage on the power box terminals, (between GND - #95) and the signal wire going to that actuator (61, 161, 261, 361, 461, or 561). The low fire position of the electronic mod valve is factory defaulted at 4.0VDC. This gives the valve position of 25% open. The terminals 61, 161, etc, should all have 4.0VDC (if the low fire position is set to 25%) on them when the burners are OFF. Thus the PLC is operating correctly. Check your connection between the power box terminals and the actuators themselves. If there is 0VDC on the terminals 61, 161, etc, then there may be a problem with the PLC or its Yellow Analog Output Card.
5. If the burner fires and the electronic mod valve does not open, it's more than likely that there is a problem with the flame sense circuit on the heater board. The FLAME ON signal (#45, #106, etc) tells the PLC to start controlling the plenum temperature by adjusting the EMOV. If this signal doesn't come back from the heater box, the valve will not operate.
6. If a reference voltage (2-10VDC) is measured at the valve, but the valve did not open or close, re-confirm the presence of 24 VDC to the valve. If 24 VDC is present, the valve is probably defective, or the U-bolt, which mechanically connects the valve to the butterfly shaft is loose and needs to be tightened.

DISCHARGE MOISTURE SENSOR

Moisture sensor is located at bottom of discharge tube at rear of dryer. It will read discharge moisture and temperature and send a voltage to PLC. Adjustments to meter roll speed will be made after comparing this information to set-point.
 0% = 9.98VDC 48% = 0VDC

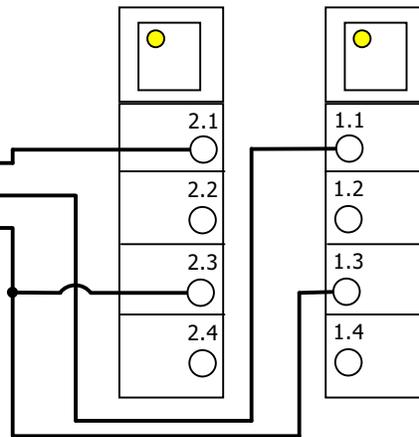


- WIRE NUMBERS AND VOLTAGES:
 #18: +24VDC
 #95: 0VDC - DC COMMON
 MOISTURE SENSOR CABLE VOLTAGES
 RED: +24VDC - MAY ALSO BE LABELED 18
 BLUE: 0-3VDC - VARIABLE: DEPENDS ON GRAIN TEMPERATURE
 MAY ALSO BE LABELED D3
 BLACK: 1-9.97VDC - VARIABLE: DEPENDS ON GRAIN MOISTURE.
 MAY ALSO BE LABELED D4
 GREEN & SHIELD: 0VDC - DC COMMON MAY BE LABELED 95



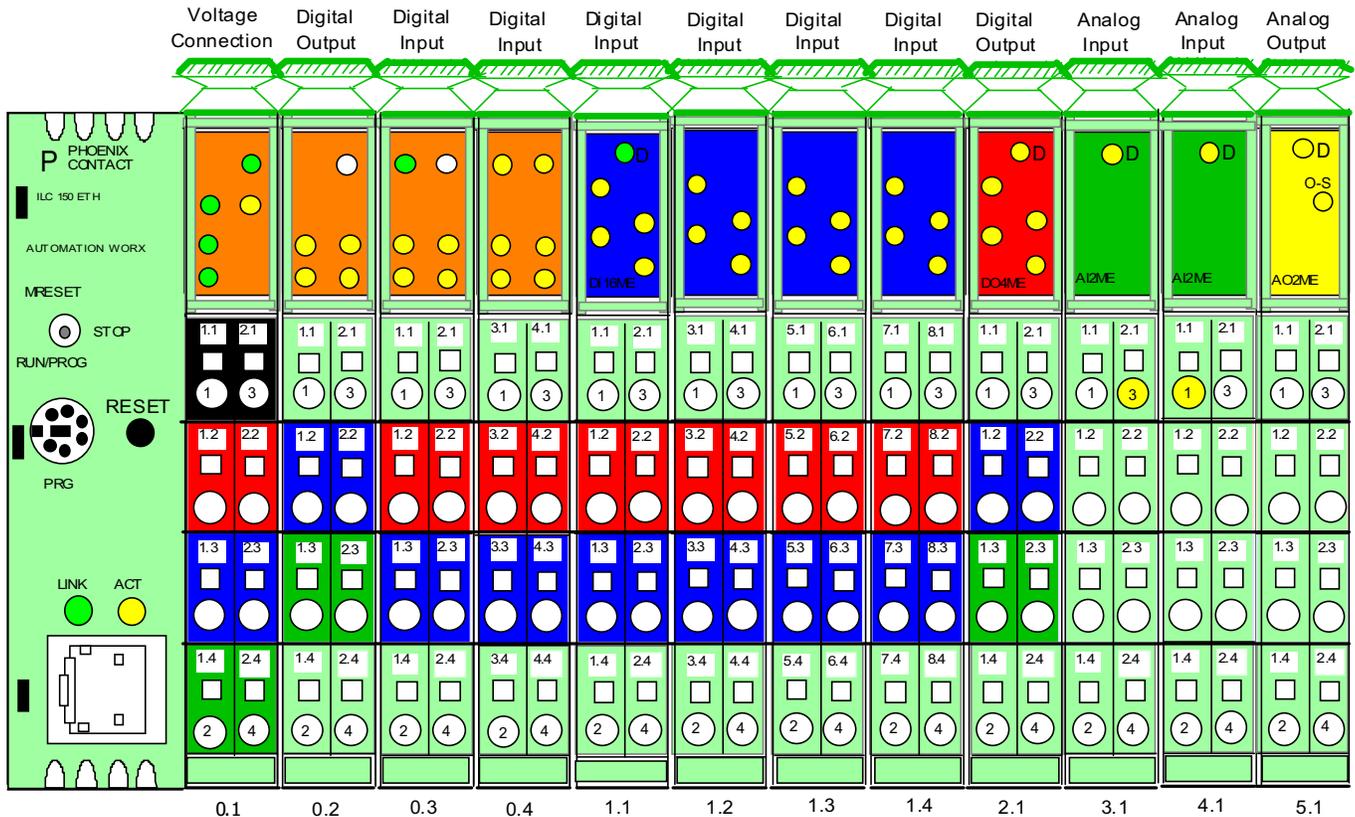
THE 4 COND CABLE GOES FROM THE POWER BOX TO THE RIGHT SIDE AND THROUGH A CONDUIT TO THE BACK.

**PHOENIX PLC
 ANALOG INPUT CARDS**



	PLC INPUT #
1 FAN: D3	3.1.3
1 FAN: D4	4.1.1
2 FAN: D3	5.1.3
2 FAN:D4	6.1.1
3/4 FAN:D3	7.1.3
3/4 FAN:D4	8.1.1
5/6 FAN:D3	9.1.3
5/6 FAN:D4	10.1.1

TEMPERATURE = D3
 MOISTURE = D4



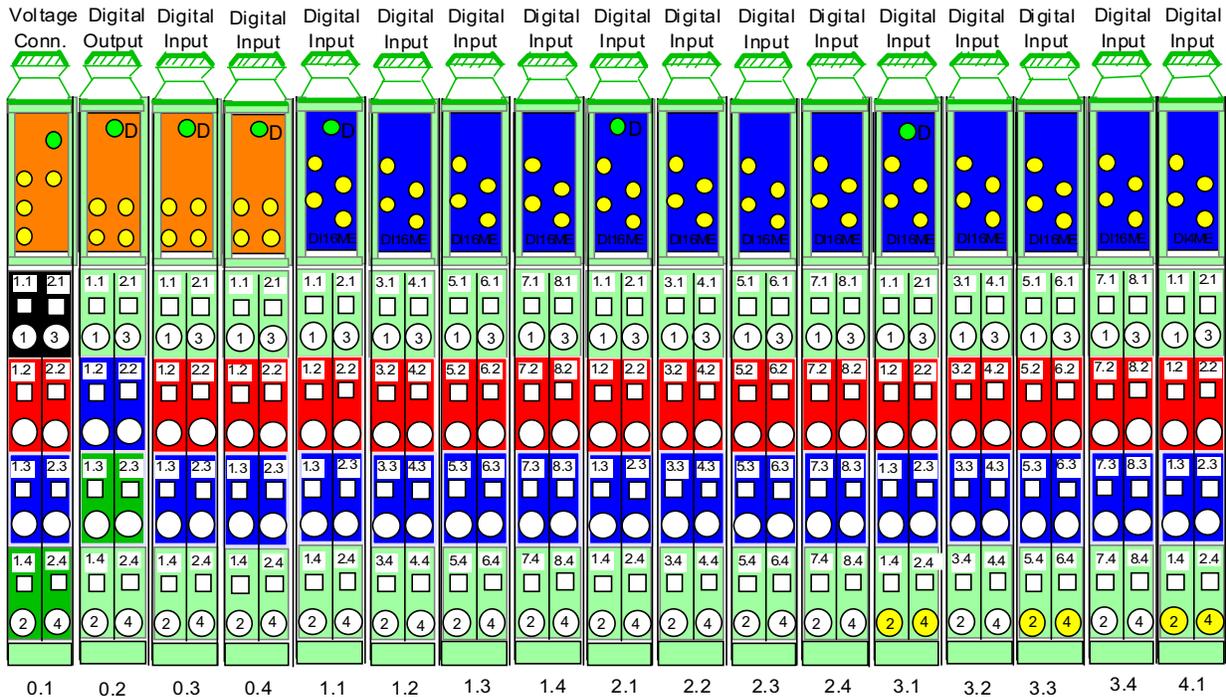
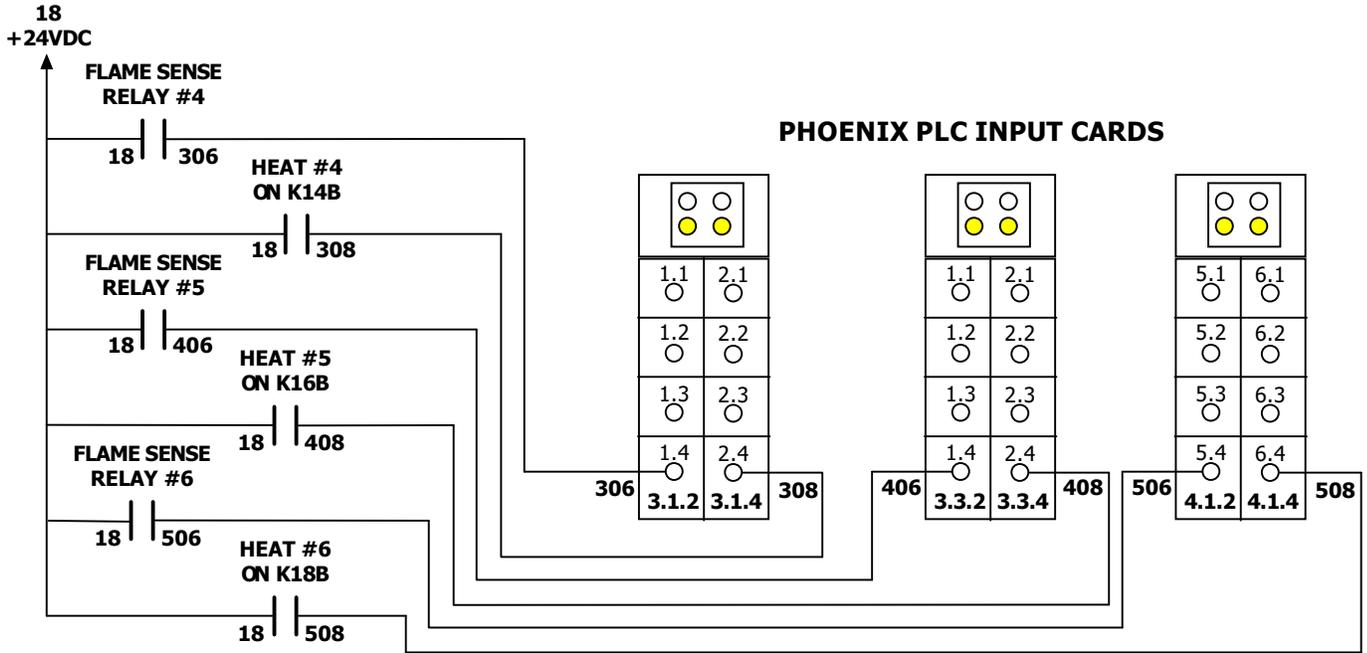
Yellow circles show connection points for temperature & moisture inputs.

Title: 1 - 6 FAN YELLOW - DISCHARGE MOISTURE SENSOR	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet:
Revision: 5/14 7/14	QUADRATOUCH

45 SECOND HEATER TIME OUT FAULT

PLC 45-second time-out occurs when Heat On relay is energized, but Flame Sense relay is not energized. Heat On relay is located in power box and when energized, power is sent to heater control box. Flame Sense relay is located in heater control box on top of fan barrel, and is energized when solid state heater board applies power to gas solenoid valves. Coil of Flame Sense relay is connected to terminal # 10 of heater board.

Fault Condition
No Flame Detected



Yellow circles show connection points for Heat On and Flame Sense Relay.

Title: 4 - 6 FAN DRYER: FLAME SENSE WIRING & TIME-OUT FAULT.

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

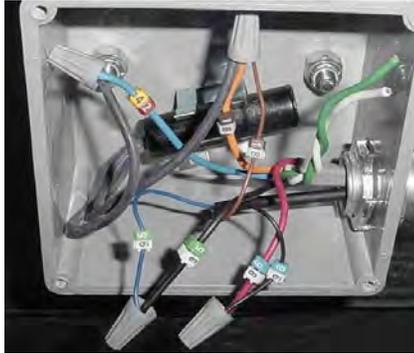
Revision: 5/14 7/14

QUADRATOUCH

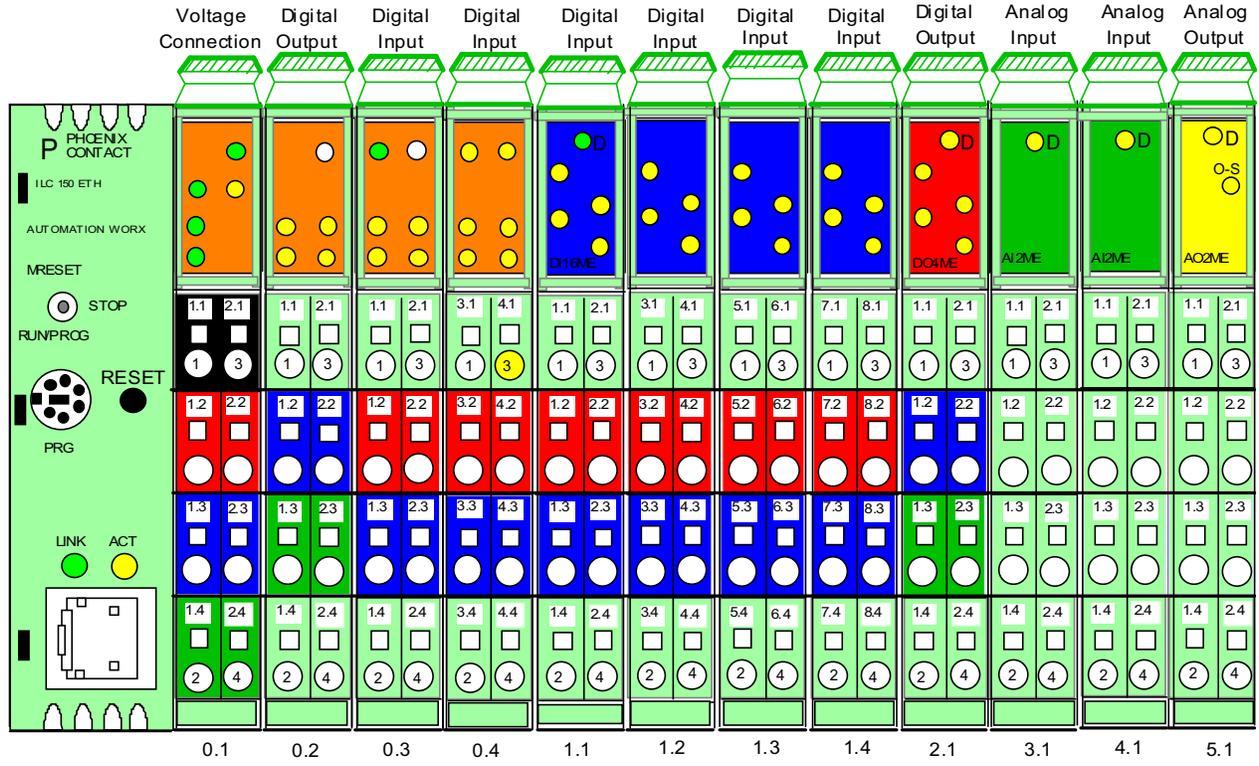
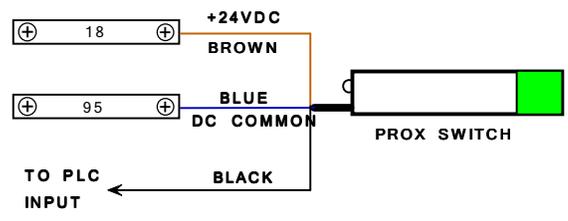
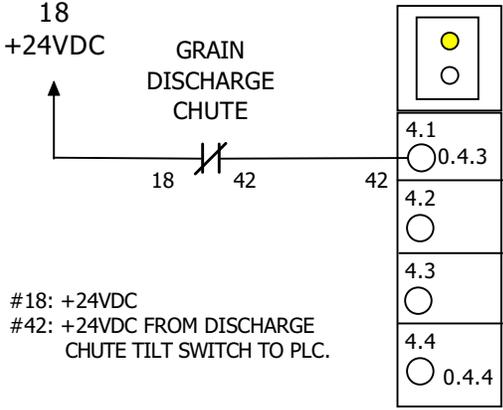
DISCHARGE CHUTE SWITCH

Inside a 4 x 4 box which is mounted to lid of discharge chute, is a tilt switch with a set of contacts which open when top door of discharge chute box opens. This will cause a grain discharge chute fault to occur.

Fault Condition
 Discharge Chute is Open



PHOENIX PLC INPUT CARD



Yellow circle shows connection point for grain discharge chute tilt switch.

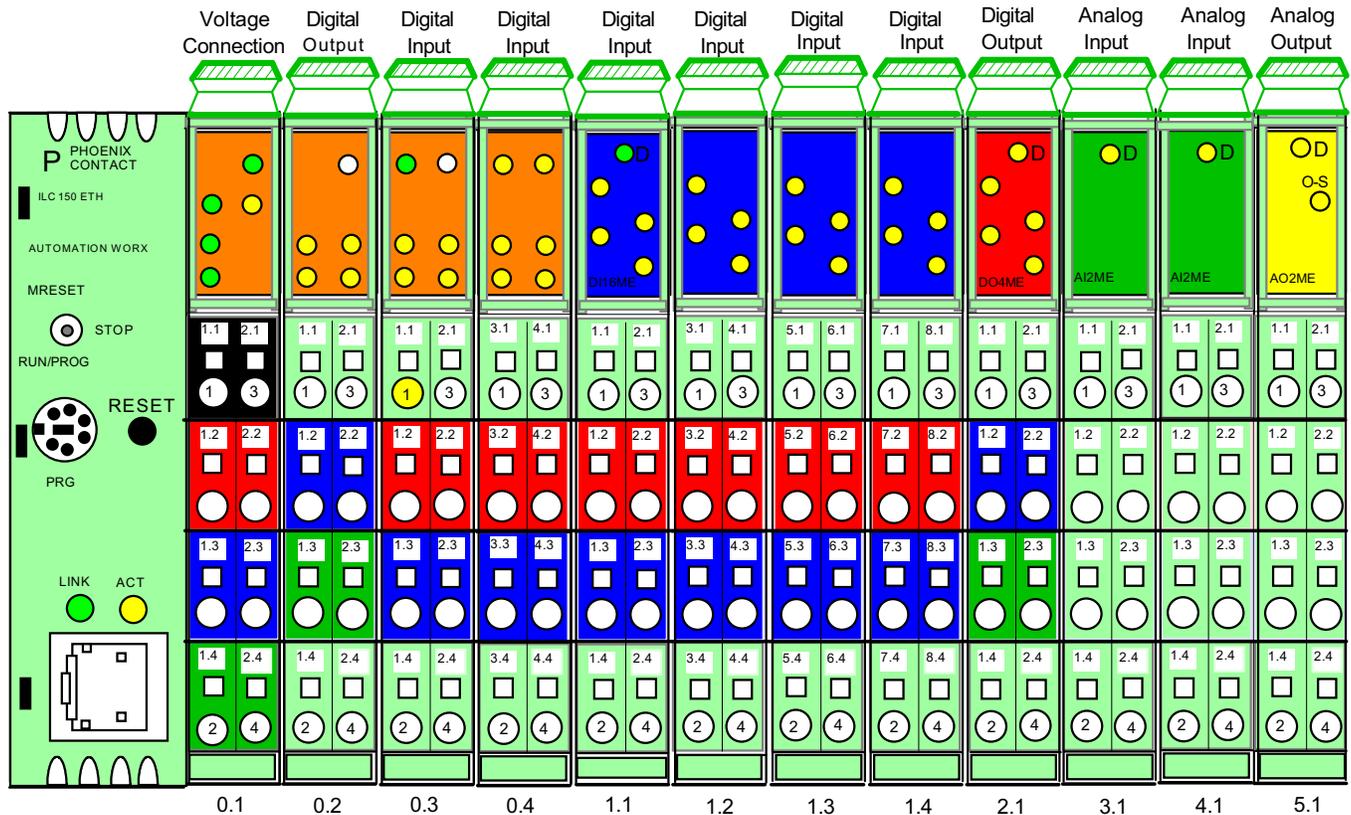
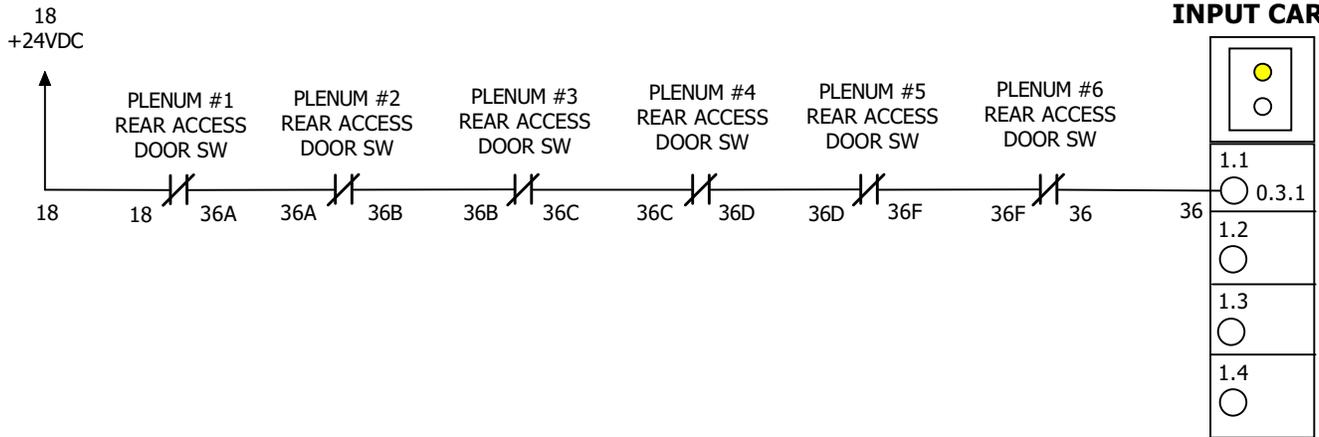
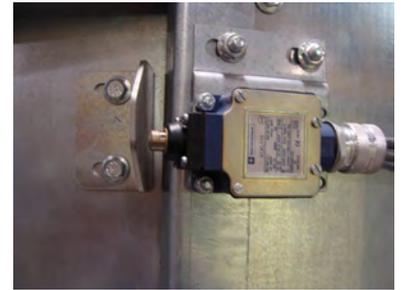
Title: 1 - 6 FAN: GRAIN DISCHARGE CHUTE FAULT	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet:
Revision: 5/14 7/14	QUADRATOUCH

REAR ACCESS DOOR

An access door switch is located next to each access door. A bracket on the door pushes against the plunger of the switch. One switch is used for each plenum door. The dryer will not start if a switch is open. When more than one door switch is used, they are wired in series.



Fault Condition
Rear Door is Open



Yellow circle shows connection point for door switches.

Title: 1 - 6 FAN: REAR ACCESS DOOR SWITCH

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

Revision: 5/14 7/14

QUADRATOUCH

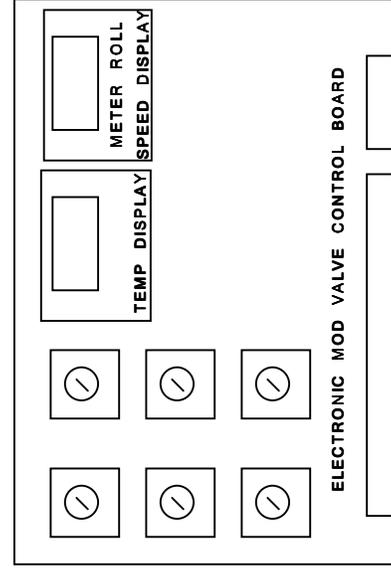
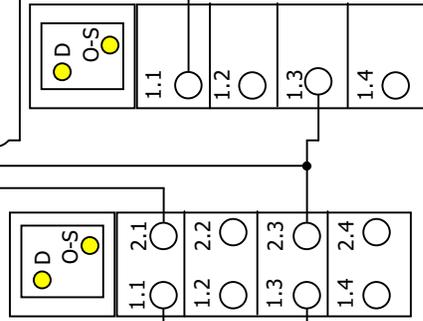
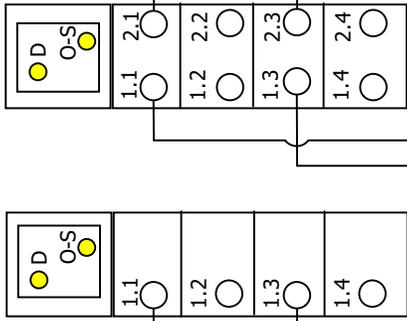
1 - 6 FAN DRYER

ELECTRONIC MODULATING VALVE

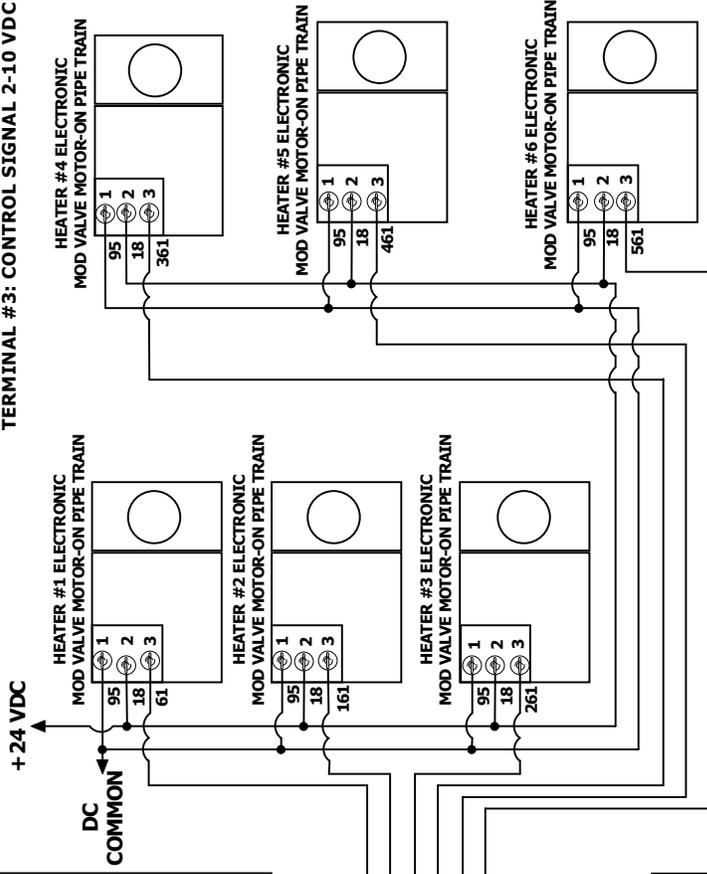
Electronic modulating valve is a combination of a butterfly valve with an electric motor (actuator) connected to the shaft of the butterfly valve. Plenum temperature is automatically controlled to the desired setpoint. Plenum temperature RTD signal voltage is connected to a PLC analog input card and compares this signal with the plenum temperature setpoint. The PLC will change the voltage sent to the actuator to either open or close valve. Actuator reference voltage is 2 - 10 VDC. The actuator also requires a 24 VDC supply voltage to operate.



PHOENIX PLC ANALOG OUTPUT CARDS



BELMO ACTUATOR CONNECTION
TERMINAL #1: DC COMMON
TERMINAL #2: SUPPLY OF +24VDC
TERMINAL #3: CONTROL SIGNAL 2-10 VDC



1 FAN		PLC CARD
61B	5.1.1	

3 FAN		PLC CARD
61B	10.1.1	
161A	11.1.1	
261A	11.1.3	

5/6 FAN		PLC CARD
61B	14.1.1	
161A	15.1.1	
261A	15.1.3	
361A	16.1.1	
461A	16.1.3	
561A	17.1.1	

2 FAN		PLC CARD
61B	7.1.1	
161A	8.1.1	

4 FAN		PLC CARD
61B	11.1.1	
161A	12.1.1	
261A	12.1.3	
361A	13.1.1	

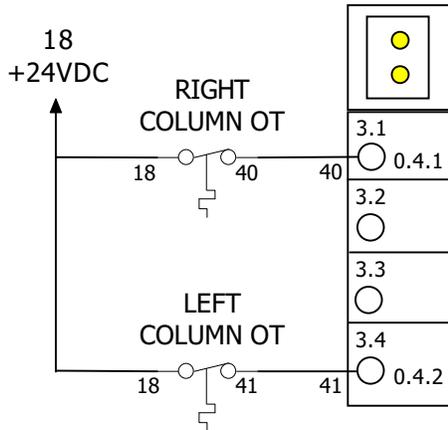
Title: 1 - 6 FAN DRYERS: ELECTRONIC MOD VALVE	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet:
Revision: 5/14	7/14
QUADRATOUGH	

GRAIN COLUMN OVER TEMPERATURE SENSOR

Grain column O/T sensor is located in a conduit that runs the length of the dryer inside grain column. Sensor monitors grain temperature. Contact will open if temperature exceeds 240 F. Junction box for sensors are located on fan end of dryer.



PHOENIX PLC INPUT CARD

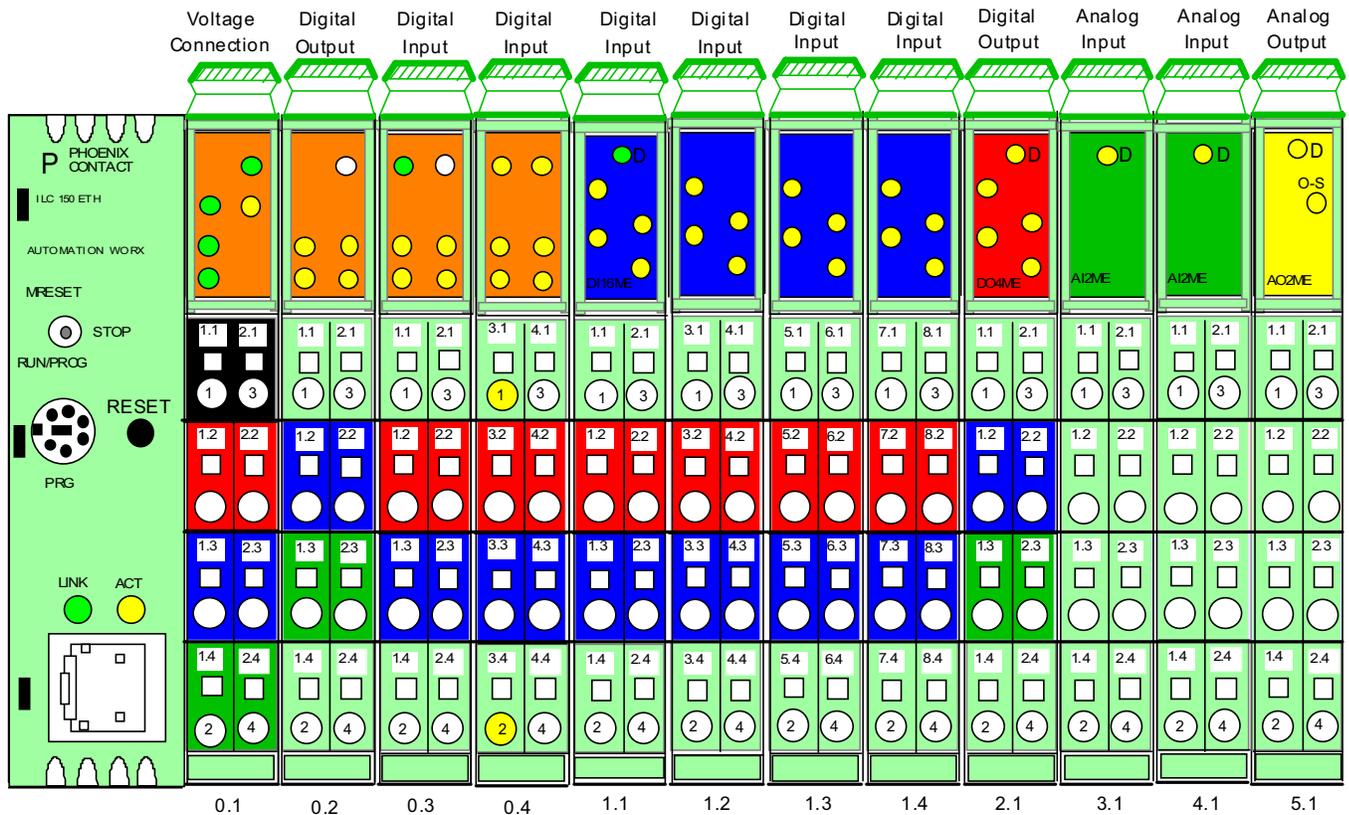


Fault Condition
Right Column O/T

For a Right Column O/T fault condition there will be 0 VDC between 40 & 95 or between connection point 0.4.1. & 95.

Fault Condition
Left Column O/T

For a Left Column O/T fault condition there will be 0 VDC between 41 & 95 or between connection point 0.4.2 & 95.



Yellow circles show connection points for left and right column O/T switches.

Title: 1 - 6 FAN: LEFT/RIGHT GRAIN COLUMN O/T FAULT

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

Revision: 5/14 7/14

QUADRATOUCH

HEATER HOUSING HIGH LIMIT SWITCH

1-6 FAN DRYER

Heater housing High-limit switch is used to monitor temperature of air inside heater housing (area between the burner and the fan). Switch is mounted inside heater box on top side of the heater housing. If temperature exceeds 240 F. switch will open and a fault will occur. This switch has a manual reset button. This switch will NOT reset automatically.

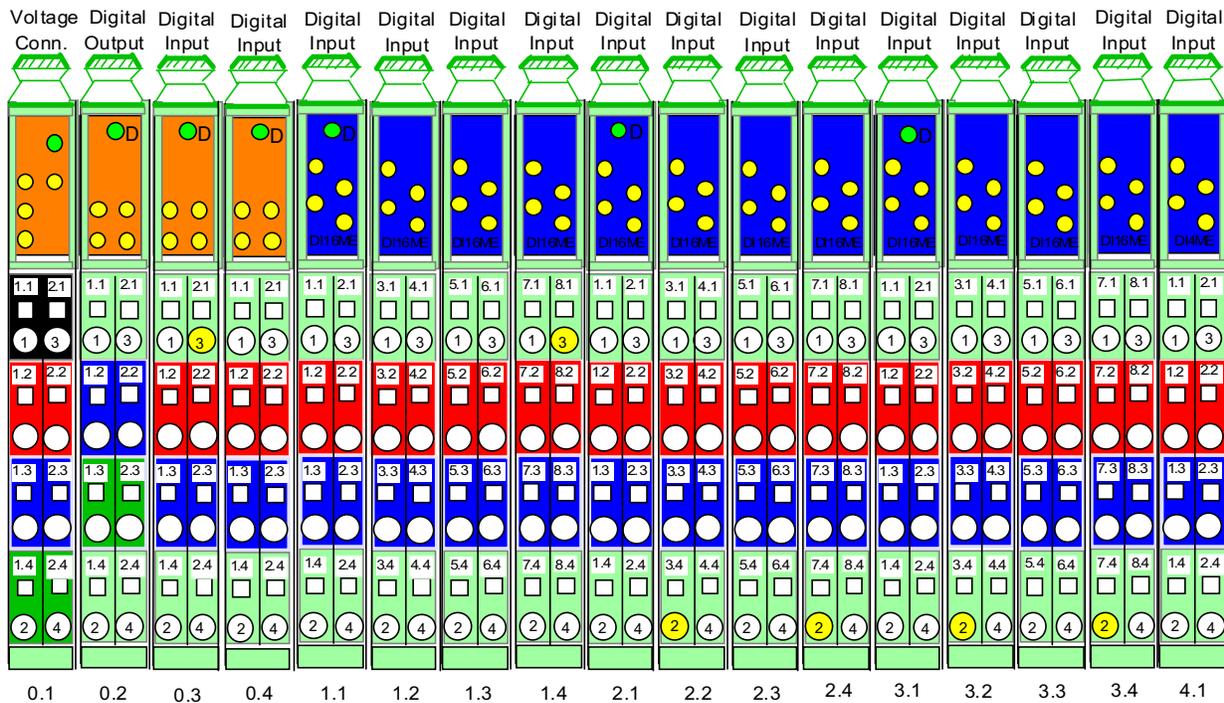
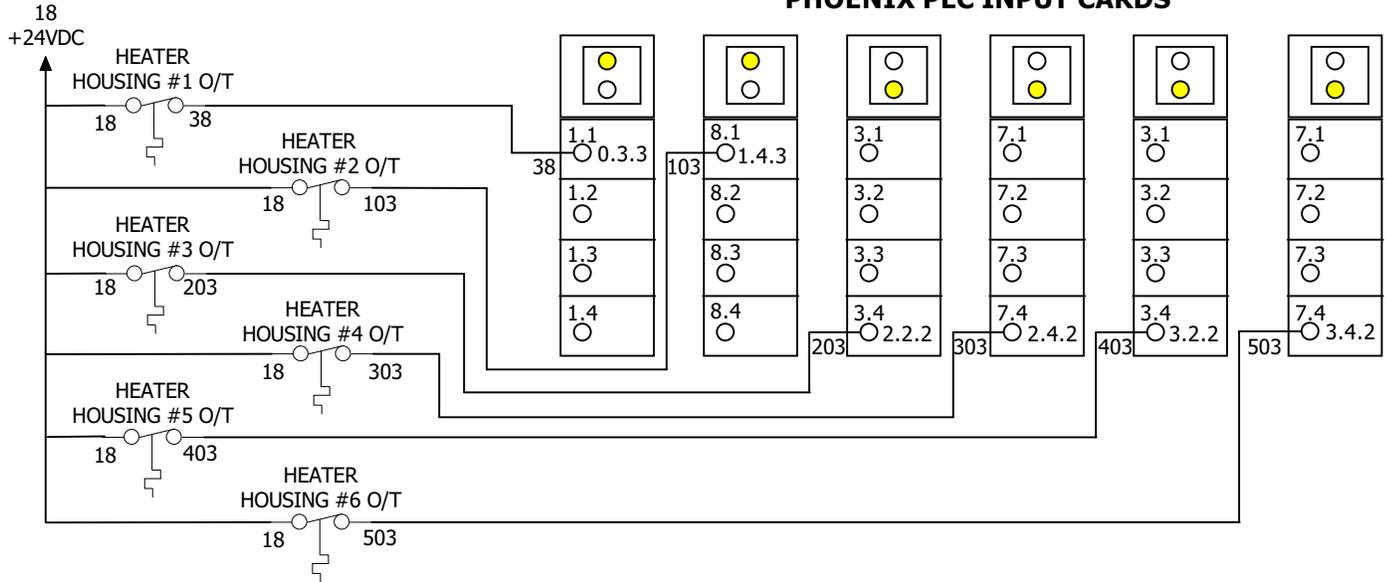


Fault Condition

Heater Housing Over Temp



PHOENIX PLC INPUT CARDS



Yellow circles show connection points for heater housing high-limit switches.

Title: 1 - 6 FAN: HEATER HOUSING O/T FAULT

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

Revision: 5/14 7/14

QUADRATOUCH

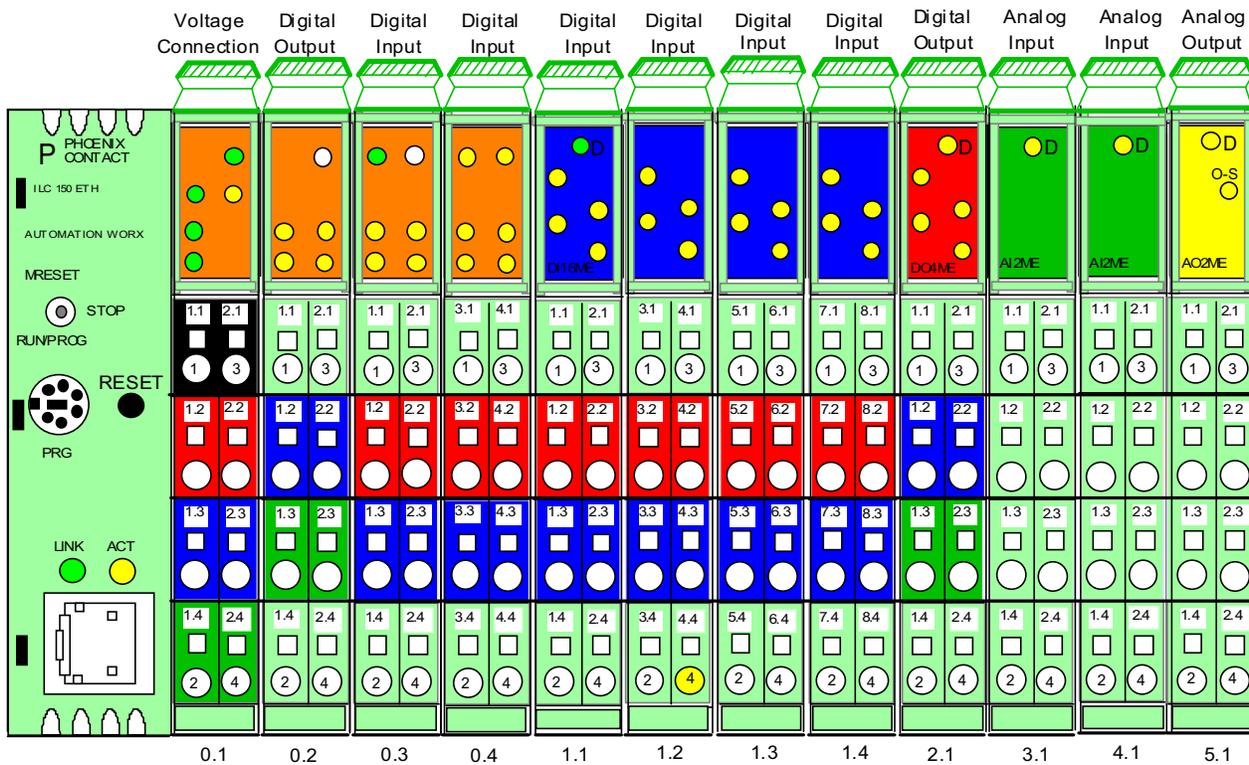
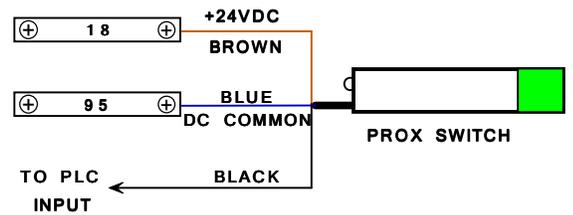
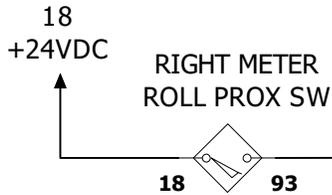
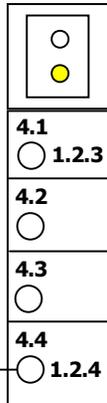
METERING ROLL PROXIMITY SWITCH

A proximity switch is used to monitor rotation of meter rolls. Proximity switch signal wire is connected to input 1.2.4 of PLC. A 2-minute timer in PLC will time out if a pulse is not detected. One sensor is used to monitor rotation of right meter roll. On Quadratouch control system, proximity switch sensors are positive switching PNP.



- #18: + 24VDC SUPPLY - BROWN
- #93: + 24VDC SIGNAL - BLACK
- #95: - DC COMMON - BLUE

PHOENIX PLC INPUT CARD



Yellow circle shows connection point for meter roll proximity switch.

Title: 1 - 6 FAN: METER ROLL PROXIMITY SWITCH

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

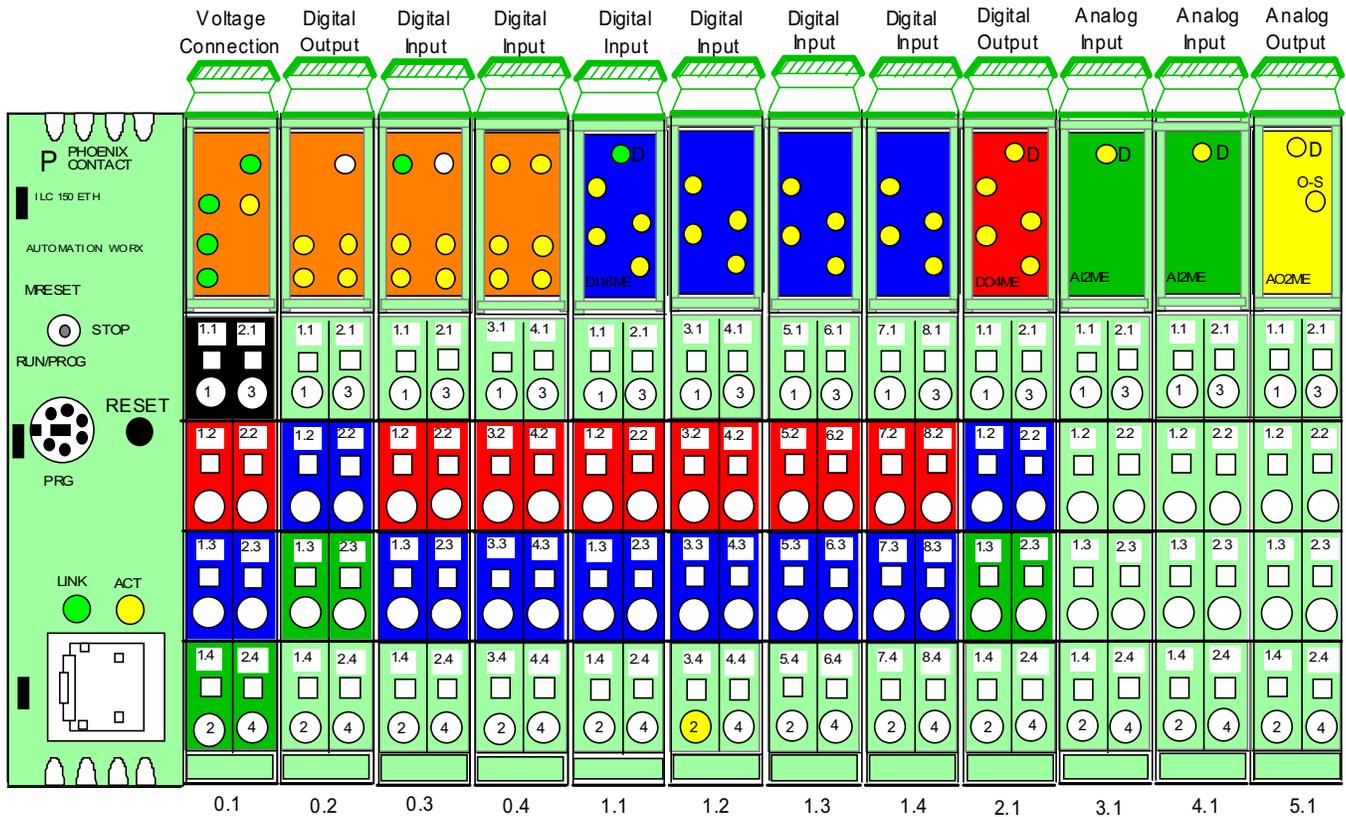
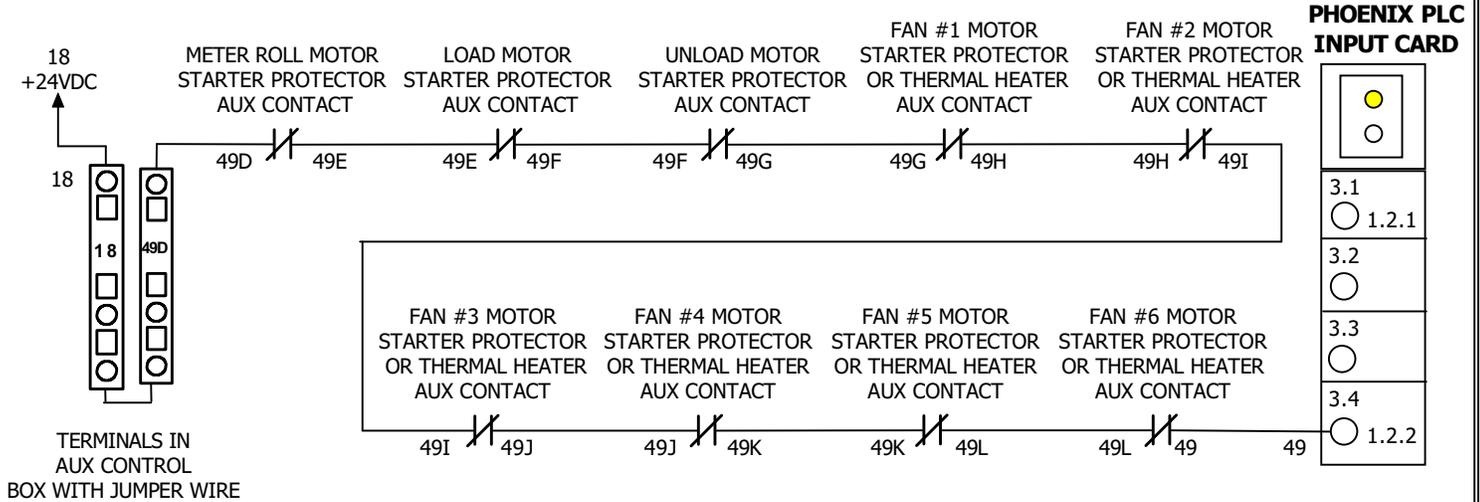
Revision: 5/14 7/14

QUADRATOUCH

MOTOR OVERLOAD FAULT

Motor overload circuit on dryer is a series circuit with current flowing through each auxiliary contact mounted on starter protector, or a set of contacts built into thermal overload block using a heater strip. If a motor uses more current than a starter protector is set at, or exceeds heater strip rating, contact will open, creating a fault condition. Series circuit begins in auxiliary control box and runs down to power box. Dryer is shipped from factory with a jumper between terminals # 18 and # 49 in auxiliary control box.

Fault Condition
Motor Overload



Yellow circle shows connection point for Motor Overload.

Title: 1 - 6 FAN: MOTOR OVERLOAD FAULT

Author: SUKUP MANUFACTURING CO.

Date: 4/11

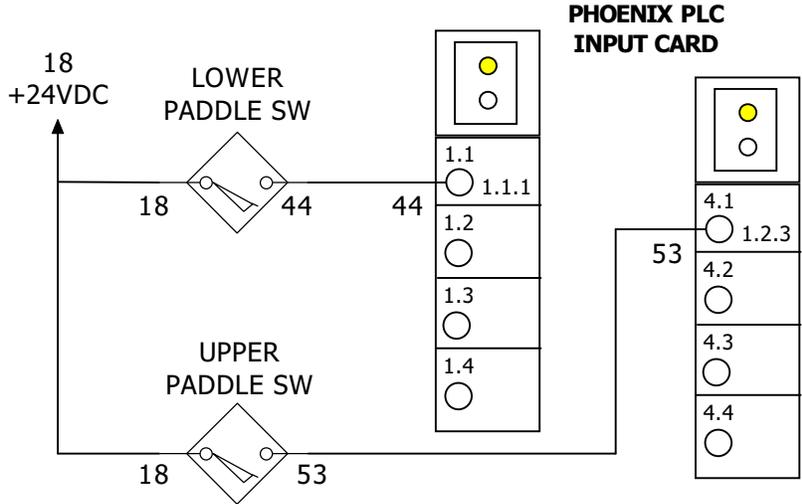
Sheet:

Revision: 5/14 7/14

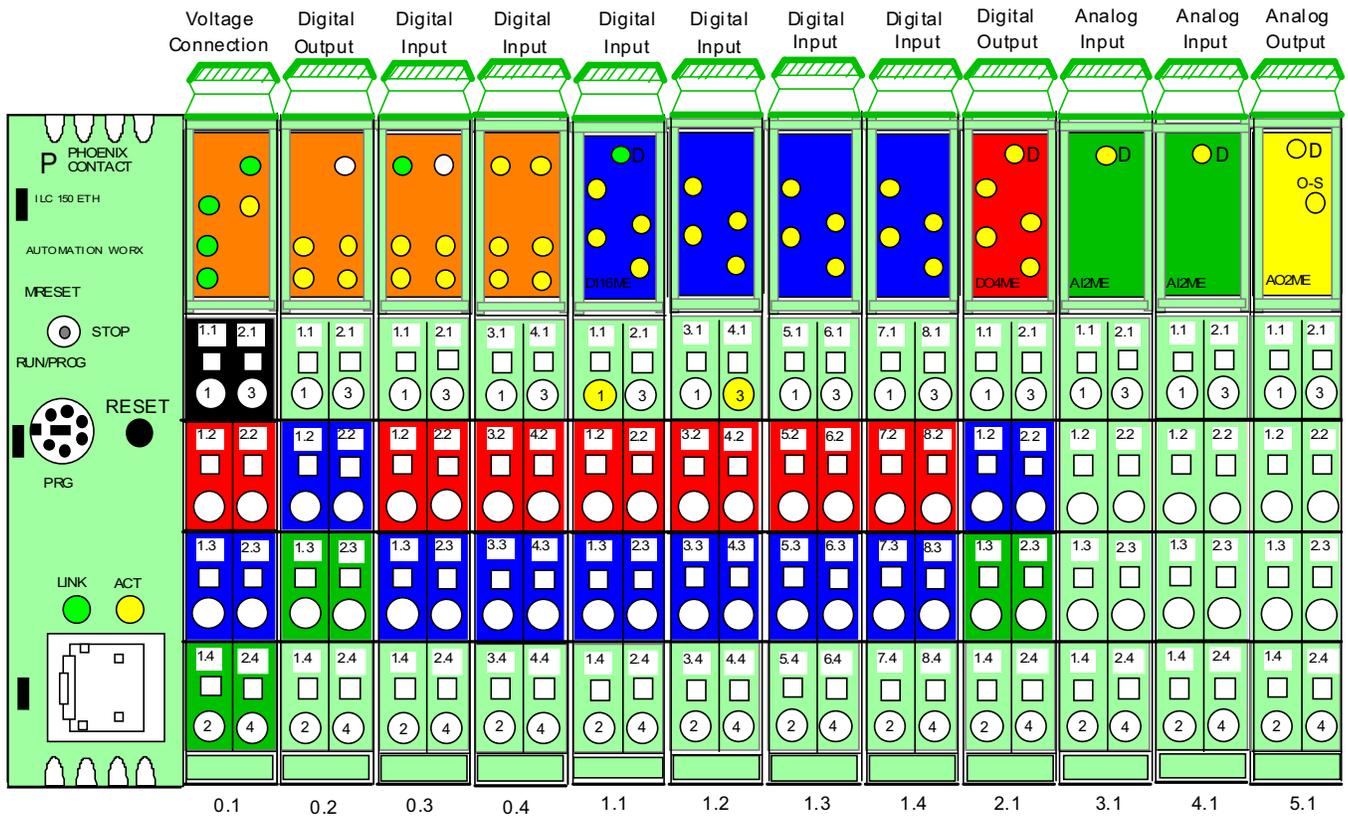
QUADRATOUCH

PADDLE SWITCH

Paddle or grain level switch is used to control load system. Two tilt switches inside box are used to fill dryer. Box containing switches is located on wet bin (top of dryer) opposite of fill end. If front-fill, box will be located on right side of dryer, if rear fill, on left side. When switches are open, or off, PLC will turn on load system. If paddle switch inputs do not turn back on within 10 minutes, a 10 minute "out of wet grain" fault will occur.



Fault Condition
 10 Min "Out Of Wet Grain"



Yellow circles show connection points for lower and upper paddle switches.

Title: 1 - 6 FAN: 10 MIN OUT OF WET GRAIN FAULT	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet:
Revision: 5/14 7/14	QUADRATOUCH

PLENUM OVER TEMPERATURE SWITCHES

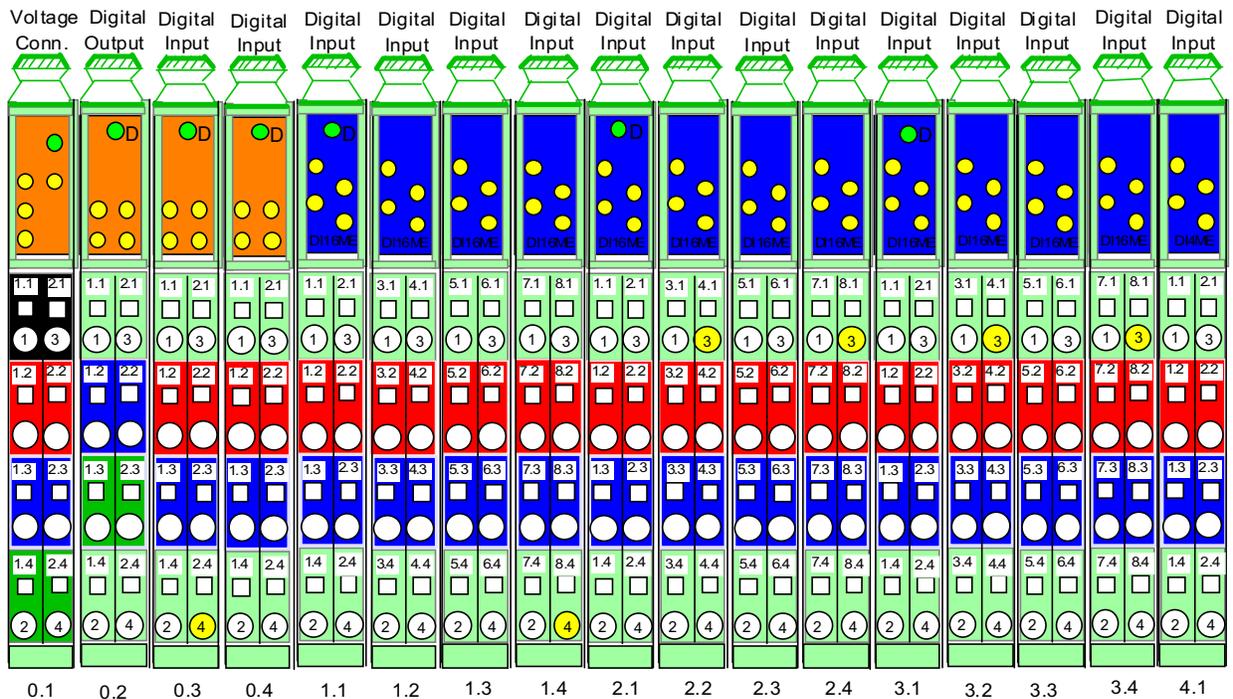
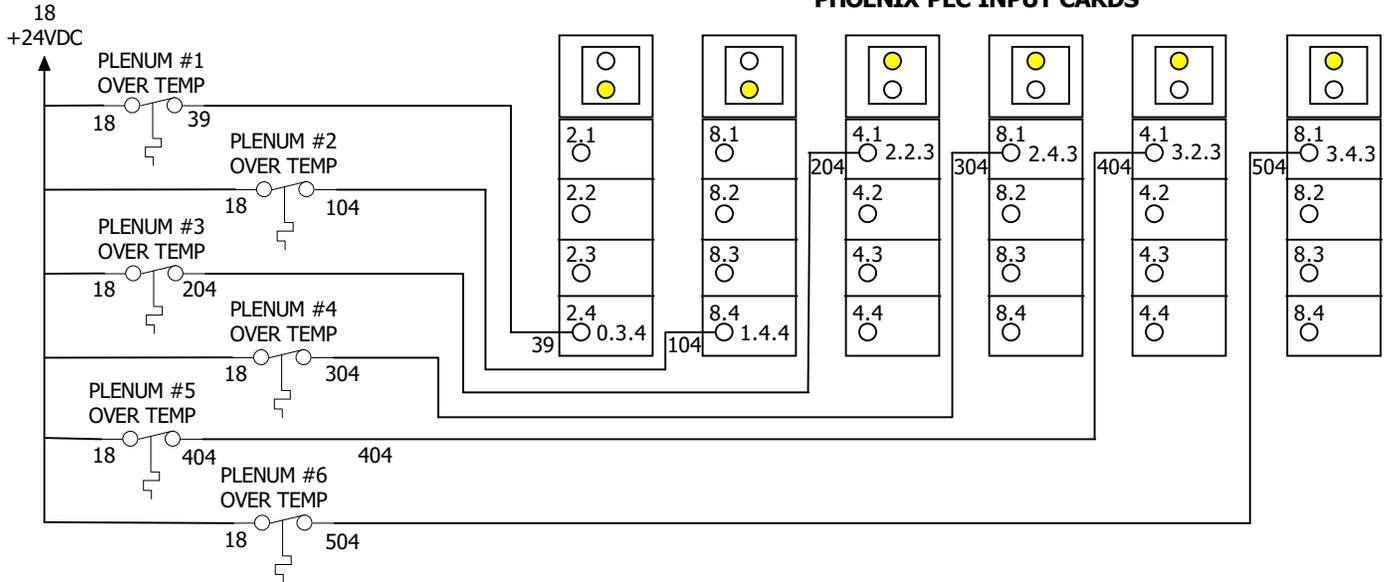
1-6 FAN DRYER

Plenum O/T switches are used to monitor temperature inside each plenum. Sensor runs along entire left side of plenum. If temperature exceeds 325 F., the switch will open and a fault will occur. Sensor will automatically reset when sensor temperature cools below 325°F. The sensor box is located on fan end plate of dryer.

Fault Condition
Plenum Over-Temp



PHOENIX PLC INPUT CARDS

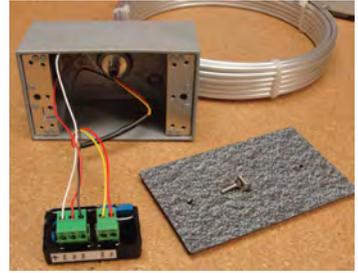


Yellow circles show the connection points for plenum O/T switches.

Title: 1 - 6 FAN: PLENUM O/T FAULT	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet:
Revision: 5/14 7/14	QUADRATOUCH

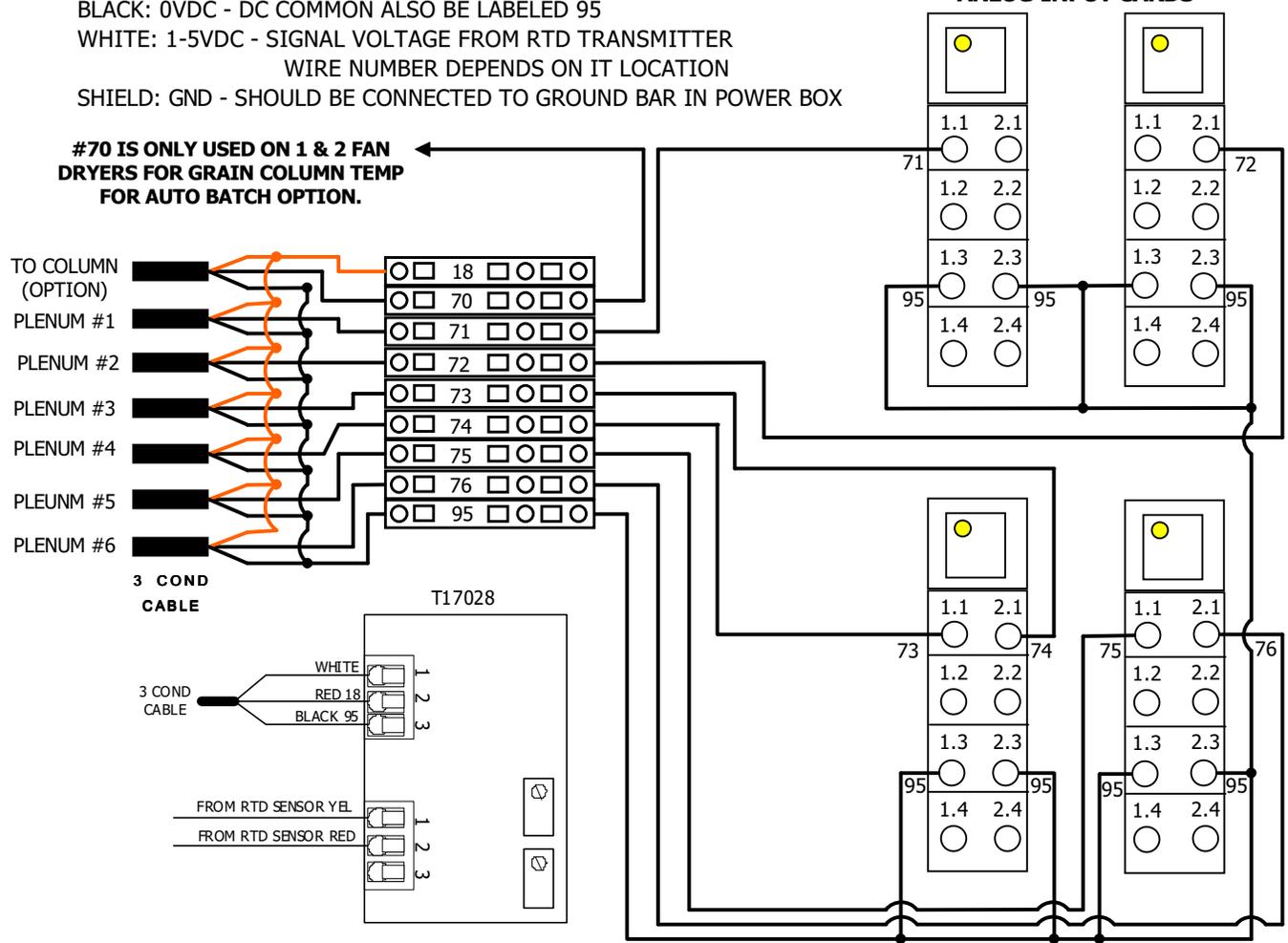
PLENUM TEMPERATURE SENSOR - RTD & TRANSMITTER

Plenum RTD sensor and transmitter are used to sense plenum and grain column temperature. Grain column temperature is used in conjunction with Autobatch option. Transmitter is located in power box.



- #18: +24VDC
- #95: 0VDC - DC COMMON
- RTD CABLE WIRE COLORS & VOLTAGES
- RED: +24VDC - MAY ALSO BE LABELED 18
- BLACK: 0VDC - DC COMMON ALSO BE LABELED 95
- WHITE: 1-5VDC - SIGNAL VOLTAGE FROM RTD TRANSMITTER
- WIRE NUMBER DEPENDS ON IT LOCATION
- SHIELD: GND - SHOULD BE CONNECTED TO GROUND BAR IN POWER BOX

#70 IS ONLY USED ON 1 & 2 FAN DRYERS FOR GRAIN COLUMN TEMP FOR AUTO BATCH OPTION.



PHOENIX PLC INPUT CONNECTION POINTS

# OF FANS	PLC INPUT #						
1 FAN:		2 FAN		3/4 FAN:		5/6 FAN	
70	4.1.3	70	7.1.1	71	7.1.1	71	9.1.1
71	3.1.1	71	5.1.1	72	8.1.3	72	10.1.3
		72	6.1.3	73	9.1.1	73	11.1.1
				74	9.1.3	74	11.1.3
						75	12.1.1
						76	12.1.3

Next page for PLC layout/connection points.

Title: 1 - 6 FAN: RTD & TRANSMITTER WIRING	
Author: SUKUP MANUFACTURING CO.	
Date: 4/11	Sheet: 1 OF 2
Revision: 5/14 7/14	QUADRATOUCH

UNLOAD AUGER PROXIMITY SWITCH

1-6 FAN DRYER

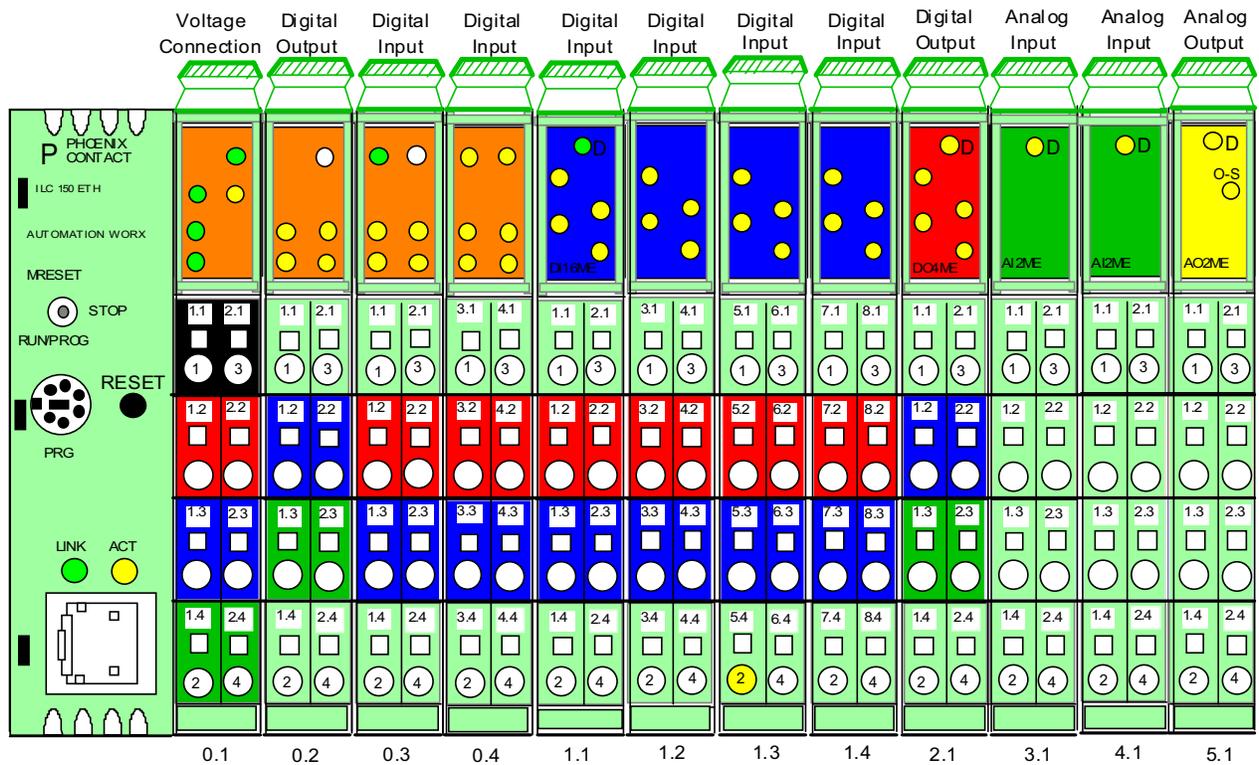
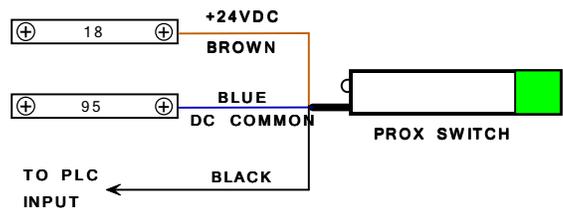
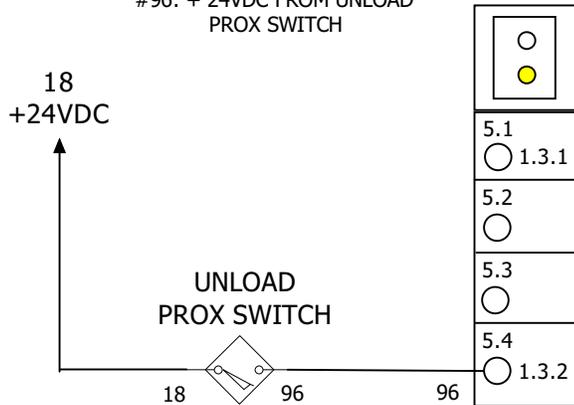
Proximity switch is used to monitor rotation of unload auger. Signal wire is connected to a digital input card - 1.3.2. Whenever metal of rotating target is over sensor head, 24 VDC is present on signal wire going to PLC. If a voltage pulse is not detected within 5 seconds of operation, a fault will occur. QuadraTouch proximity switches are PNP, or positive switching.

Fault Condition
Unload Prox Failure



- #18: +24VDC
- #95: - DC COMMON
- #96: + 24VDC FROM UNLOAD PROX SWITCH

PHOENIX PLC INPUT CARD



Yellow circle shows connection point for unload auger proximity switch.

Title: 1 - 6 FAN: UNLOAD PROXIMITY SWITCH FAULT

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

Revision: 5/14 7/14

QUADRATOUCH

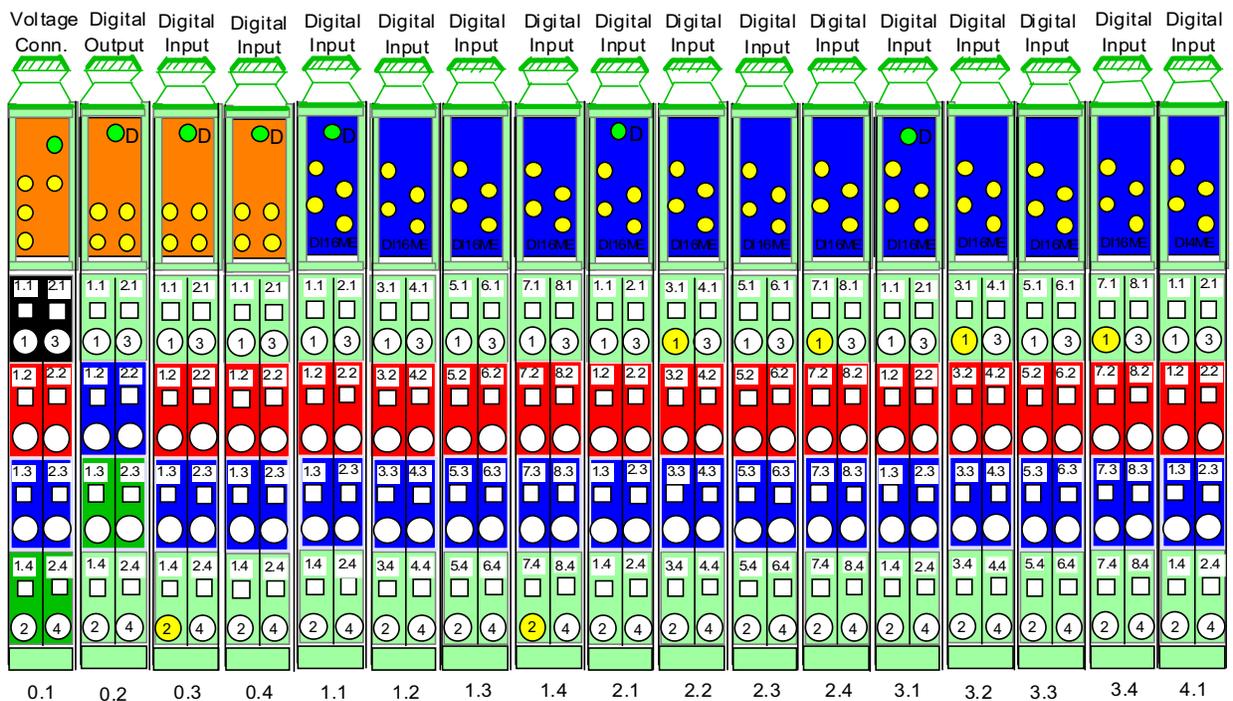
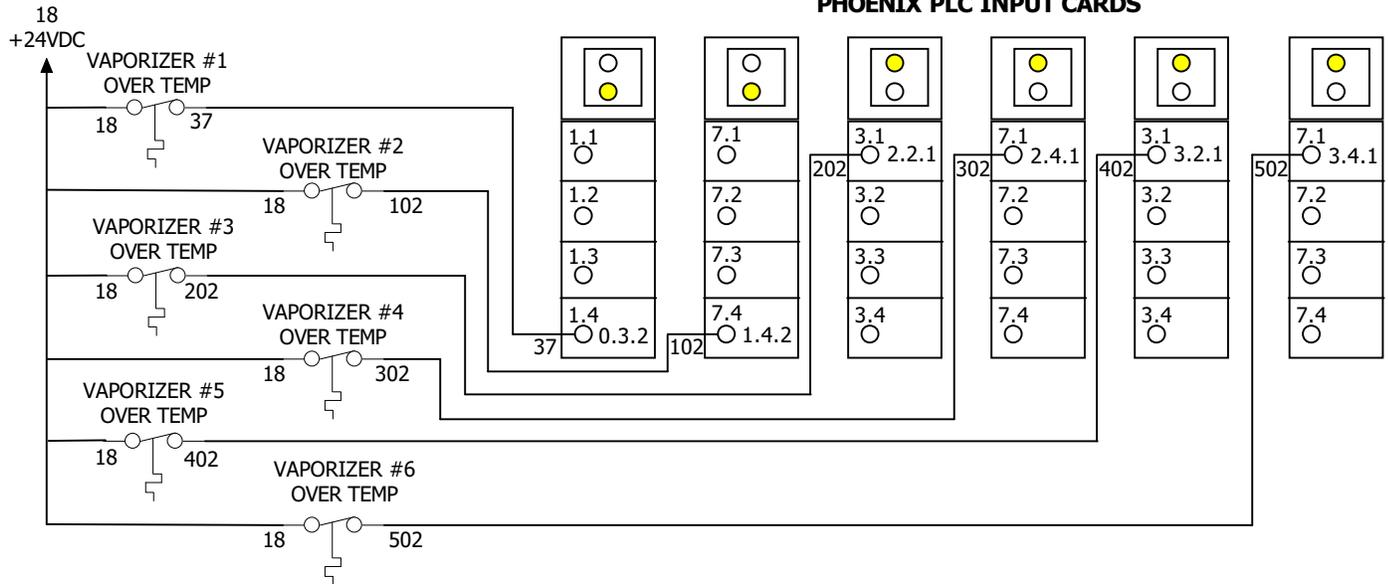
VAPOR OVER-TEMPERATURE SWITCH

Vapor O/T switch is used to monitor temperature of vapor exiting the vaporizer coil. A hose clamp secures sensor to vapor pipe, just before pressure regulator. If sensor temperature exceeds 140 F, sensor will open a set of contacts and an O/P fault will occur. Sensor will automatically reset upon cooling below 140 F. This sensor is used on LP dryers only.



Fault Condition

Vapor Over-Temp



Yellow circles show connection points for vapor O/T switches.

Title: 1 - 6 FAN: VAPOR O/T FAULT

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

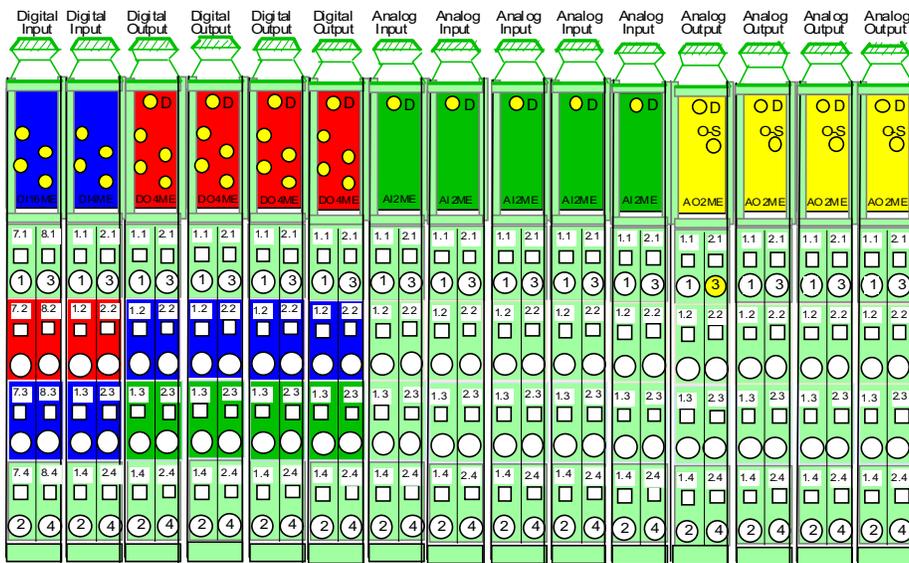
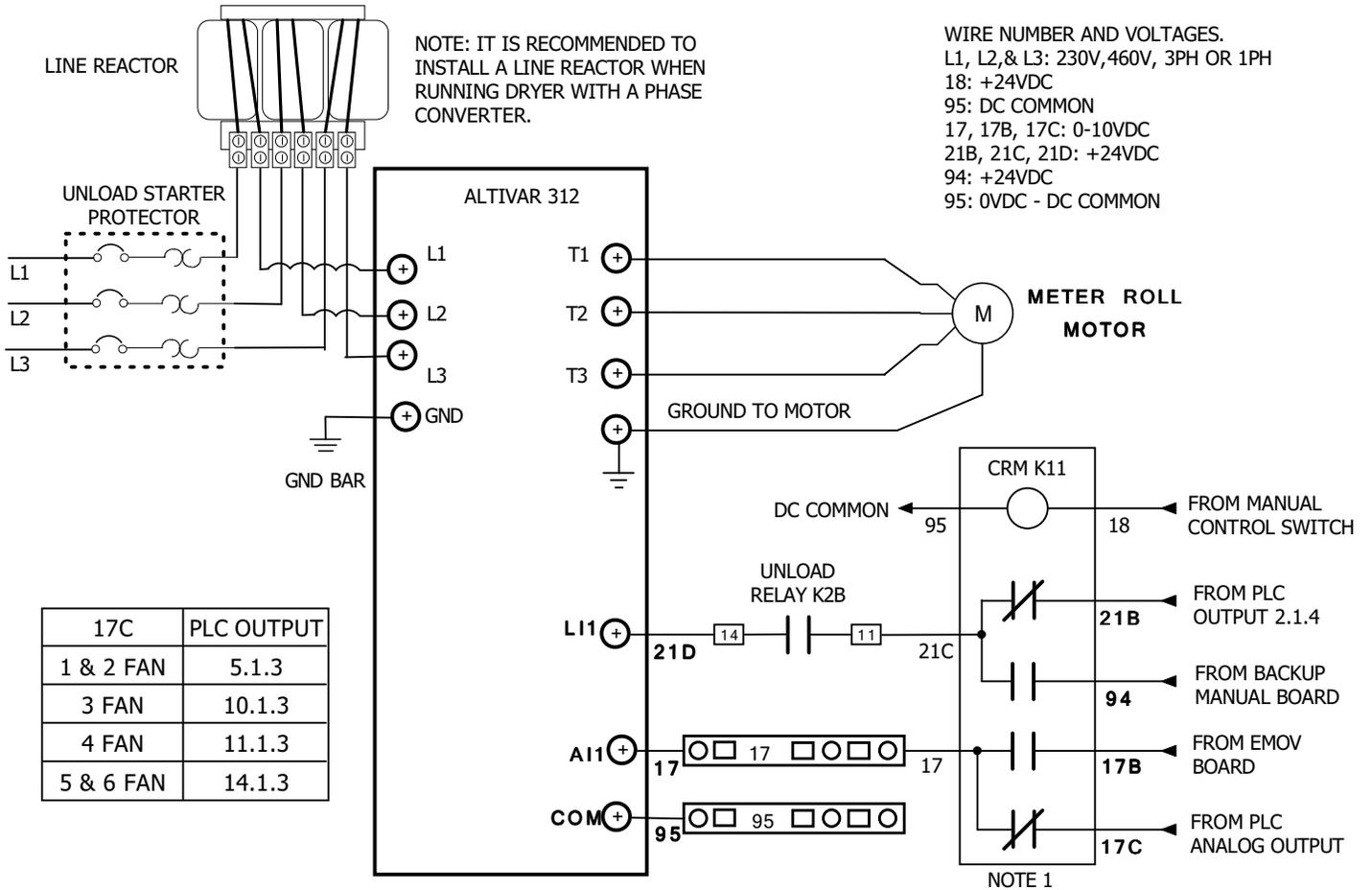
Revision: 5/14 7/14

QUADRATOUCH

METER ROLL MOTOR VARIABLE AC DRIVE

1 - 6 FAN DRYER

This drawing shows wiring connections for frequency drive that controls meter roll motor. When reference voltage to VFD is changed, output voltage to motor changes, which either increases or decreases motor RPM. When dryer is controlled using back-up Manual system, this voltage may be changed by pressing UP or DOWN button on electronic modulating valve board which is located under meter roll % display. When running in Computer mode, Reference voltage is generated by analog output card (yellow) on PLC.



Yellow circle shows connection point for 17C. Connection point is always on first analog output card. Card will have a different location number depending on number of fans.

□ - INDICATES RELAY SOCKET TERMINAL

NOTE: RELAY K11 IS LOCATED ON THE MANUAL BOX

Title: 1 - 6 FAN DRYERS: AC FREQUENCY DRIVE

Author: SUKUP MANUFACTURING CO.

Date: 4/11

Sheet:

Revision: 5/14 7/14

QUADRATOUCH



Automatic Centrifugal Grain Dryer

QuadraTouch™ Dryer Control System

Appendices

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Appendix A

Specifications

Estimated tonnes per hour

Unload time

Dryer holding capacities

Metric Tonnes Per Hour Information

<i>Estimated Drying Capacities</i>	Single Centrifugal Fan/Heater Dryer Models					
	<i>Metric Tonnes/Hour</i>					
	TC16	TC20	TC24	TC163	TC203	TC243
Full Heat 20% - 15%	up to 18.8	up to 24.6	up to 26	up to 18.8	up to 24.6	up to 26
Full Heat 25% - 15%	up to 11.4	up to 15.2	up to 18	up to 11.4	up to 15.2	up to 18
Pressure Heat/Vacuum Cool 20% - 15%				up to 11.2	up to 14.7	up to 17.5
Pressure Heat/Vacuum Cool 25% - 15%				up to 7.1	up to 9	up to 11

Numbers in table above are APPROXIMATE.

Determining Meter Roll Speed

Use table below to select meter roll speed for a single-fan dryer based on plenum temperature and desired points of moisture to be removed. Percentages are approximate. Adjust as necessary for each drying. **NOTE:** Grain variety, maturity level, cleanliness, weather conditions and operation can all affect performance of dryer. To the extent possible, be aware of different varieties of grain being fed into dryer, as well as other factors that may affect performance.

Table below is to be used for CORN only.

Desired Points of Moisture Removed	DETERMINING METER ROLL SPEED PERCENTAGE						
	Plenum Temperature						
	160°F (71°C)	170°F (77°C)	180°F (82°C)	190°F (88°C)	200°F (93°C)	210°F (99°C)	220°F (104°C)
15	7%*	7%*	8%*	9%*	9%*	10%*	11%
10	10%*	11%	12%	13%	14%	15%	16%
5	19%	21%	23%	25%	27%	29%	31%
3	32%	36%	39%	42%	46%	49%	52%

*If it is necessary to run meter rolls lower than 5%, Automatic Batch *must* be used. Percentages in table above are APPROXIMATE.

Dryer Stabilization Using Manual Mode

IMPORTANT: Let dryer stabilize after making any adjustments to meter roll. DO NOT make any further adjustments until dryer has turned grain over completely one time. To determine length of time to turn grain over one time, refer to table below.

Unload Time Based on Meter Roll Speed Percentage

Meter Roll Setting	Minutes to Unload Entire Dryer	Meter Roll Setting	Minutes to Unload Entire Dryer
10%	165.0	60%	27.5
15%	110.0	65%	25.4
20%	82.5	70%	23.6
25%	66.0	75%	22.0
30%	55.0	80%	20.6
35%	47.1	85%	19.4
40%	41.3	90%	18.3
45%	36.7	95%	17.4
50%	33.0	100%	16.5
55%	30.0		

Dryer Holding Capacities

Dryer Model	Holding Capacity	
	Bushels	Metric Tonnes
TC16	440	11.2
TC163	440	11.2
TC20	550	13.9
TC203	550	13.9
TC24	660	16.8
TC243	660	16.8

Appendix B

Electrical Requirements

Three-phase dryers

Single module

Two module

Electrical Load Requirements, Three-Phase Centrifugal Dryers (50Hz)

Note: A Service-Rated, Fused Disconnect needs to be installed ahead of the Dryer power distribution box. This disconnect is not included with the dryer and should be installed by a qualified electrician in accordance with local and national standards.

CAUTION: The only device connected to this disconnect should be your Grain Dryer.

The following charts provide information for the electrician wiring the Grain Dryer. It is recommended that you contact your local Power Company and have a representative inspect the installation to see that your wiring is compatible with their system and that sufficient power is supplied to your dryer.

Standard electrical safety practices and codes should be used. **IMPORTANT: Any supporting electrical panels or combinations of electrical components supplied by the end user must be compliant with local and national standards.**

All electrical work should be completed by a qualified electrician.

Dryer Electrical Specifications:

SINGLE MODULE DRYERS

TC1631DW (LP) or TC1632DW (NG) – 16 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, 380Volt, 3 Phase, 50 Hz, Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan	Minimum Amps	Maximum Amps
Motor/Wire Amps	3Kw/ #14 5 FLA	3Kw/ #14 5 FLA	22Kw/ #6 41 Amps	51 Amps	250 Amps

** See Auxiliary Kits section for options

TC2431DW (LP) or TC2432DW (NG) – 24 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, 380Volt, 3 Phase, 50 Hz, Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan	Minimum Amps	Maximum Amps
Motor/Wire Amps	5.5Kw/ #10 13 FLA	5.5Kw/ #10 13 FLA	37Kw/ #4 80 Amps	106 Amps	250 Amps

** See Auxiliary Kits section for options

TWO MODULE DRYERS

TC2451DW (LP) or TC2452DW (NG) – 24 Foot Dryer, 2 Fan, Stacked Module, 380Volt, 3 Phase, 50 Hz, Main Switch = 400 Amps

	Top Auger	Bottom Auger	Fan	FAN	Minimum Amps	Maximum Amps
Motor/Wire Amps	5.5Kw 13 FLA	5.5Kw 13 FLA	37Kw 80 FLA	37Kw 80 FLA	186 Amps	400 Amps

** See Auxiliary Kits section for options

Appendix C

Optional Dryer Accessories

Auxiliary motors
Dryer aspirator
GSM modem
Personalized sign

Auxiliary Motor Operation

Auxiliary control box is located directly above power box. Inside of auxiliary box there are three (3) optional control circuits. Two (2) control circuits are provided for loading system and one (1) control circuit is provided for unloading system.

For unloading system, a single control circuit is used to start and stop an external unload device at **same time as unload auger of dryer**.

Auxiliary loading system has two (2) optional control circuits. When commencing the load sequence, there is a **factory-programmed delay of 5 seconds** between the start of the load motor and the first auxiliary. After first auxiliary has started, there is an **additional factory-programmed 5 second delay** before second auxiliary is started. Delay settings can be adjusted using QuadraTouch™ system.

All Sukup grain dryers use a paddle switch style grain level indicator. It has two position switches in it. As paddle switch is raised by grain, the first switch closes, indicating dryer is becoming full. When lower switch closes, output for load auxiliary 2 turns off. Typically this is the wet bin auger. When second switch closes, dryer is completely full. Dryer then turns off load auger and first auxiliary load simultaneously. Dryer will not start load system again until both paddle switches are in their respective "off" positions.



CAUTION: Auxiliary components should not be installed in power box; only in Auxiliary box located above power box.



Installing components

When installing components in Auxiliary box, starter/protector is mounted on top DIN rail and contactor is mounted on middle DIN rail directly below.

If component kits are purchased from Sukup Manufacturing Co., starter/protectors and contactors will be pre-wired together.

Wiring components

Wiring auxiliaries:

1. Terminal Assignments (Dry Contacts – Potential Free):
 - a. 5 & 7 Load Auxiliary 1 (i.e. Incline)
 - b. 8 & 9 Load Auxiliary 2 (i.e. Horizontal)
 - c. 14 & 15 Unload Auxiliary

IMPORTANT: Terminals 5 & 7, 8 & 9, and 14 & 15 are all potential free contacts. This means that there is no voltage present on these terminals when dryer leaves factory. If auxiliary contactors use a 110VAC coil voltage, supply terminals 5 and 8 with 110VAC via a jumper wire from 1. Therefore, 7 and 9 will be the coil voltages for Load Auxiliaries 1 and 2, respectively. The same goes for 14 (coil voltage) and 15 (unload contactor coil).

NOTE: If contactors are not purchased from Sukup Manufacturing Co. **AND** use a coil voltage other than 115VAC, **DO NOT** jumper 1 to 5, 8 or 14. Supply terminals 5, 8 or 14 with correct coil voltage.

2. Fault protection wiring
 - Wire 49D – Fed from terminal strip into first motor overload contact (N/O - will be closed during normal operation)
 - **All additional motor overload contacts are then wired in series**
 - Wire 49* – Taken from last motor overload contact to terminal strip
- * Final letter (i.e. – 49'E') depends on number of overloads used.
3. Power wiring
 - Installed similar to those located in power box



CAUTION: If contacts installed are not purchased from Sukup Manufacturing, fault protection must be installed. Contact Sukup Manufacturing Co. to purchase these components.

NOTE: On three-phase systems, wild leg should always be connected to center terminal of Main Disconnect Switch.

Auxiliary Load and Unload Kit (Optional)

Dryers may be equipped with auxiliary load and/or unload motor starters / overloads. These can only be field installed.

From the chart below, use HP, Voltage and Phase to determine correct auxiliary kit number.

SINGLE-PHASE Field Install Kits

HP	Voltage	Phase	Part No.	Starter/ Protector	Contactors	Wire Size	Min Amps	Max Amps
5	230	1	T4270	J5230 (16-25A)	J52462 (40A)	#6	16	25
7.5	230	1	T4273	J5232 (25-40A)	J5247 (60A)	#6	25	40
10	230	1	T4276	J5242 (40-63A)	J5247 (60A)	#6	40	63

THREE-PHASE Field Install Kits

HP	Voltage	Phase	Part No.	Starter/ Protector	Contactors	Wire Size	Min Amps	Max Amps
5	230	3	T4620	J4243 (13-18A)	J52462 (40A)	#8	13	18
5	460	3	T4621	J5236 (6-10A)	J52462 (40A)	#10	6	10
7.5	230	3	T4623	J5230 (16-25A)	J52462 (40A)	#8	16	25
7.5	460	3	T4624	J5237 (9-14A)	J52462 (40A)	#10	9	14
10	230	3	T4626	J5232 (25-40A)	J52462 (40A)	#8	25	40
10	460	3	T4627	J5243 (13-18A)	J52462 (40A)	#10	13	18

Auxiliary Load and Unload Kit specifications

NOTICE

Most Main Switches and Distribution Blocks have been sized to handle up to four (4) 10 HP kits on every dryer. Refer to the electrical load requirements to ensure that main switch and distribution block are sized adequately. If unsure, contact your dealer.

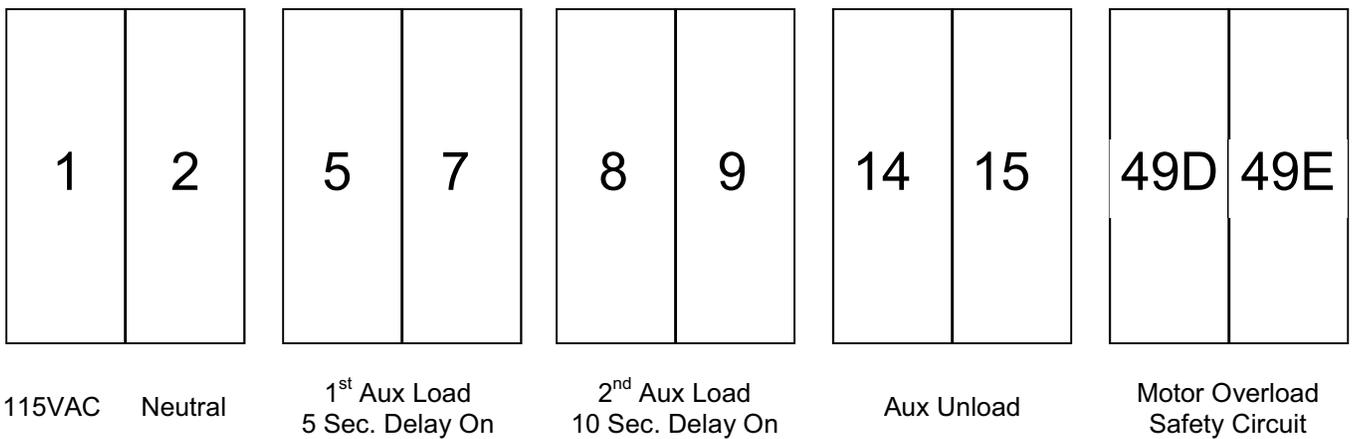
IMPORTANT: If additional auxiliaries are required, dealer is responsible to determine if dryer can handle additional load. If dryer is not able to handle extra load, auxiliary must have its own power source independent of dryer.

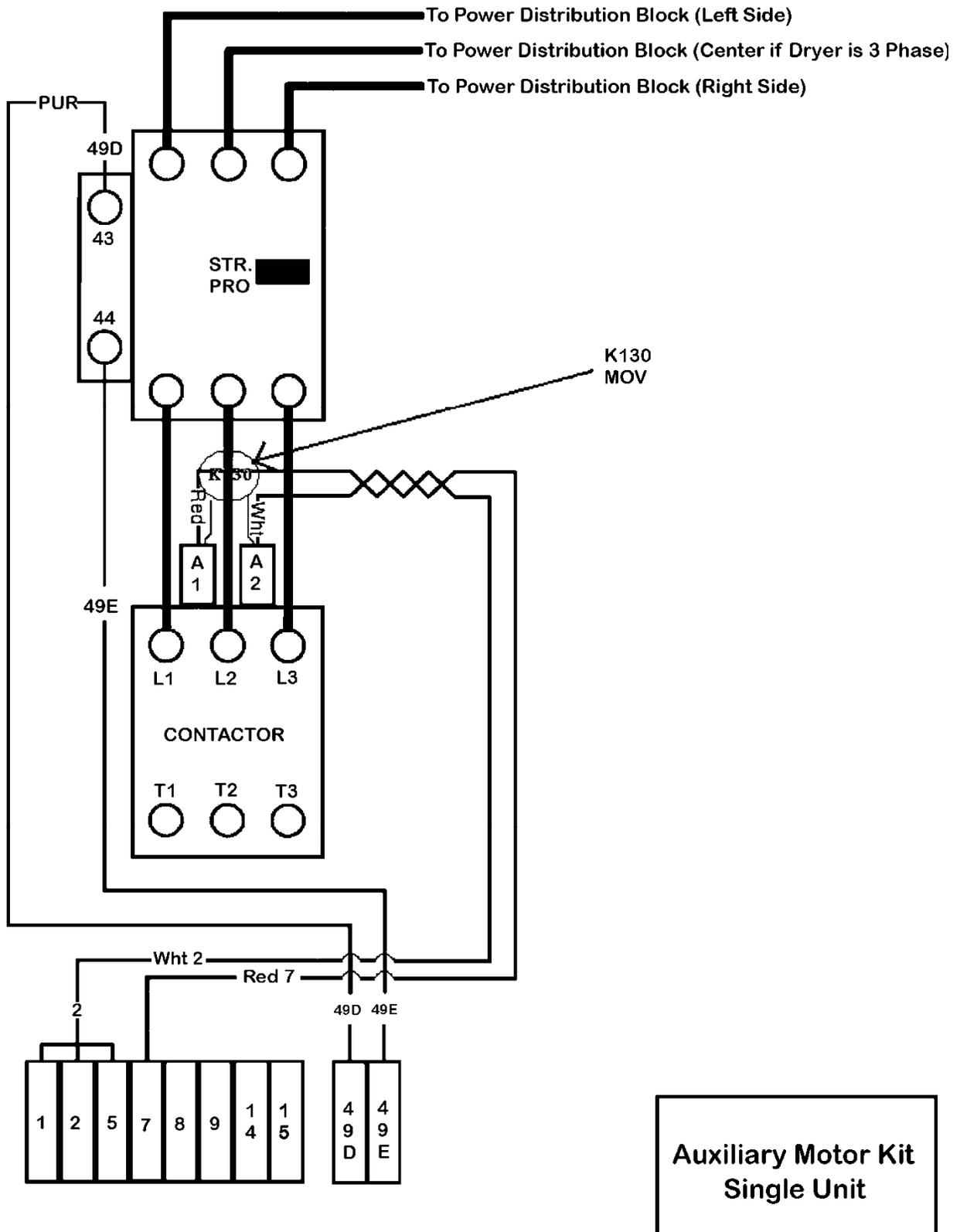
Temperature Compensated Overloads, 3-Phase Units

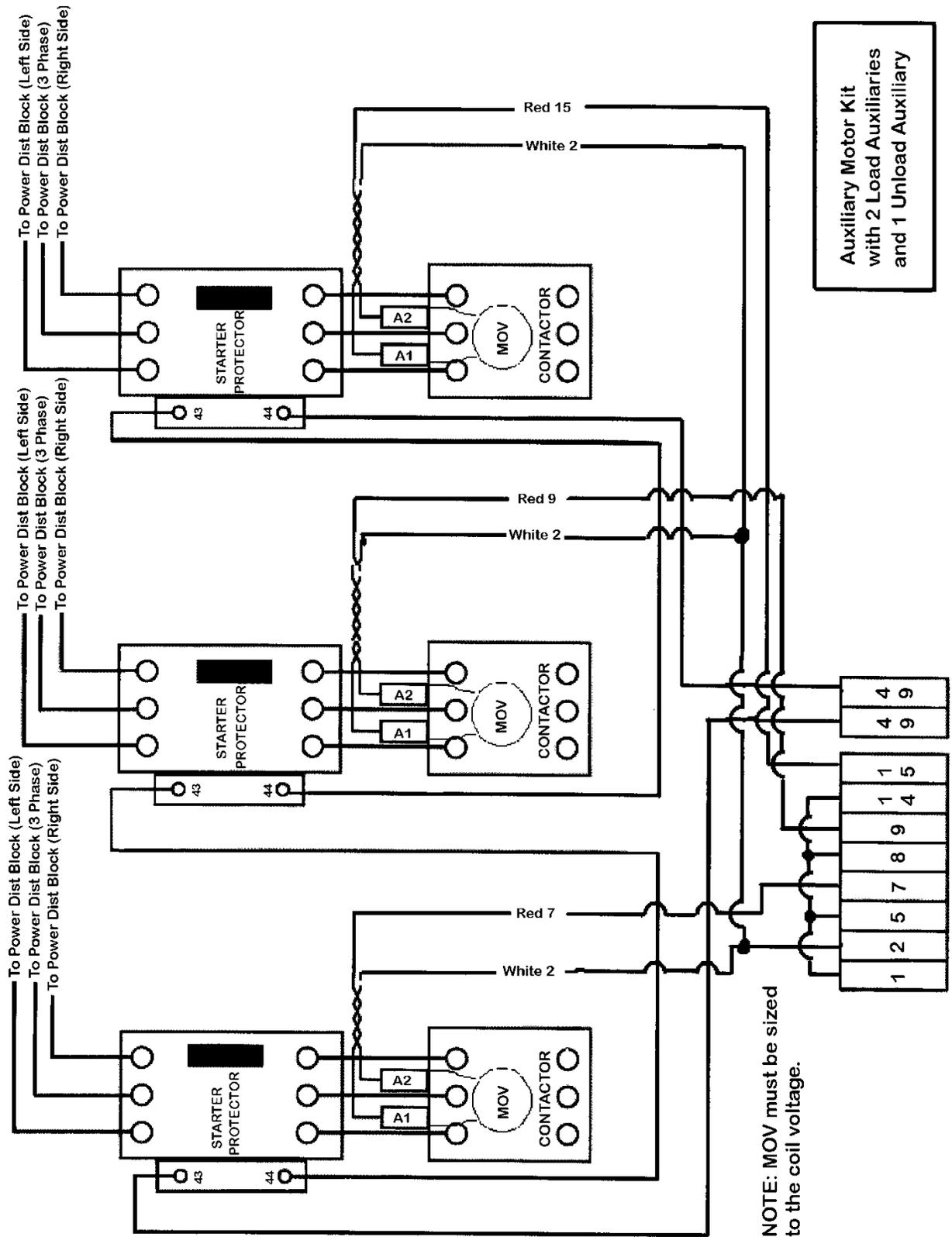
All dryers manufactured as three-phase units are equipped with temperature-compensated overloads. If auxiliary load and unload kits are installed and not purchased from Sukup Manufacturing Co., it is recommended that temperature-compensated units be used.

Auxiliary Load and Unload Terminals

Note: Terminals 5 & 7, 8 & 9, and 14 & 15 can be used as either dry contacts or 115VAC by using Terminals 1 (115VAC) and 2 (Neutral)







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Dryer Aspirator Component Instructions

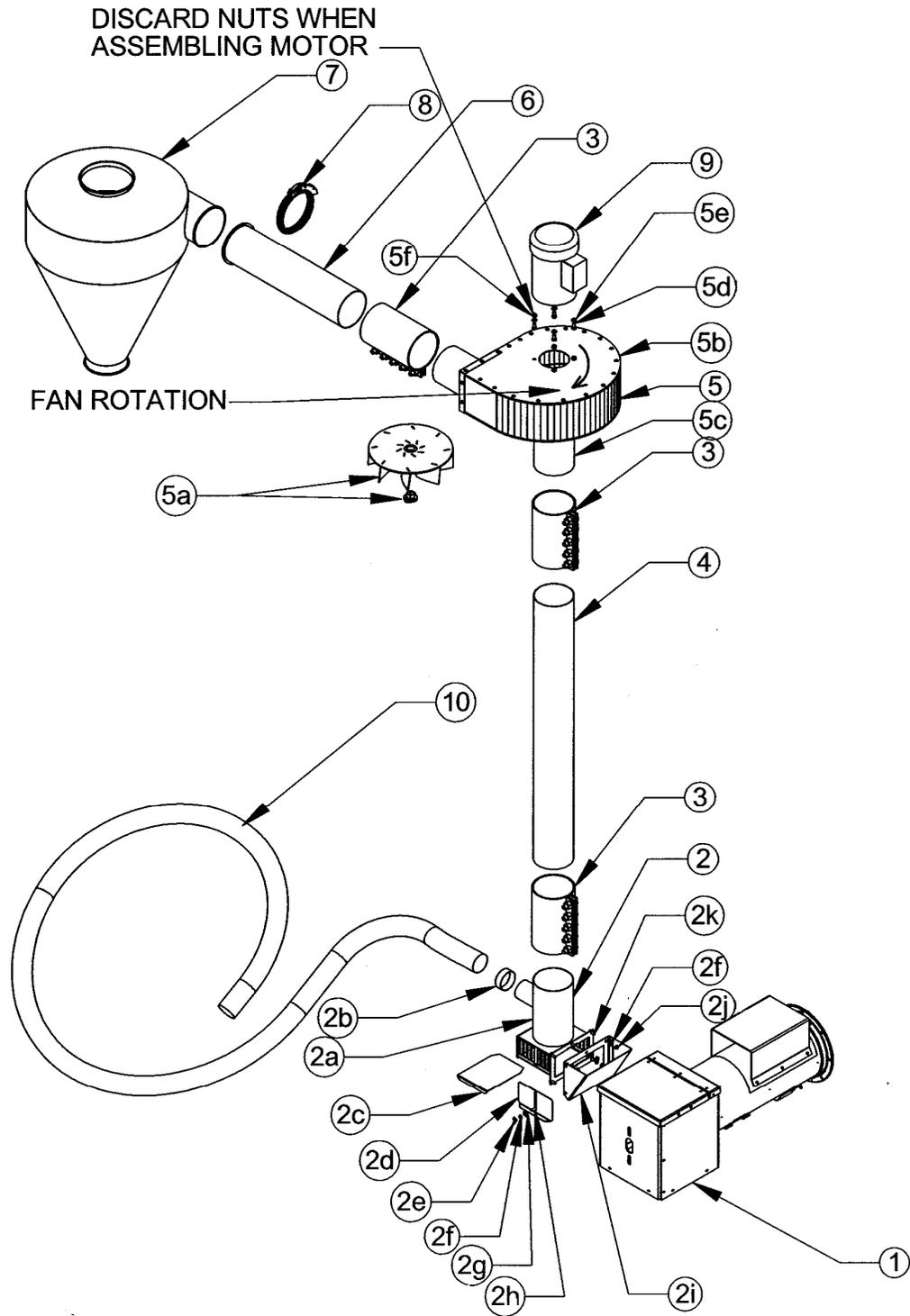
Assembly

1. Attach aspirator base assembly to side of dryer discharge housing. Mark and cut a 3³/₄" x 7¹/₄" hole (about 2 inches from top) in side of dryer discharge housing and drill (6) ³/₈" mounting holes using base flange as a template. Mount deflector with these same holes on inside face of dryer discharge housing.
2. Assemble the C-face motor to aspirator fan housing using hex-head ³/₈" -16 x ³/₄" screws and lock-washers that are provided in housing (discard ³/₈" nuts). Attach fan wheel to motor shaft with a ⁷/₈" split tapered bushing (J0409). Position bushing so it is flush with end of motor shaft and tighten ¹/₄" screws evenly to a torque of 95 inch-pounds.
3. Wire motor so fan wheel rotates in a clockwise direction when viewed from top. (See exploded view on next page.)
4. Fan may be assembled directly on top of aspirator base, or extended with a length of 6" tube. Use 6" compression couplers to fasten extension tube.
5. Assemble the cyclone to fan in the same manner using a 6" extension tube if desired. The 6" to 160mm tube adapter and clamp ring are used to secure the cyclone.
6. Use standard 6" tube supports and brackets (not shown in exploded view) to secure aspirator assembly to dryer or other convenient structure.

Operation

1. Remove clean-up plate (Item 2c) from aspirator base when unit is to be used to clean light material from discharged grain. Adjust restrictor plates up or down to vary amount of air pulling chaff from grain.
2. The aspirator base may also be used to clean up around dryer. Remove 3" cap (Item 2b) and attach a 3" flexible hose (Item 10), slide clean-up plate back into base and use it to regulate amount of air required to pull material up the 6" tube to fan.

Dryer Aspirator Component Assembly



Dryer Aspirator Components

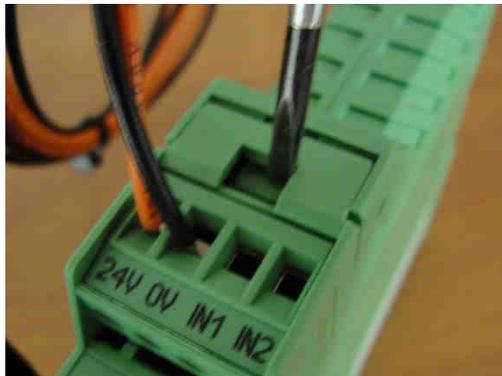
REF. #	DESCRIPTION	QTY.	COMP. #
1	Dryer outlet tube	1	T25670-A
2	Aspirator base assembly	1	D9585
2a	Aspirator base weldment	1	D9586
2b	Cap, 3"	1	J7535
2c	Plate, clean-up	1	D9588
2d	Plate, restrictor	2	D9587
2e	5/16" Wing nut	2	J1005
2f	5/16" Lock washer	8	J1200
2g	5/16" Flat washer	2	J1111
2h	5/16 x 1 Carriage bolt	2	J0535
2i	Deflector, aspirator	1	D95861
2j	Nut, 5/16-18, PLT	6	J1002
2k	Screw, 5/16-18 x 1, PLT, GRD 5, HHCS	6	J0527
3	Coupler, compression, 6", 5 bolt	3	J7560
4	6" Tube, cut to desired length	1	K2941-48
5	Fan, aspirator, 2 HP, w/o motor	1	D9580
5a	Fan wheel w/J0409 bushing	1	D9575
5b	Housing assembly, aspirator	1	D9581
5c	Inlet plate, weldment	1	D9583
5d	Screw, 3/8-16 x 3/4, PLT	4	J0605
5e	Washer, lock 3/8, PLT	4	J1205
5f	Nut, hex 3/8-16	4	J1020
6	Tube, weldment, 160mm to 6" adaptor	1	D9589
7	Cyclone, light material	1	J7565
8	Clamp, 160mm tube	1	J7566
9	Motor, 2HP, 3PH, 3450 RPM, C-face, F145TC	1	H2020
	Motor, 2HP, 1PH, 3450 RPM, C-face, F145TC	1	H2010
10	Hose, 3" ID Flex	1	K5248

GSM Modem Kit Install Instructions T24999

IMPORTANT: For modem to work properly, software on both the PLC and HMI must be version V2.02 or greater. To get the latest dryer updates, go to <http://www.sukup.com/Products/QuadraTouch>.

1. Check for GSM coverage in your area. AT&T, T-Mobile, and iWireless are popular GSM providers, and each offer prepaid plans. Check each one for the best coverage plan.
 - a. You will need to know the 20-digit ICCID# on the card provided.
 - b. You may need the 15-digit IMEI# found on the sticker on side of GSM modem.
 - c. Activating your SIM card online is usually the easiest, but if you do call, talking to a real person is generally the next best option.
 - d. Prepaid is usually the easiest way to go. Each company has different plans to accommodate your situation. The GSM modem operates with text messages over *VOICE NETWORK*. **Do not get a data plan or add a line if it's not necessary! It will be much less expensive to use the prepaid option.**

SIM card comes pre-installed into GSM modem. If for some reason you need to change SIM cards (like in step 7) or need the IMEI#, you may open the modem by pressing in the green tabs with a small screwdriver on top and bottom of the modem. See Image 1. The piece will slide outward as shown in Image 2.



2. Mount GSM modem onto DIN Rail. The modem should be mounted in power box or auxiliary box.
3. Connect GSM modem's power wires (See Image 3) to terminals 18 (orange) and 95 (black) located at bottom of power box.



4. Connect the GSM modem to the PLC with the Serial Interface Cable as shown.



5. To mount the antenna, you'll need to make a 5/8" hole. The hole should go in the top of the power box or the top of the auxiliary box (**typically gives the best reception**), depending of course where you mounted the modem.
6. Mount the antenna, and connect the other end to the GSM modem as shown.



7. You are finished. When you power up, you will see the VCC light flashing. After it has started up, the modem will search for a GSM signal. If it finds a signal, you will see a steady flashing or solid light on the NET light (after a couple of minutes). If the NET light is not lit, the SIM card was not properly activated, or there is no GSM signal. You may have to try a different GSM provider if this is the case.

IMPORTANT REMINDER!!!!

To make this modem work, the software version must be V2.02 or greater on both the PLC and HMI. Without this, the modem will not function properly. To get the latest dryer updates, go to <http://www.sukup.com/Products/QuadraTouch>

GSM Modem Operation Instructions

The GSM Modem interacts with the PLC by relaying text messages to a preprogrammed number in the touch-panel. In the event of a fault condition, the system will automatically text message that preprogrammed number one time a minute for 10 minutes. It will include the reason for the fault as well as a wire number if applicable.

If you have received the fault message, and do not wish to keep receiving the same message for the next ten minutes, simply send a text response of "00" to the GSM modem.

In addition to receiving text alerts in fault conditions, you can also query the dryer for its running status. Text message the GSM modem with "1234" and the modem will respond with the dryer's running status including time remaining (if applicable), plenum temperatures, moisture content, grain temperature, and roll speed.

If for some reason you wish to shut the dryer down without being there, we also offer a remote shutdown feature. Text message the GSM modem with "8888" to shut the dryer down remotely. You will not, however, be able to remote start the dryer.

V2.6 software updates allow you to change the plenum temperature setpoint(s) and the discharge moisture setpoint.

Text "P#XXX" to give the dryer a new plenum temperature setpoint.

Example: "P1220" would give plenum 1 (lowest plenum) a new setpoint of 220°.

This command *is not* case sensitive. "P" or "p" will work.

This command will receive an acknowledgement after it has been changed.

Text "MSTXXX" to give the dryer a new discharge moisture setpoint.

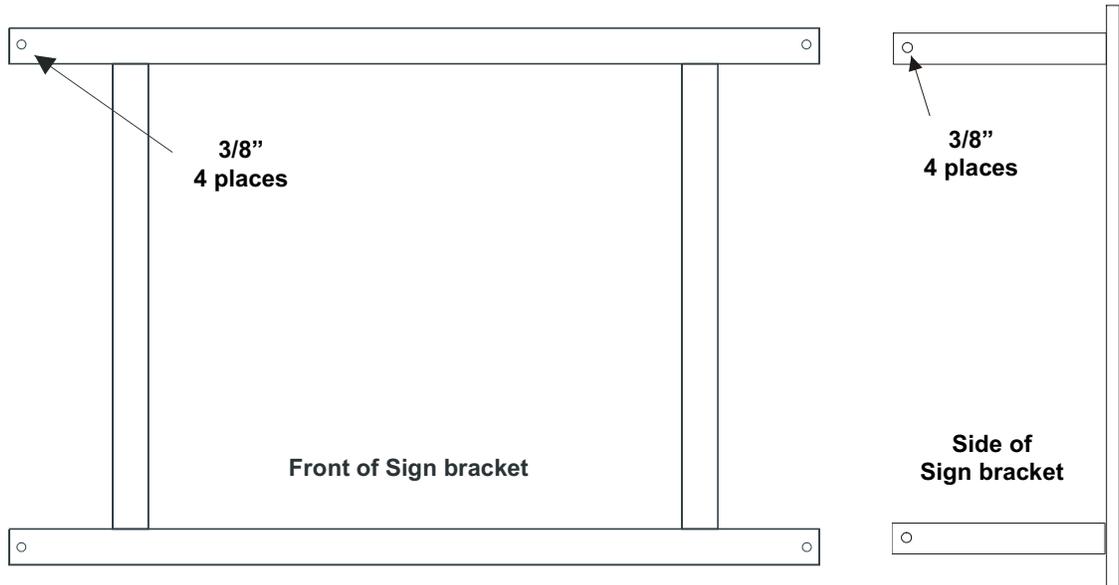
Example: "MST145" would give the dryer a new setpoint of 14.5%.

This command *is slightly* case sensitive. "MST", "Mst", and "mst" will work.

This command will receive an acknowledgement after it has been changed.

Keep in mind, you can text the dryer from ANY phone with the messages "00" "1234" or "8888" or "P#XXX" or "MSTXXX". However, only the preprogrammed number in the touch-panel will receive fault condition text message alerts.

Personalized Sign



Sukup Manufacturing Co. provides a sign for portable dryers, showing customer name or farm name and/or dealer name, at no additional charge. The dealer will order the sign if desired, furnishing appropriate information for printing.

The bracket pictured above can be mounted to outside of dryer, on any two-foot grain column section. The sign is then mounted to bracket. It can also be mounted under fan(s) on a sheet metal support.



Appendix D

Soft Start Programming

ATS22 Soft Start

The following information is needed from motor nameplate before programming the ATS22 Soft Start:

Motor voltage: _____ (Step 5)

Motor horsepower: _____

Motor full load amps: _____ (Step 10)

Steps to program the ATS22 Soft Start

1. Press down arrow until **conF (Configuration Menu)** is shown on screen.
2. Press Enter.
3. Press down arrow until **Uln (Line Voltage)** is shown on screen.
4. Press Enter.
5. Press up or down arrow until display shows line voltage of dryer. If dryer is 230vac, set to 240. If dryer is 380vac, set to 400. If dryer is 460vac, set to 480. If dryer is 575vac, set to 600.
6. Press Enter. Display should blink, indicating that new value is set into memory.
7. Press Escape.
8. Press the down arrow until **In (Motor Rated Current)** is shown on display.
9. Press Enter.
10. Press up or down arrows until you find appropriate motor current using the Full Load Amps table on page 4.
11. Press Enter. Display should blink indicating that new value is set into memory.
12. Press Escape.
13. Press down arrow until **LAC (Advanced Mode)** is shown on screen.
14. Press Enter.
15. Press down or up arrow until **on** is shown on screen.
16. Press Enter. Display should blink indicating that new value is set into memory.
17. Press Escape.
18. Press Escape again. Display should show **ConF**.
19. Press down arrow until **SEt (Settings Menu)** is shown on screen.
20. Press Enter.
21. Display should show **t90 (Initial voltage)**. If not, press down arrow until it appears on screen.
22. Press Enter.
23. Press down or up arrow until **50** is displayed on screen.
24. Press Enter. Display should blink indicating that new value is set into memory.
25. Press Escape.
26. Press down arrow until **tLS (Max Start Time)** is shown on screen.
27. Press Enter.
28. Press down or up button until **50** is displayed on screen.
29. Press Enter. Display should blink indicating that new value is set into memory.
30. Press Escape.
31. Press down arrow until **ACC (Acceleration time)** is displayed on screen.
32. Press Enter.
33. Press down or up arrow until **15** is displayed on screen.
34. Press Enter. Display should blink indicating that new value is set into memory.
35. Press Escape.
36. Press down arrow until **tHP (Motor Thermal Protection)** appears on screen.
37. Press Enter.

38. Press down or up arrow until **20** appears on screen.
39. Press Enter. Display should blink indicating that new value is set into memory.
40. Press Escape.
41. Press Escape again. Display should show **SEt**.
42. Press down arrow until **ADJ (Advanced adjustments menu)** appears on screen.
43. Press Enter.
44. Display should show **Snb (Number of starts)**. If not, press down button until it appears on screen.
45. Press Enter.
46. Press down or up button until **I** appears on screen.
47. Press Enter. Display should blink indicating that new value is set into memory.
48. Press Escape.
49. Press down arrow until **SLG (Start period)** shows up on screen.
50. Press Enter.
51. Press down or up arrow until **5** appears on screen.
52. Press Enter. Display should blink indicating that new value is set into memory.
53. Press Escape.
54. Press down arrow until **SSC (Start-stop control)** appears on screen.
55. Press Enter.
56. Press down or up arrow until **oFF** appears on display.
57. Press Enter. Display should blink indicating that new value is set into memory.
58. Press Escape.
59. Press Escape again. Display should show **ADJ**.
60. Press down arrow until **IO (Advanced Input/Output Menu)** appears on screen.
61. Press Enter.
62. Press down arrow until **r1 (Relay 1)** appears on screen.
63. Press Enter.
64. Press down or up arrow until **Tr Ip** appears on the screen.
65. Press Enter. Display should blink indicating that new value is set into memory.
66. Press Escape.
67. Press down arrow until **r2 (Relay 2)** appears on screen.
68. Press Enter.
69. Press down or up arrow until **rUn** appears on screen.
70. Press Enter. Display should blink indicating that new value is set into memory.
71. Press Escape.
72. Press Escape again. Display should show **IO**.
73. Press Escape again or until **rdY** appears on display.
74. Turn off control power to soft start.
75. Restore power to soft start and allow it to reboot.

Soft Start Full Load Amps

Motor	Voltage	Full Load Amps (FLA)	Voltage	Full Load Amps (FLA)
5HP	208VAC	17.5	230VAC	15.2
	380VAC	9.2	460VAC	7.6
	575VAC	6.1		
7½HP	208VAC	25.3	230VAC	22
	380VAC	13	460VAC	11
	575VAC	9.0		
10HP	208VAC	32.2	230VAC	28
	380VAC	16	460VAC	14
	575VAC	11		
15HP	208VAC	48.3	230VAC	42
	380VAC	25	460VAC	21
	575VAC	17		
20HP	208VAC	62.1	230VAC	54
	380VAC	32	460VAC	27
	575VAC	22		
25HP	208VAC	78.2	230VAC	68
	380VAC	41	460VAC	34
	575VAC	27		
30HP	208VAC	92	230VAC	80
	380VAC	48	460VAC	40
	575VAC	32		
40HP	208VAC	120	230VAC	104
	380VAC	62	460VAC	52
	575VAC	41		
50HP	208VAC	150	230VAC	130
	380VAC	78	460VAC	65
	575VAC	52		
60HP	208VAC	177	230VAC	154
	380VAC	93	460VAC	77
	575VAC	62		
75HP	208VAC	221	230VAC	192
	380VAC	116	460VAC	96
	575VAC	77		
100HP	208VAC	285	230VAC	248
	380VAC	150	460VAC	124
	575VAC	99		
125HP	208VAC	359	230VAC	312
	380VAC	189	460VAC	156
	575VAC	125		

Appendix E

Dryer Startup

Actions required to start dryer
Adjusting vaporizer coil on LP models
Dryer installation checklist

Dryer Startup

Following are the minimum operator actions required to successfully start the Dryer:

 **CAUTION:** Augers, fans, and heaters will start without warning at the appropriate times. Please use caution around dryer.

1. Open the power box and ensure that all internal breakers and starter protectors are turned on. Close the door to the power box, close the latch, and turn the master disconnect “ON”.
2. On the power box, pull the Emergency Stop button out. It should illuminate red. If using the QuadraTouch™ controller, the System Control Switch needs to be turned to the “COMPUTER” position. If using the manual backup system, “MANUAL” needs to be selected.
3. The Display should show “System Ready”. All faults must be cleared before the dryer can start. Press “Start” to choose an operation.
4. The display will give the options of selecting Continuous Flow, Autobatch, Grain Transfer, and Final Dry. Press “Reset” to abort dryer startup.

For Continuous Flow

- Operator must select Initial Dry, Restart & Stabilization, or Restart without Stabilization.

Initial Dry

- Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed.
- A 160°F (71°C) plenum temperature is required for an Initial Dry
- It is **HIGHLY RECOMMENDED** that the operator is at the dryer to verify the grain moisture accuracy once sampling has started and calibrate if necessary.
- If an output sensor moisture or temperature calibration adjustment is necessary, while the dryer is sampling, press “Tools” and select “Calibrate Sensors” to change the moisture or temperature. Once the required calibration adjust has been entered, the dryer will recommence with the moisture sampling. Allow 30 minutes for the dryer to stabilize before repeating this procedure.

Restart & Stabilization

- Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed.
- Plenum temperatures and meter roll speed must be accepted or changed.
- Dryer will run through stabilization. This choice is **recommended** if dryer has been off for longer than three (3) hours and the grain in the dryer is partially dry.

Restart without Stabilization

- If dryer has been off for less than 1 hour and the grain has retained some heat from the last drying sequence, it is **recommended** that this option be used.
- If dryer is off for more than one (1) hour, the operator can choose to use stabilization or can skip that option.

For Automatic Batch

- If user has the “Temperature Option”, the user must choose if the dryer will run in Time Setting or Temperature Setting.
- When the Time Option is chosen, user must decide the times for heating and cooling of the grain.
- If the Temperature Option is present and chosen, user must decide the temperature for heating and time for cooling the grain.
- When the dryer unloads the grain, the meter rolls will run at the maximum meter roll setting given by the operator.

For Grain Transfer

- Dryer operator must decide the maximum meter roll speed for this option.
- **Do not** exceed unload system capability.

Vaporizer Coil Adjustment (LP Models Only, Not Applicable to Natural Gas)

Adjusting the Heater Vaporizer Coil



CAUTION: If vaporizer is not adjusted correctly, piping could be hot!



Selecting the Dry Fire / Test Mode is required to operate the dryer's fan and heater when there is no grain in the dryer. After the dryer has been allowed to run and the plenum temperature has stabilized, the vaporizer outlet (top) should be warm but not hot to the touch.



Fault Condition
Vapor Over-Temp

If the vapor side of the pipe train is hot, or if the dryer has shut down due to a "VAPOR OVER-TEMP" alarm. The vaporizer may need to be adjusted out (away from the flame). To adjust the vaporizer loosen the 2 pivot bolts (1 top, 1 bottom) of the vaporizer adjustment bracket and then pivot the vaporizer either in or out of the flame as necessary to regulate the temperature at the vaporizer outlet. The U-Bolts mounting the vaporizer to the adjustment bracket can also be loosened and vaporizer can be moved in and out to adjust. Viewing hole is present to watch vaporizer adjustment.

In the event the exact opposite is happening and the vaporizer is freezing up, loosen the vaporizer as described above and move it toward the flame instead of away from it.

**TO VALIDATE WARRANTY PERIOD
YOUR SUKUP DEALER MUST
COMPLETE THIS FORM AND
FAX OR MAIL TO SUKUP.**



Sukup Manufacturing Company
1555 255th Street, PO Box 677
Sheffield, Iowa USA 50475
Fax: 641-892-4629

Sukup Grain Dryer Installation Checklist
(Use ball point pen and press firmly)

Customer: _____
Street: _____
City/State: _____
Dryer Model #: **T** _____
Date: _____

Dealer: _____
Street: _____
City/State: _____
Serial #: _____
Tested By: _____

(Please Print Name)

Initials

1. Tighten all gas connections and check that all electrical wires are inserted properly and secured. _____
2. Ensure that gas and electrical power is connected properly and secured. _____
3. Check that all circuit breakers or starter protectors in the power box are in the ON position. _____
4. Check the ground rod for proper installation and secure connections. _____
5. Check that the gas supply is ready for use, and all valves are in the OPEN position. _____
6. Turn on main power disconnect handle, pull out E-Stop. E-Stop should illuminate. _____
7. On the control box, turn the system control switch to ON. The QuadraTouch™ controller should illuminate and display "System Ready." The system control switch should illuminate. Any fault conditions that exist must be cleared before proceeding. _____
8. Perform Dry Fire tests by pressing Tools → Dry Fire/Test. (Refer to page 5 in the Software Manual Section of the Dryer Manual.)
 1. Check each fan for proper rotation. _____
 2. Check each heater for proper operation, and check for leaks on the gas pipe train by using soapy water. _____
9. Perform sensor test by pressing Tools→System Tools→System Diagnostics. The display should show ambient temperature and little to no moisture. Press the Main Menu button to return to main screen. _____
10. Go into manual operation by pressing Tools→Manual Operation. _____
11. Press and hold the *burgundy* "Load OFF" button for one full second. It should turn to *neon-green* and "Load ON." Check the leveling auger for correct rotation. Check all Auxiliary load augers as necessary. Press and hold the "Load ON" button for one full second to stop. (Button will again turn *burgundy* in color, the "OFF" state.) _____
12. Press and hold the *burgundy* "Unload OFF" button for one full second. Check unload auger for correct rotation. Check all Auxiliary unloads as necessary. _____
13. Increase and decrease the meter roll speed to confirm that the speed is changing. _____
14. Press reset – all moving parts should stop. _____
15. Secure the Power box by pushing in the E-Stop and turning off the main power disconnect (on the power box door). Lock out power. _____

(Signature)

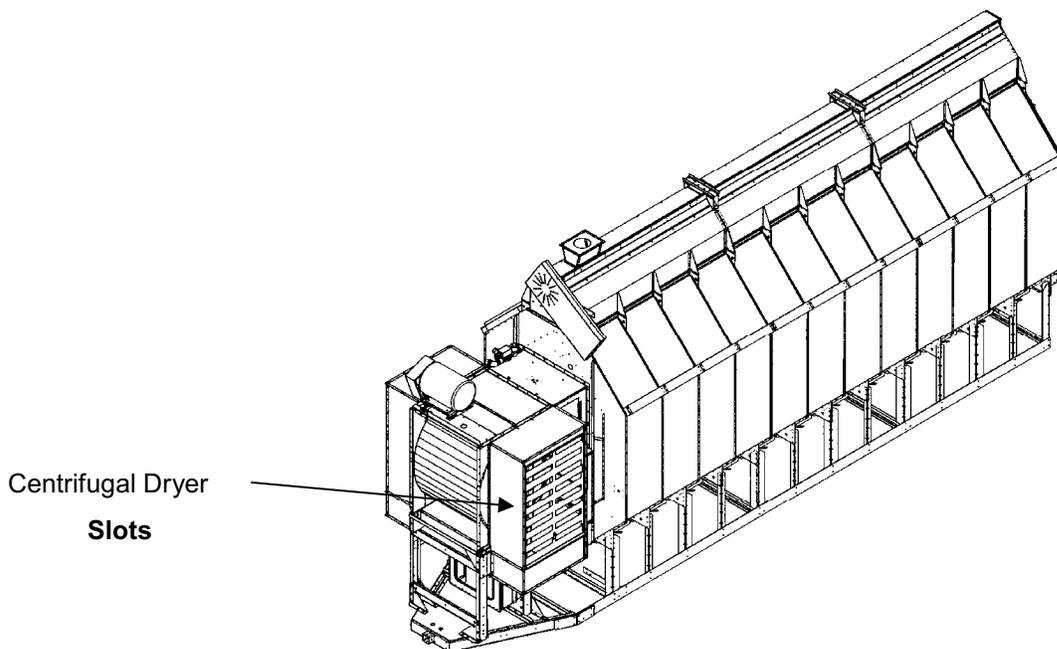
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Operational Information

SLOT OPENINGS ON INTAKE OF SUCTION COOL CENTRIFUGAL DRYERS

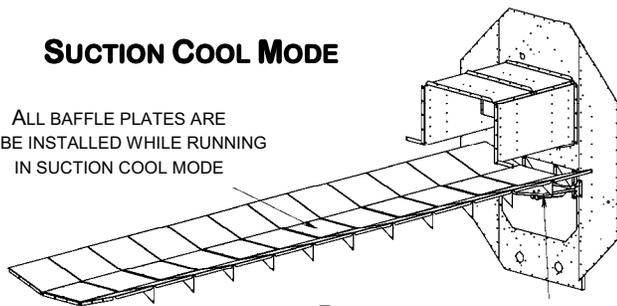


IN SUCTION COOL MODE (Refer to page 61):

Slots should be narrower to create more suction in the bottom cooling plenum. But slots should not be fully closed.

SUCTION COOL MODE

ALL BAFFLE PLATES ARE TO BE INSTALLED WHILE RUNNING IN SUCTION COOL MODE



FRONT DOOR COVER IS IN THE OPEN POSITION TO RUN IN SUCTION COOL MODE

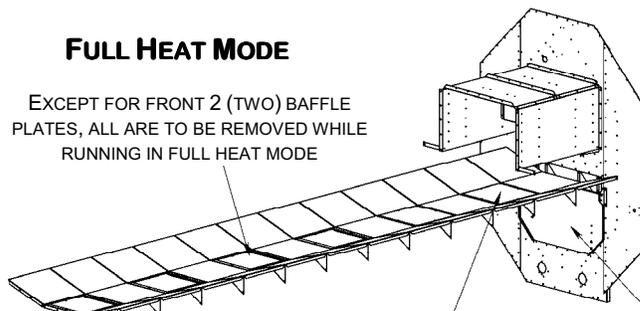
Instructions: Start with a 3/4" to 1" opening on slots and adjust from there. Closing slots more will increase efficiency and pull more heated air into the fan, but will decrease capacity. Opening slots more will increase capacity but will decrease efficiency and less heated air will be pulled into the fan.

IN FULL HEAT MODE (Refer to page 63):

Slots should be fully opened.

FULL HEAT MODE

EXCEPT FOR FRONT 2 (TWO) BAFFLE PLATES, ALL ARE TO BE REMOVED WHILE RUNNING IN FULL HEAT MODE

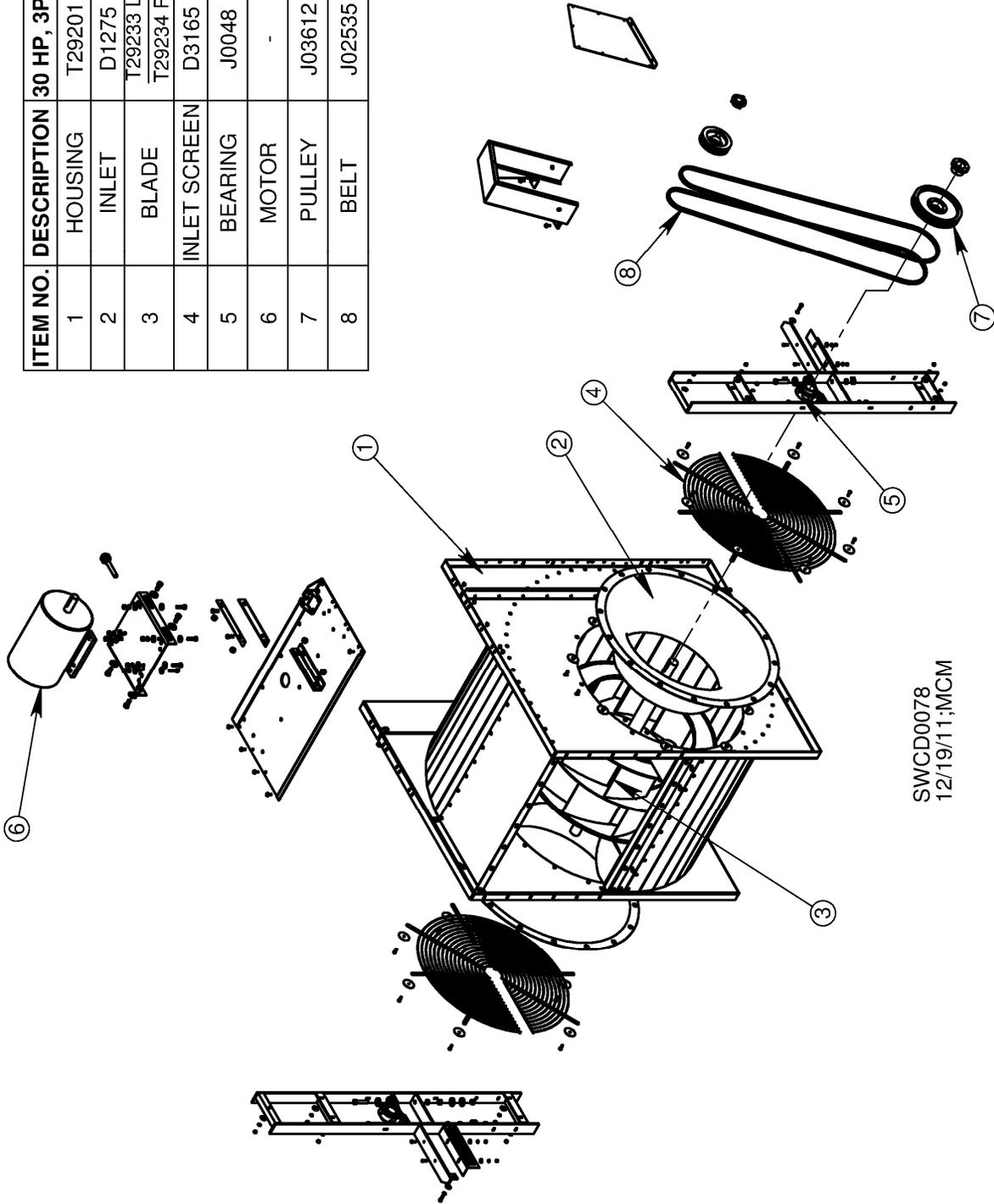


FRONT 2 (TWO) BAFFLE PLATES REMAIN IN PLACE

FRONT DOOR COVER IS IN THE CLOSED POSITION TO RUN IN FULL HEAT MODE

DRYER FAN PARTS, EU, D-C

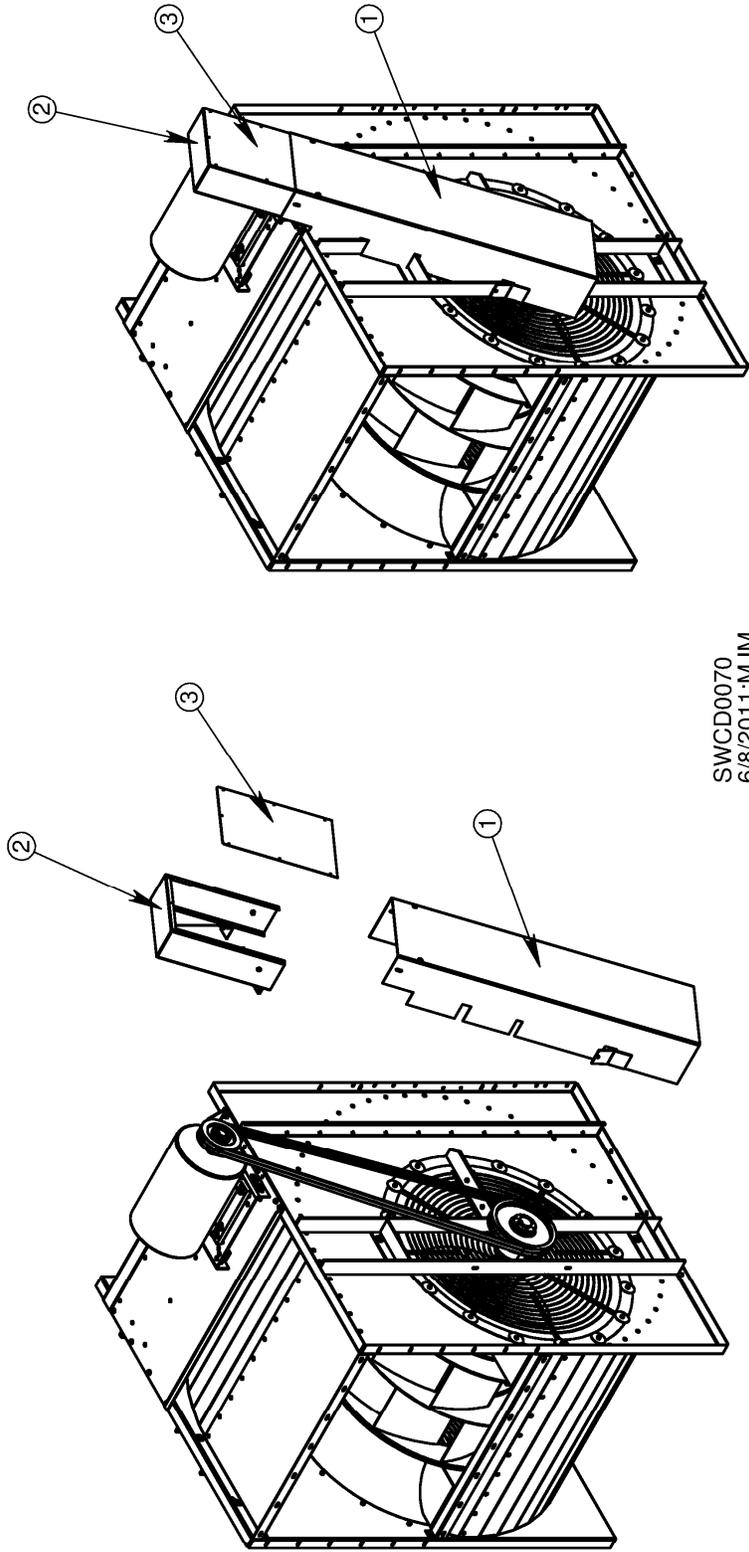
ITEM NO.	DESCRIPTION	30 HP, 3PH	40 HP, 3PH	50HP, 3PH
1	HOUSING	T29201	T29201	T29201
2	INLET	D1275	D1275	D1275
3	BLADE	T29233 L T29234 R	T29133 L T29134 R	T29333 L T29334 R
4	INLET SCREEN	D3165	D3165	D3165
5	BEARING	J0048	J0048	J0048
6	MOTOR	-	-	-
7	PULLEY	J03612	J03612	J03612
8	BELT	J02535	J02533	J02533



SWCD0078
12/19/11;MCM

FULL HEAT FAN BELT SHIELD ASSEMBLY

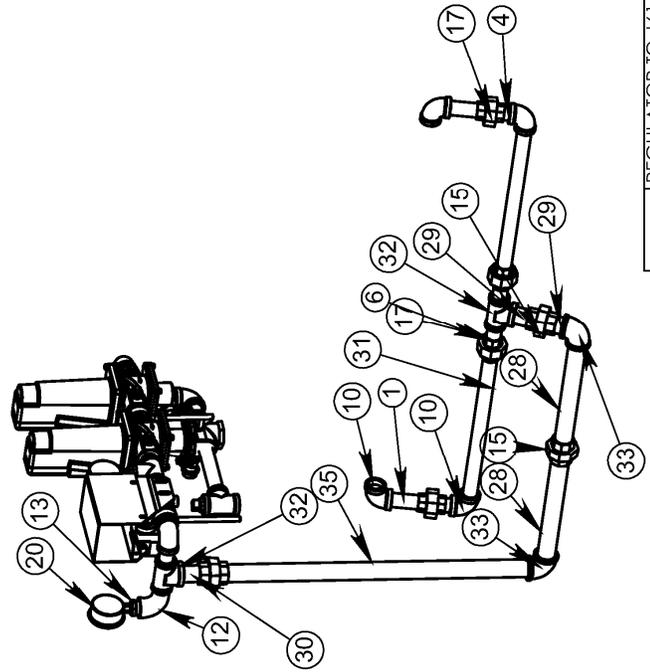
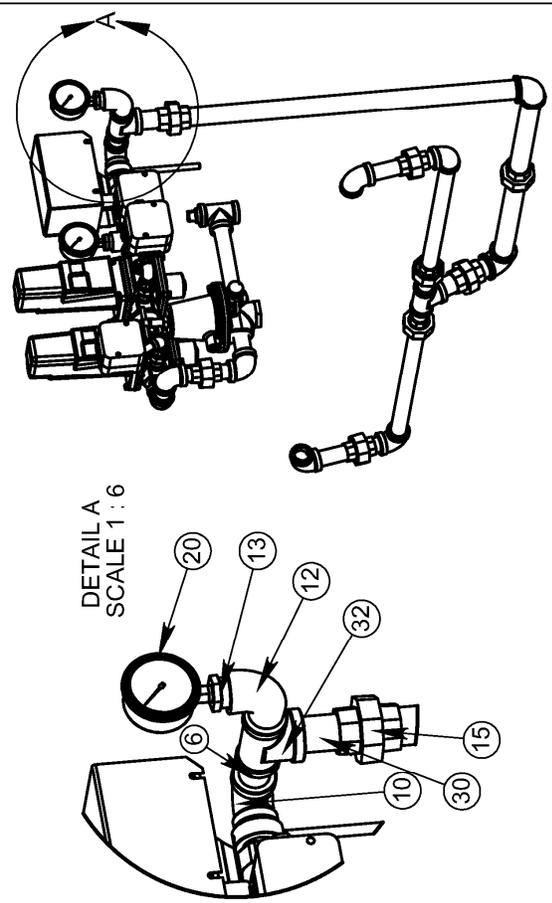
PART NUMBER	DESCRIPTION	QTY
1	SHIELD, ASSY, BELT, LOWER	1
2	SHIELD, ASSY, UPPER	1
3	COVER, BELT SHIELD	1



SWCD0070
6/8/2011;MJM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
24	J6236	VALVE,GAS, 3/4" SINGLE, VGG10.2044	2
25	J6240	ACTUATOR, SKP15.001E1	2
26	J6241	KIT, NEMA 4, AGA66	2
27	J24003	NIPPLE, 1/4" X 7/8", SCH 40	9
28	J24171	NIPPLE, 1 X 10, SCH 40	2
29	J24172	NIPPLE, 1 X 2", SCH 40	2
30	J24173	NIPPLE, 1.00 X 2.5 SCH40	1
31	J24291	NIPPLE, 3/4" X 14", BLACK, SCH 40	2
32	J24811	TEE, 3/4 X 3/4 X 1, SCH40	2
33	J25251	ELBOW, 1, 90 DEG., SCH40	2
34	T10150	SHIM	1
35	T17216	PIPE, 1 X 24", SCH 40	1
36	T18810	EYEBOLT, PIPE TRAIN, 4.75" THREAD	2
37	T29902	COVER, ELECTRONIC VALVE, 5.625 X 3.5	1
38	T161935	BRACKET, ELECTRONIC MOD VALVE	1
39	J6200	RAIN CAP, 7545-10	1
40	J6229	CONNECTOR, DIN, ACTUATOR(SWITCH)	2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	D71193	ORIFICE PIPE, 3/4" X 3", SCH80	2
2	J0975	STUD, WELD, RTANGLE, 10-24 X 1/2" LG.	1
3	J0976	NUT, #10-24, WING	1
4	J2410	NIPPLE, 3/4 X CLOSE, SCH 40	7
5	J2411	NIPPLE, 1/4" X 3", SCH 40	1
6	J2420	NIPPLE, 3/4" X 2", SCH40	7
7	J2428	NIPPLE, 3/4 X 6, SCH 80	1
8	J2490	TEE, SIDE OUTLET, 3/4 BLACK	1
9	J2491	TEE, 3/4 X 3/4 X 3/4, SCH80	1
10	J2525	ELBOW, 3/4, 90 DEG., SCH40	8
11	J2526	ELBOW, 1/4 X 90, SCH 40	4
12	J2530	ELBOW, STREET, 3/4", 90 DEG, SCH 40	1
13	J2570	BUSHING, REDUCING, 3/4 X 1/4, SCH40	3
14	J2620	PLUG, 3/4, PIPE	1
15	J2696	UNION, 1" SCH40	3
16	J2703	UNION, 1/4", SCH40	3
17	J2710	UNION, 3/4, BLACK, #150	5
18	J4437	SWITCH, PRESS., DUNGS, GW2000 A4	1
19	J4443	SWITCH, PRESS., DUNGS, GW6000 A4H	2
20	J5960	GAUGE, PRES., 0-30, LIQ, 1/4BTM, MT	2
21	J6126	VALVE, BUTTERFLY L/ACTUATOR, 3/4	1
22	J6163	REGULATOR, 3/4", 1586VN	1
23	J6171	VALVE, 1/4", RELIEF, A1325, H120	1



TOLERANCE UNLESS SPECIFIED
.X = ± .050
.XX = ± .010
.XXX = ± .005
FRAC = ± 1/32
= ± 1°

DRAWN BY: **MJM**
DATE: **05/23/2011**
DESCRIPTION: **CE, CENT. PIPE TRAIN**
DESCRIPTION: **PIPE TRAIN, ELMOD, 3/4", LP, DC**

RAW MATL. NO.: -----
PART NO.: **T17223D**

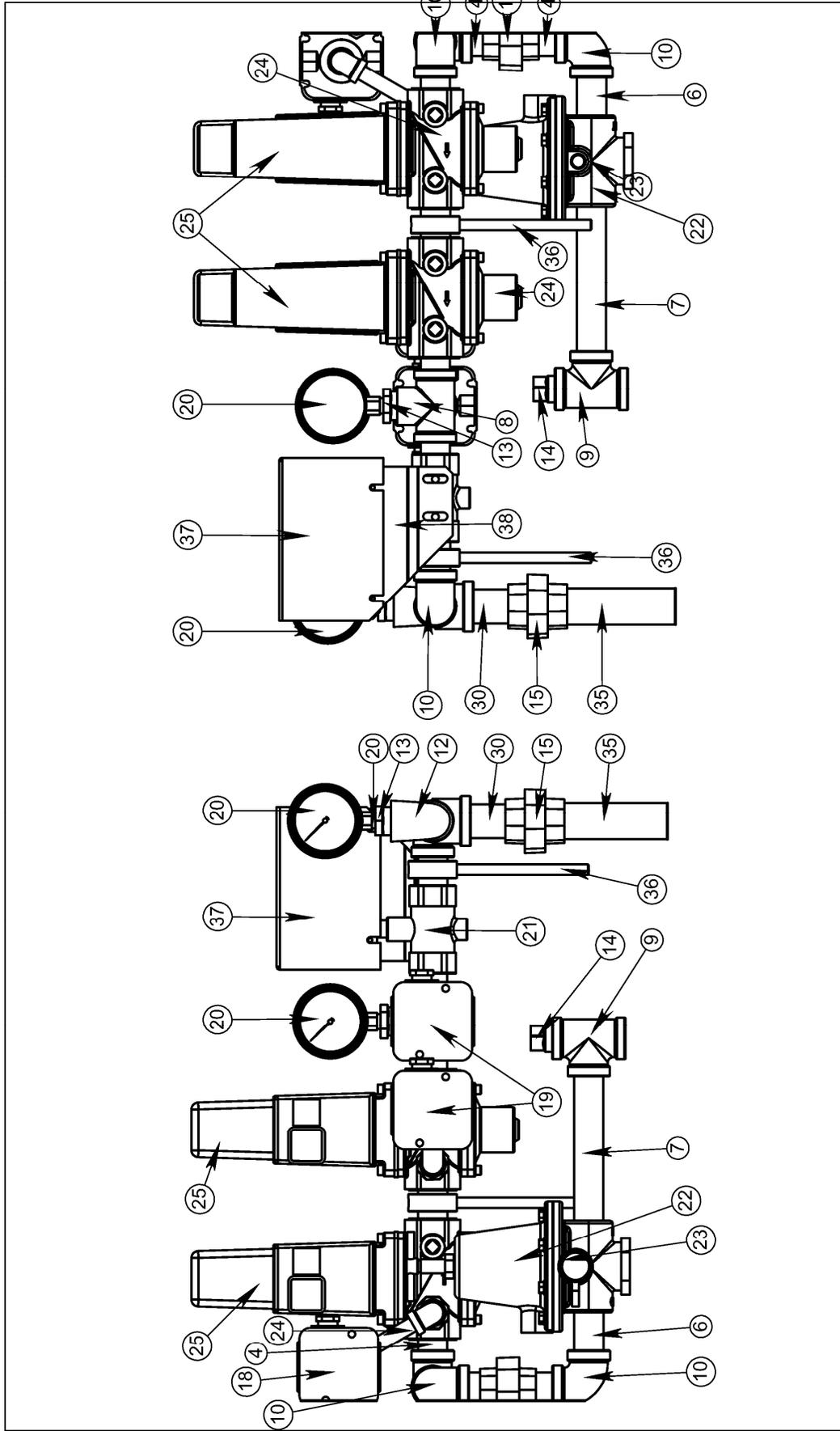
MATERIAL: -----

WEIGHT: **73.98**
SHEET: 1 OF 3

REGULATOR TO J6163
06/17/2013 CSH
DESCRIPTION OR ENG. ORDER #
DATE BY
REVISIONS

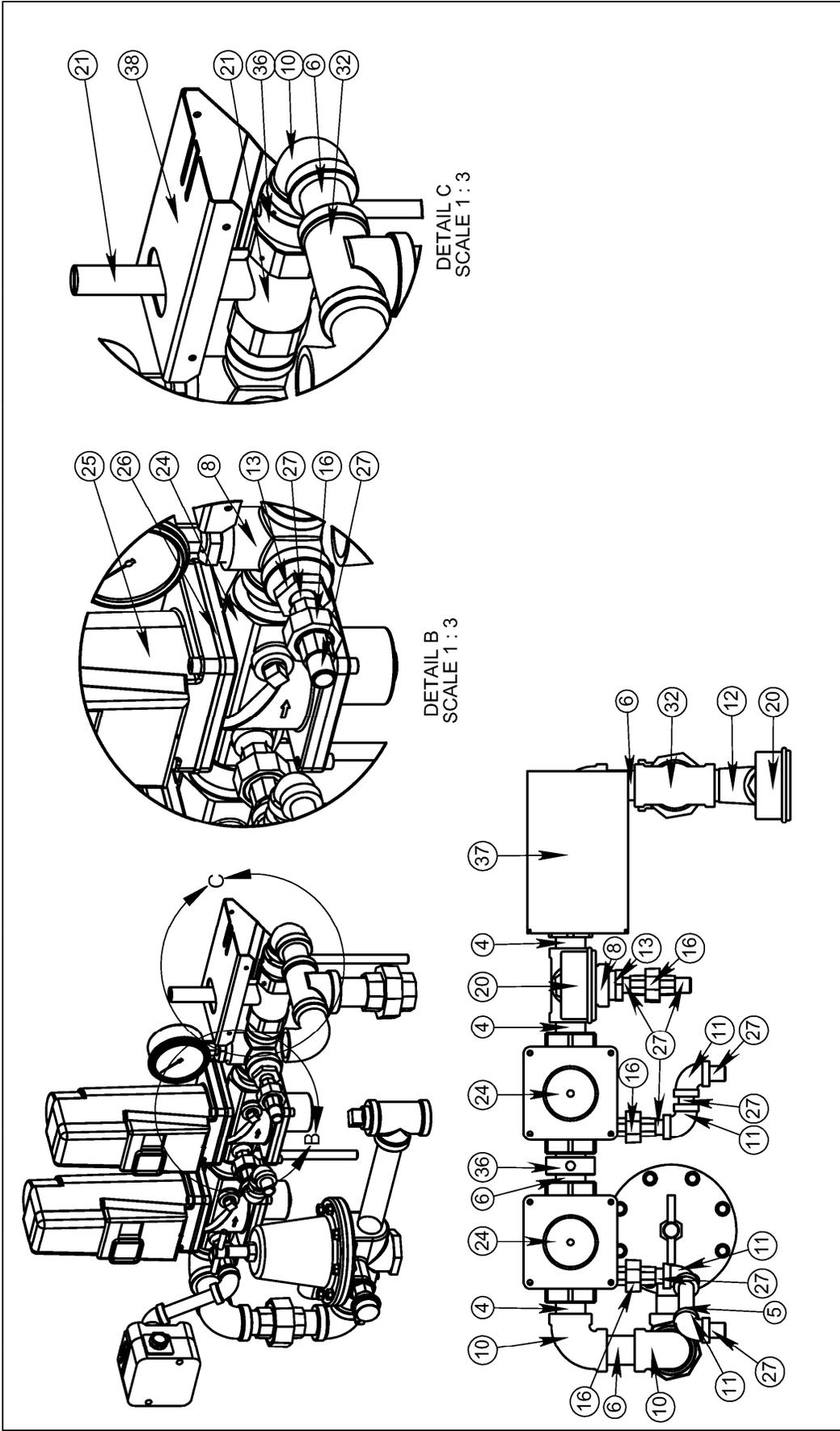
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TOLERANCE UNLESS SPECIFIED .X = ± .050 .XX = ± .010 .XXX = ± .005 FRAC = ± 1/32 = ± 1°		SUKUP MFG. CO. Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475	
DRAWN BY: MJM		PART NO.: T17223D	
DATE: 05/23/2011		MATERIAL: -----	
REV. C		REGULATOR TO J6163	DATE: 06/17/2013
DESCRIPTION OR ORDER #		CE, CENT. PIPE TRAIN	WEIGHT: 73.98
REVISIONS		PIPE TRAIN,ELMOD,3/4",LP,DC	SHEET: 2 OF 3

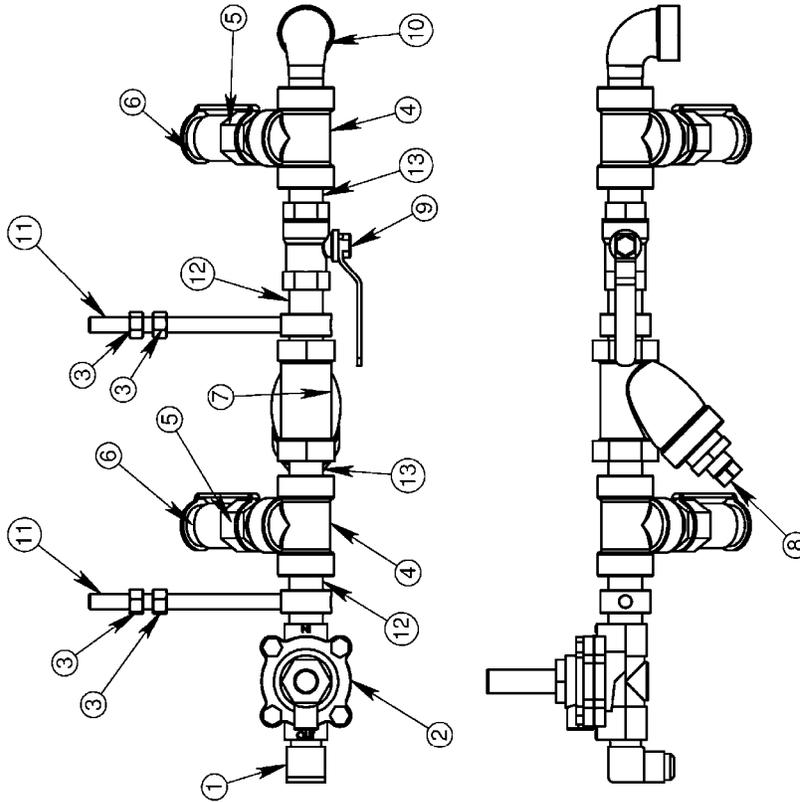
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<p>SUKUP MFG. CO. SUKUP PARKWAY SHEFFIELD, IA. 50475</p>		<p>RAW MATL. NO. ----- PARTNO. T17223D</p>	
<p>TOLERANCE UNLESS SPECIFIED .X = ± .050 .XX = ± .010 .XXX = ± .005 FRAC = ± 1/32 ° = ± 1°</p>		<p>DRAWN BY MJM MATERIAL -----</p>	
<p>DATE 05/23/2011</p>		<p>DATE 06/17/2013 CSH</p>	
<p>DESCRIPTION CE, CENT. PIPE TRAIN</p>		<p>DESCRIPTION OR ENG. ORDER #</p>	
<p>WEIGHT 73.98</p>		<p>DATE BY</p>	
<p>DESCRIPTION PIPE TRAIN,ELMOD,3/4",LP,DC</p>		<p>REVISIONS</p>	
<p>SHEET: 3 OF 3</p>		<p>REGULATOR TO J6163</p>	

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	J2745	ELBOW, 1/2 FL X 1/2 MIP, 90 DEG, E1-8D	1
2	T17097	CONDUIT WITH J6257 SOLENOID, LIQUID W/WRS. VA. D-C	1
3	J1020	NUT, HEX. 3/8-16,PLT	4
4	J2472	TEE, 1/2 X 1/2 X 1/2, SCH80	2
5	J6170	VALVE, 1/2", RELIEF, 3129G,H135-2	2
6	J6200	RAIN CAP, 7545-10	2
7	J5992	STRAINER, LIQ, 1/2"	1
8	J2610	PLUG, 3/8, PIPE, BLK	1
9	J6082	VALVE, 1/2", BALL, ITT 1550	1
10	J2519	ELBOW, STREET, 1/2, 90 DEG., SCH80	1
11	D71161	EYEBOLT, PIPE TRAIN, 7/8" SHAFT COLLAR	2
12	J24071	NIPPLE, 1/2 x 2, SCH 80	2
13	J2407	NIPPLE, 1/2" x CLOSE, SCH 80	2



DXF CREATED:

TOLERANCE UNLESS SPECIFIED
 X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ° = ± 1°

SUKUP MFG. CO.
Sukup
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

DRAWN BY: MJM
 DATE: 05/31/2011
 RAW MAT'L NO.: -----
 MATERIAL: -----
 PART NO.: T17132D

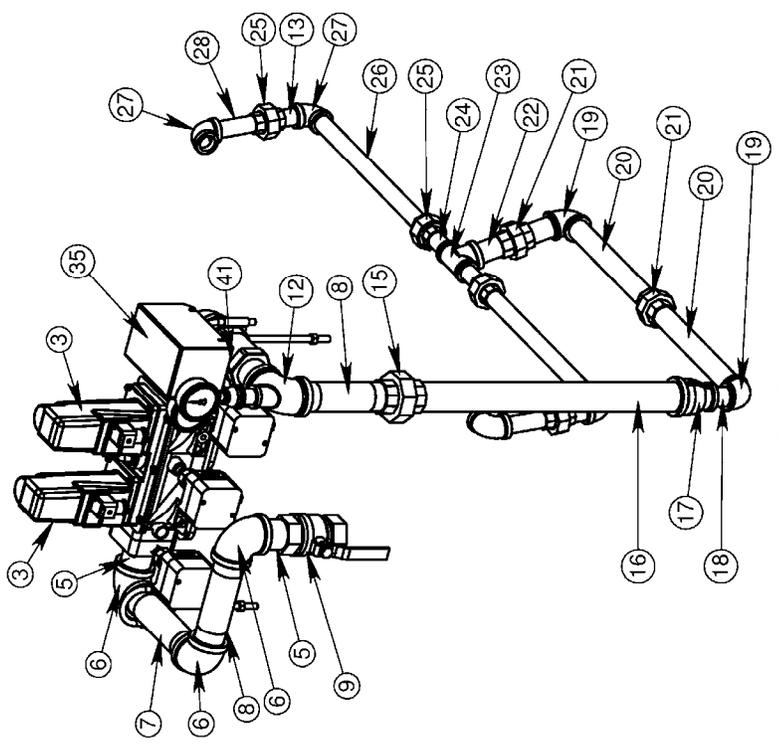
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REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
	CENT REV DRYER		
	PIPE TRAIN, LIQ, 1/2, CENT RV, D-C		

REVISIONS

WEIGHT: 7.605
 SHEET: 1 OF 1

ITEM NO.	QTY.	PART NO.	DESCRIPTION	ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	J6237	VALVE, GAS, 1 1/2, DBL, VGD20.403	39	2	J0496	SCREW, 1/4-20, 3/4, PLT, SELFDRILL
2	2	J6241	KIT, NEMA 4, AGA66	40	1	T10150	SHIM
3	2	J6240	ACTUATOR, SKP15.001E1	41	2	D71163	CLAMP, PIPE TRAIN, 2"
4	2	J6239	FLANGE SET, 1 1/2 NPT, AGA4U				
5	4	J2431	NIPPLE, 1.5XCLOSE SCH40				
6	4	J2541	ELBOW, 1 1/2", 90 DEG, SCH40				
7	1	J2445	NIPPLE, 1 1/2" x 7", SCH 40				
8	2	J2437	NIPPLE, 1.5 X 6" SCH40				
9	1	J6087	VALVE, 1 1/2", BALL (FIREING)				
10	1	J2432	NIPPLE, 1 1/2 x 2, SCH 40				
11	1	J6127	VALVE, BUTTERFLY, L/ACTUATOR, 1 1/2", MAXON				
12	1	J2477	TEE, 1 1/2 x 3/4 x 1 1/2, SCH 40				
13	3	J2410	NIPPLE, 3/4 x CLOSE, SCH 40				
14	1	J2574	COUPLING, REDUCING, 3/4X1/4 SC40				
15	1	J2707	UNION, 1 1/2", SCH40				
16	1	T17215	PIPE, 1 1/2 X 19", SCH 40				
17	1	J2553	COUPLING, RED., 1 1/2" x 1", SCH 40				
18	1	J2417	NIPPLE, 1.00XCLOSE SCH40				
19	2	J25251	ELBOW, 1, 90 DEG., SCH40				
20	2	J24171	NIPPLE, 1 X 10, SCH 40				
21	2	J2696	UNION, 1" SCH40				
22	2	J24172	NIPPLE, 1 X 2", SCH 40				
23	1	J24811	TEE, 3/4 X 3/4 X 1, SCH40				
24	2	J2420	NIPPLE, 3/4 X 2, SCH40				
25	4	J2710	UNION, 3/4, BLACK, #150				
26	2	J24291	NIPPLE, 3/4" x 14", BLACK, SCH 40				
27	4	J2525	ELBOW, 3/4, 90 DEG., SCH40				
28	2	D71193	ORIFICE PIPE, 3/4" X 3", SCH80				
29	7	J24003	NIPPLE, 1/4" X 7/8", SCH 40				
30	3	J2703	UNION, 1/4", SCH40				
31	1	J2469	TEE, 1/4" X 1/4" X 1/4", SCH40				
32	3	J4437	SWITCH, PRESS., DUNGS, GW2000 A4				
33	2	J5967	GAUGE, PRESSURE, 0-15, LIQ, 1/4" BTM, MT				
34	1	T161935	BRACKET, ELECTRONIC MOD VALVE				
35	1	T26902	COVER, ELECTRONIC VALVE, 5.625 X 3.5				
36	2	J6229	CONNECTOR, DIN, ACTUATOR (SWITCH), AGA65				
37	1	J0975	STUD, WELD, RTANGLE, 10-24 x 1/2" LG.				
38	1	J0976	NUT, #10-24, WING				



DXF CREATED:

TOLERANCE UNLESS SPECIFIED
 X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 = ± 1°

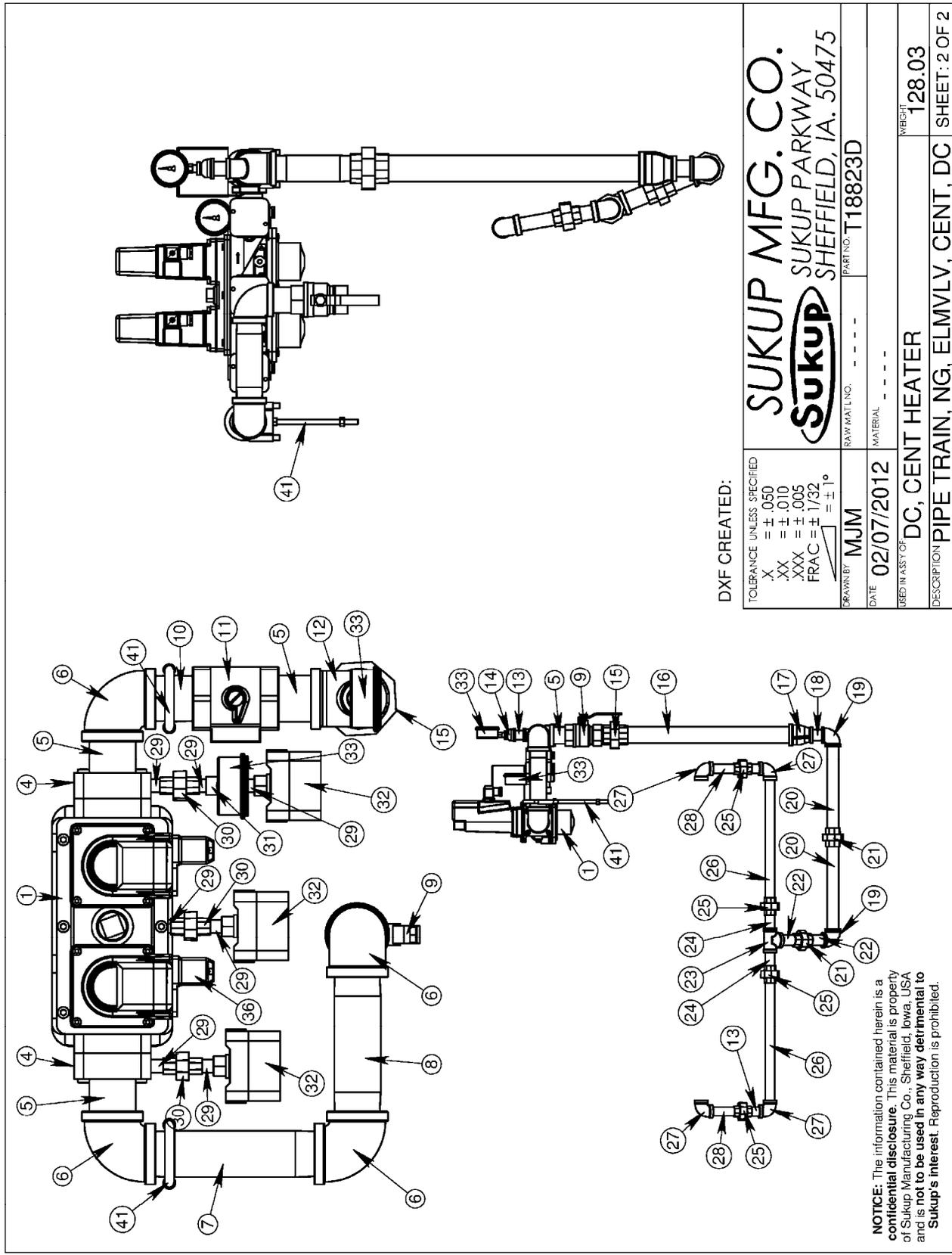
DRAWN BY: MJM
 DATE: 02/07/2012
 MATERIAL: -----
 PART NO.: T18823D

SUKUP MFG. CO.
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

USED IN ASSY OF:	DC, CENT HEATER	WEIGHT:	128.03
DESCRIPTION:	PIPE TRAIN, NG, ELMVLV, CENT, DC	SHEET:	1 OF 2

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REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
	REVISIONS		



DXF CREATED:

TOLERANCE UNLESS SPECIFIED
 .X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ° = ± 1°

SUKUP MFG. CO.
Sukup
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

DRAWN BY: MJM
 DATE: 02/07/2012
 PART NO.: T18823D

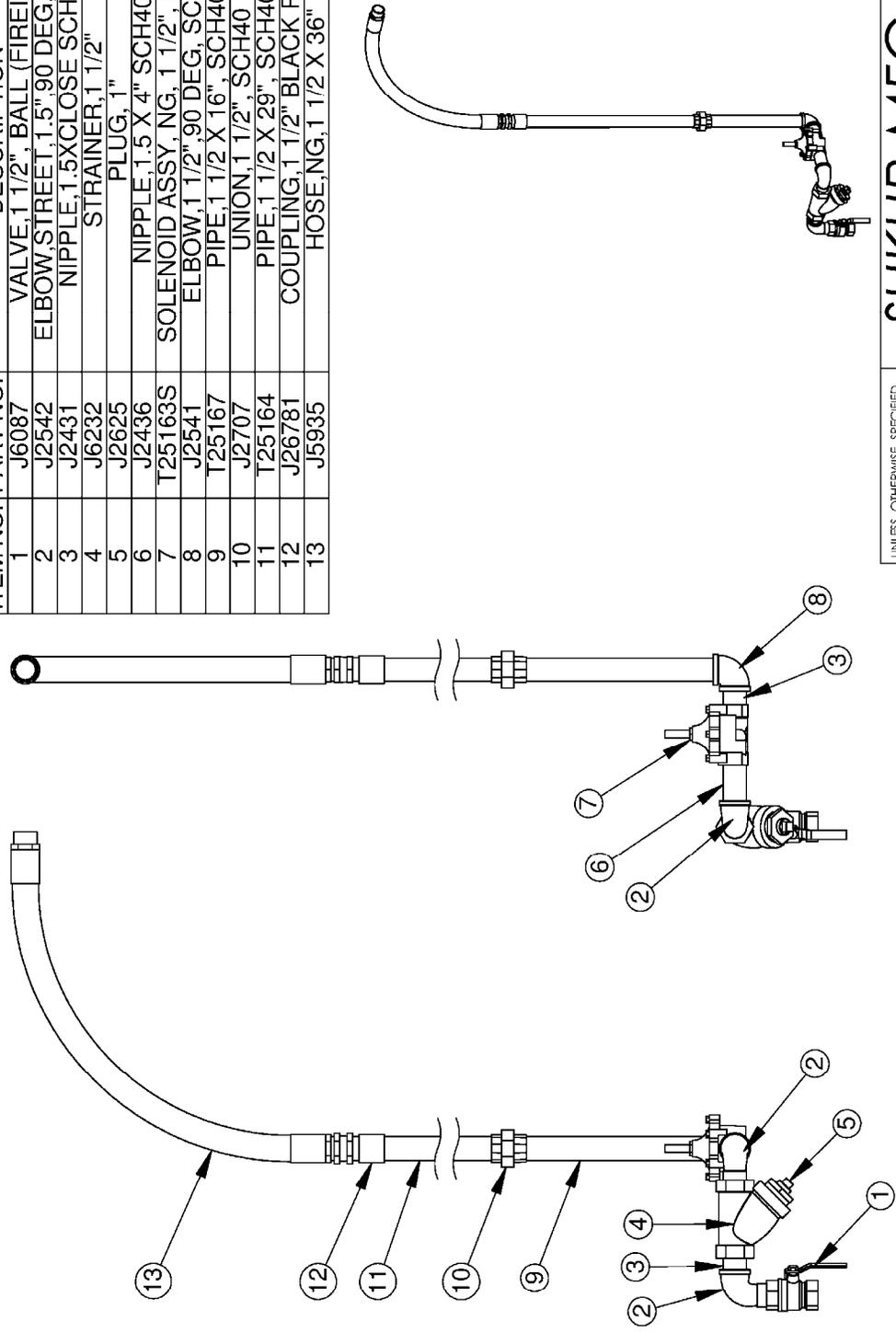
RAW MAT'L NO.:
 MATERIAL:

USED IN ASSY OF:
 DC, CENT HEATER

WEIGHT: 128.03
 DESCRIPTION: PIPE TRAIN, NG, ELMVLV, CENT, DC SHEET: 2 OF 2

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ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	J6087	VALVE, 1 1/2", BALL (FIREING)	1
2	J2542	ELBOW, STREET, 1.5" 90 DEG, SCH40	2
3	J2431	NIPPLE, 1.5XCLOSE SCH40	2
4	J6232	STRAINER, 1 1/2"	1
5	J2625	PLUG, 1"	1
6	J2436	NIPPLE, 1.5 X 4" SCH40	1
7	T25163S	SOLENOID ASSY, NG, 1 1/2", MNFLD	1
8	J2541	ELBOW, 1 1/2" 90 DEG, SCH40	1
9	T25167	PIPE, 1 1/2 X 16", SCH40	1
10	J2707	UNION, 1 1/2", SCH40	1
11	T25164	PIPE, 1 1/2 X 29", SCH40	1
12	J26781	COUPLING, 1 1/2" BLACK PIPE	1
13	J5935	HOSE, NG, 1 1/2 X 36"	1



UNLESS OTHERWISE SPECIFIED
 X. =±.010
 XX. =±.005.
 XXX. =±.001
 FRAC = ± 1/32

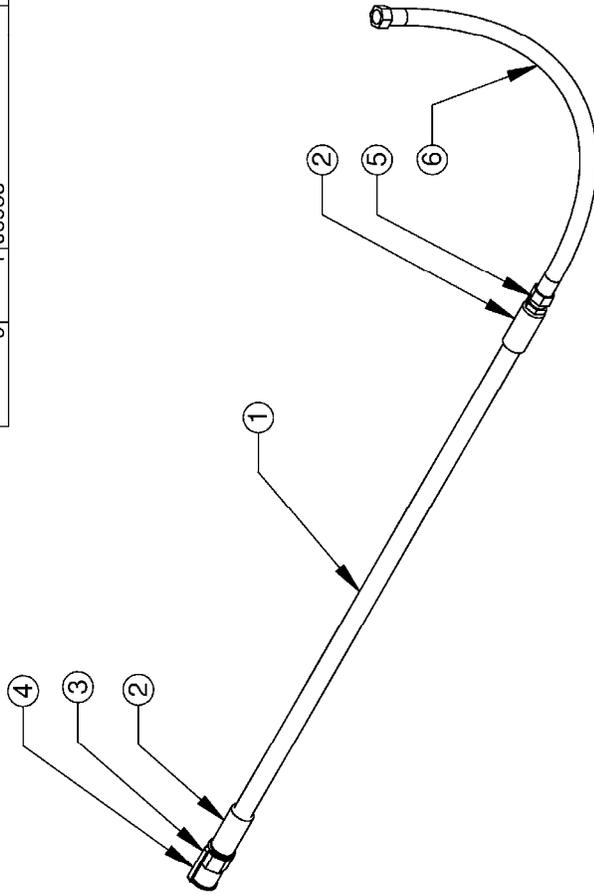
SUKUP MFG. CO.
Sukup
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

RAW MAT'L NO. ----- DWG NO. T25152
 MATERIAL -----
 DATE 6/13/2008
 USED IN ASST OF: CENT CONT FLOW DRYER
 NAME MANIFOLD, NG, 1 1/2", SUCT COOL CENT DRYER

REF	ENG. ORDER #	BY	DATE
B	REVISED	DDV	01/13/2011
A	ADDED T25167, J2678	DJB	7-29-08

R E V I S I O N

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T24161	PIPE, 1/2" X 2 1/2", SCH 80
2	2	J2577	COUPLING, 1/2", SCH 80
3	1	J6170	VALVE, 1/2", RELIEF, 3129G, H135-2
4	1	J6200	RAIN CAP, 7545-10
5	1	J2840	UNION, 1/2 FL X 1/2 NIP
6	1	J5938	HOSE, CGA x 28 1/2", 7000808-886



TOLERANCE UNLESS SPECIFIED
 X = ± .050
 XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ∠ = ± 1°

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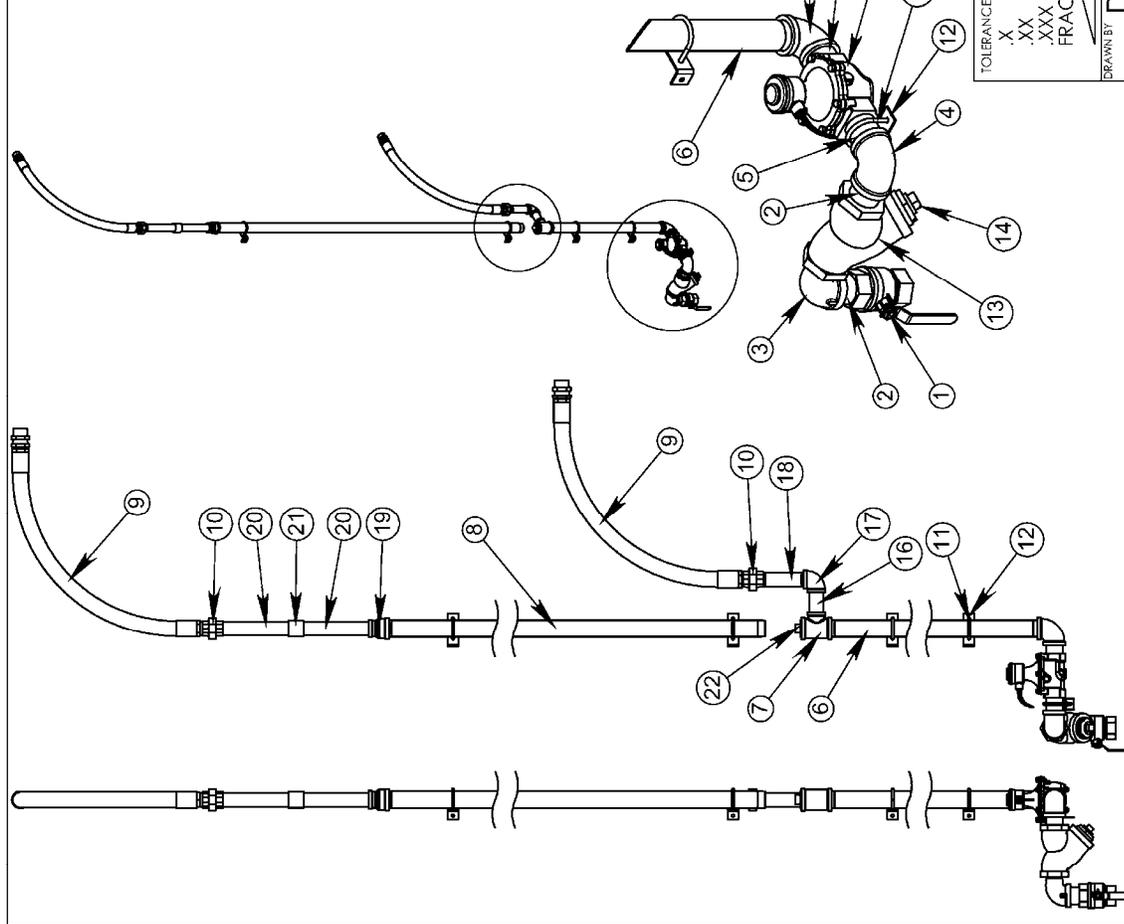
DRAWN BY: THW	RAW MAT. INC.	PART NO. T20195CS
DATE: 01/03/2011	MATERIAL:	WEIGHT:
USED IN ASSY OF:	DRYER, SUCT COOL	
DESCRIPTION:	MANIFOLD, RELIEF VALVE, CENT DRYER, CSA	

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REF	ENG. ORDER #	BY	DATE

R E V I S I O N

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	J6088	VALVE, 2", BALL	1
2	J2440	NIPPLE, 2 X CLOSE SCH 40	3
3	J2544	ELBOW, STREET, 90DEG, 2" SCH 40	1
4	J2543	ELBOW, 2", 90DEG, SCH 40	2
5	J2441	NIPPLE, 2 X 3, SCH 40	1
6	T30162	PIPE, 2", 37", SCH 40	1
7	J2497	TEE, 2x2x1 1/2, SCH 40	1
8	T30163	PIPE, 2", 99", SCH 40	1
9	J5935	HOSE, NG, 1 1/2 X 36"	2
10	J2707	UNION, 1 1/2", SCH 40	2
11	J08101	U-BOLT, 5/16-18 X 2 9/16ID, 2 7/8 DEEP	5
12	T24183	BRACKET, MANIFOLD, NG	5
13	J6234	STRAINER, 2", 100 MESH	1
14	J2626	PLUG, 1 1/4", IRON	1
15	T30166	VALVE, SOLENOID, COMP, 2", ASCO	1
16	J2436	NIPPLE, 1.5 X 4" SCH 40	1
17	J2541	ELBOW, 1 1/2", 90 DEG, SCH 40	1
18	J2445	NIPPLE, 1 1/2" x 7", SCH 40	1
19	J2586	COUPLING, REDUCING, 2 x 1.5, SCH 40	1
20	T25162	NIPPLE, 1 1/2", 10.5"L	2
21	J26781	COUPLING, 1 1/2" BLACK PIPE	1
22	J2621	PLUG, 2", PIPE, IRON	1



TOLERANCE UNLESS SPECIFIED
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 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ∠ = ± 1°

SUKUP MFG. CO.
Sukup
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 SHEFFIELD, IA. 50475

RAW MAT. NO. ----- PART NO. T25154

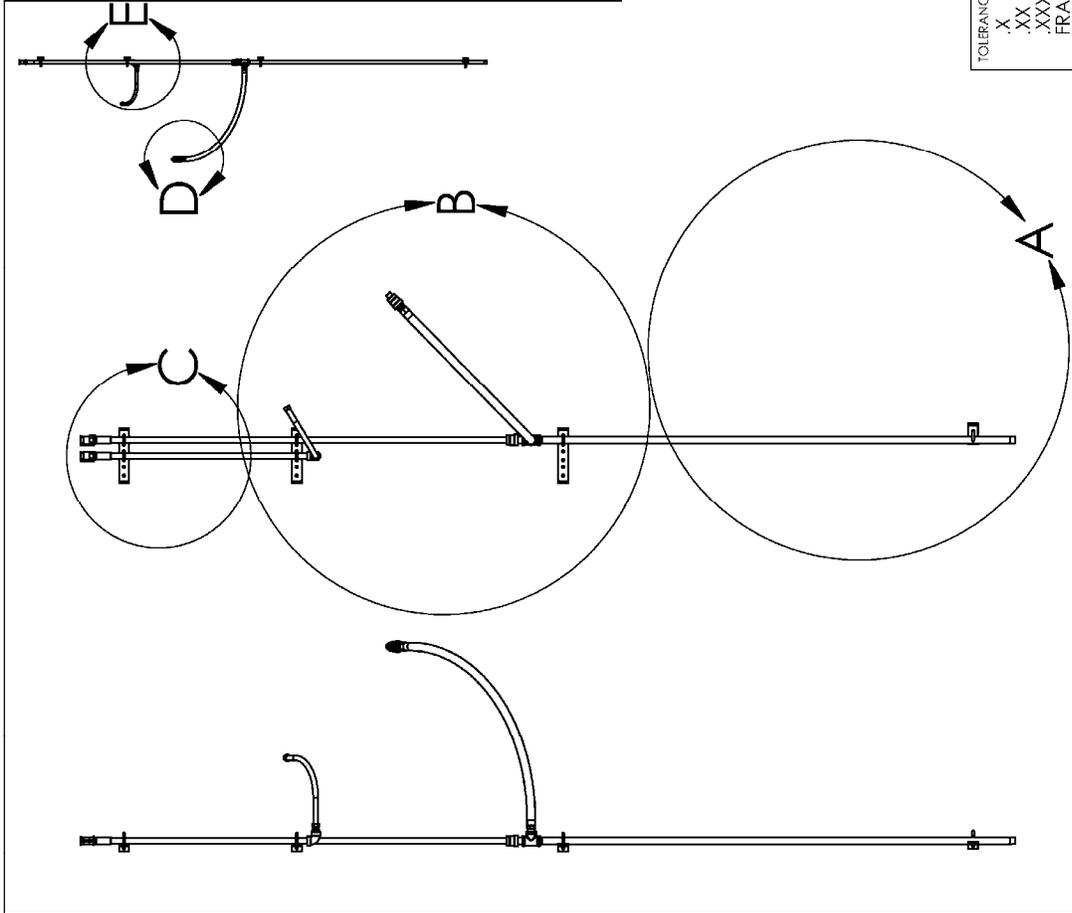
REV.	DESCRIPTION OR ORDER #	DATE	BY
B	PLUG ADDED, J2621	08/05/2011	JHS
A	REVISED	08/20/2010	DDV

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DESCRIPTION	WEIGHT
DRYER, PORT, 16', 2STK CENT	131.494

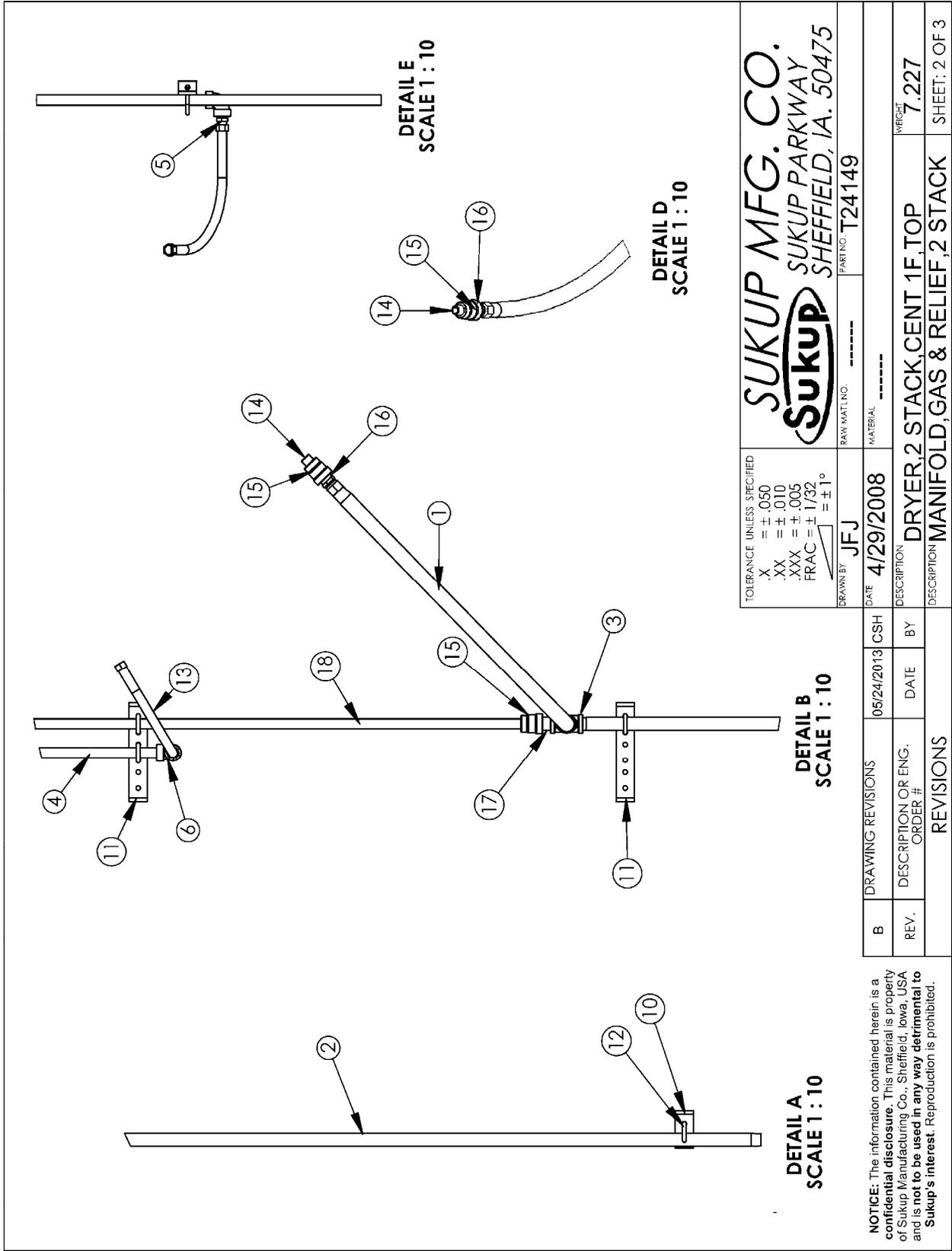
DESCRIPTION: MANIFOLD, NG, 2", 2 MOD, CENT, CSA, CE SHEET: 1 OF 1

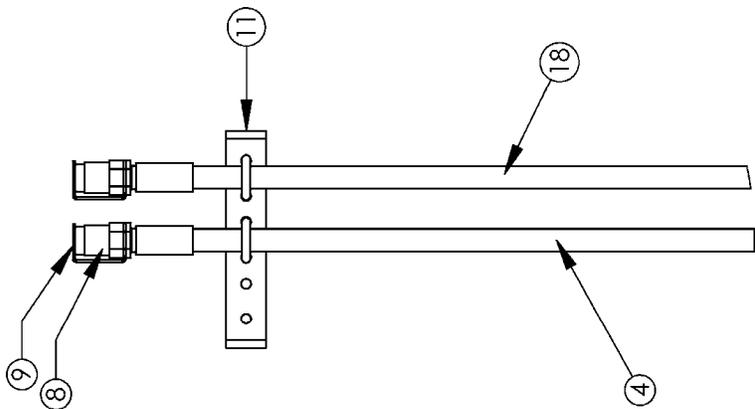
ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	J5928	HOSE, HIGH PRESSURE, 3/4" X 48"
2	1	T24144	PIPE, THREADED, 3/4 X 6' SCH 80
3	1	J2491	TEE, 3/4 X 3/4 X 3/4, SCH 80
4	1	T24161	PIPE, 1/2" X 2 1/2', SCH 80
5	1	J2840	UNION, 1/2 FL X 1/2 NIP
6	1	J2523	ELBOW 1/2 X 90° SCH 80
7	2	J2577	COUPLING, 1/2", SCH 80
8	2	J6170	VALVE, 1/2", RELIEF, 3129G, H135-2
9	2	J6200	RAIN CAP, 7545-10
10	1	T24184	BRACKET SHORT, MANIFOLD, LP
11	3	T24185	BRACKET LONG, MANIFOLD, LP
12	6	J0810	U-BOLT, 5/16-18, 1 1/16" ID 1.75D
13	1	J5936	HOSE, HIGH PRESSURE, 3/8" X 28"
14	1	J2407	NIPPLE, 1/2" x CLOSE, SCH 80
15	2	J25751	COUPLING, REDUCING, 3/4 X 1/2 SCH 80
16	1	J2416	NIPPLE, 3/4 X CLS, BR5, HEX
17	1	J2415	NIPPLE, 3/4 X CLOSE, SCH 80
18	1	T24162	PIPE, 1/2" X 5', SCH 80



TOLERANCE UNLESS SPECIFIED .X = ± .050 .XX = ± .010 .XXX = ± .005 FRAC = ± 1/32 ∠ = ± 1°		SUKUP MFG. CO. Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475	
DRAWN BY	JFJ	RAW MAT'L NO.	-----
DATE	4/29/2008	PART NO.	T24149
DESCRIPTION	DRYER, 2 STACK, CENT 1F, TOP	MATERIAL	-----
DESCRIPTION	MANIFOLD, GAS & RELIEF, 2 STACK	WEIGHT	7.227
DESCRIPTION	REVISIONS	SHEET:	1 OF 3

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DETAIL C
SCALE 1 : 6

DXF CREATED:

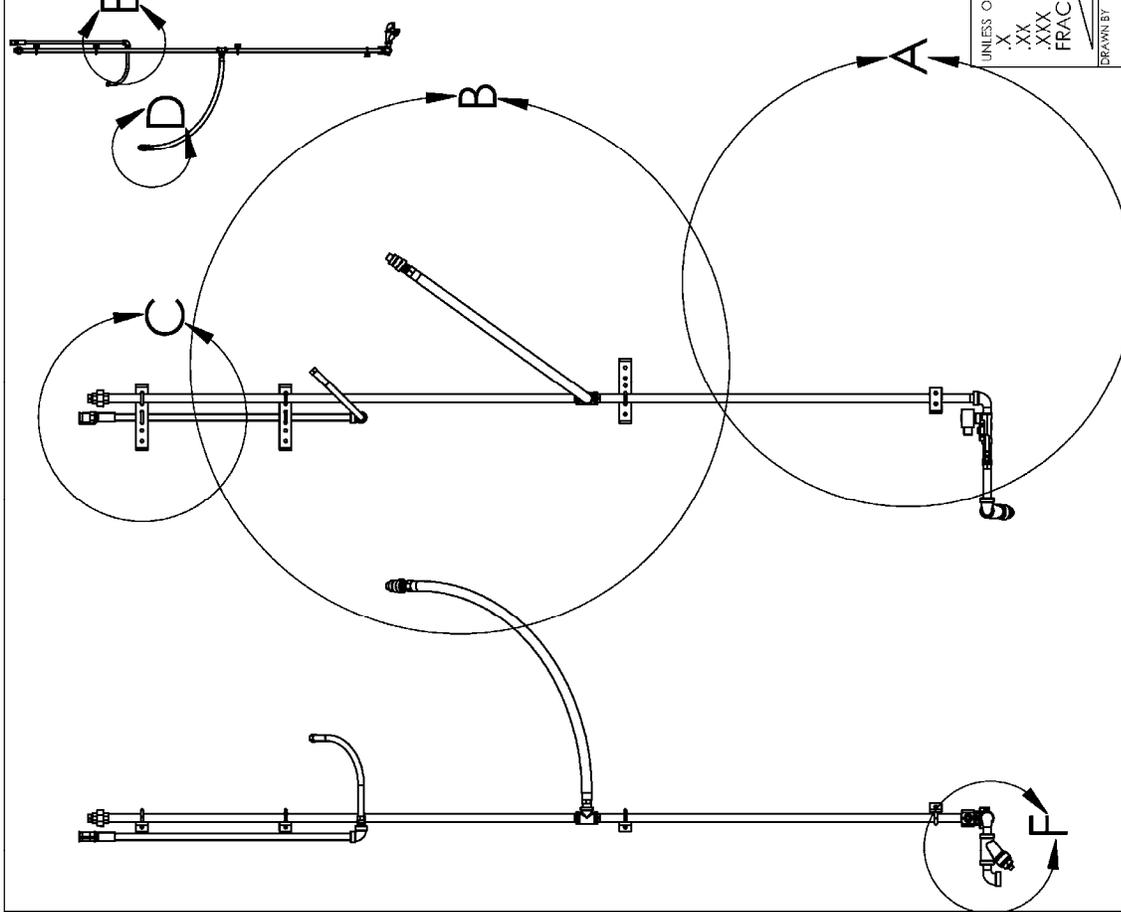
TOLERANCE UNLESS SPECIFIED .X = ± .050 .XX = ± .010 .XXX = ± .005 FRAC = ± 1/32  = ± 1°		SUKUP MFG. CO. SUKUP SUKUP PARKWAY SHEFFIELD, IA. 50475	
DRAWN BY: JFJ		PART NO. T24149	
DATE: 4/29/2008		MATERIAL: -----	
DESCRIPTION: DRYER, 2 STACK CENT 1F, TOP		WEIGHT: 7.227	
DESCRIPTION: MANIFOLD, GAS & RELIEF, 2 STACK		SHEET: 3 OF 3	

REVISIONS			
B	DRAWING REVISIONS	05/24/2013	CSH
REV.	DESCRIPTION OR ORDER #	DATE	BY

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ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	J5928	HOSE, HIGH PRESSURE, 3/4" X 48"
2	3	J2532	ELBOW, STREET, 3/4, 90 DEG., EX HVY
3	1	J6083	VALVE, 3/4", BALL
4	1	J2415	NIPPLE, 3/4 X CLOSE, SCH 80
5	1	T24143	PIPE, THREADED, 3/4" X 4', SCH 80
6	1	J2491	TEE, 3/4 X 3/4 X 3/4, SCH 80
7	1	T24161	PIPE, 1/2" X 2 1/2', SCH 80
8	1	J2840	UNION, 1/2 FL X 1/2 NIP
9	1	J2523	ELBOW 1/2 X 90° SCH 80
10	1	J2577	COUPLING, 1/2", SCH 80
11	1	J6170	VALVE, 1/2", RELIEF, 3129G, H135-2
12	1	J6200	RAIN CAP, 7545-10
13	1	T24184	BRACKET SHORT, MANIFOLD, LP
14	3	T24185	BRACKET LONG, MANIFOLD, LP
15	6	J0810	U-BOLT, 5/16-18, 1 1/16" ID 1.75D
16	1	J5936	HOSE, HIGH PRESSURE, 3/8" X 28"
17	1	J24251	PIPE, 3/4 X 4 1/2, SCH 80
18	1	J2407	NIPPLE, 1/2" x CLOSE, SCH 80
19	1	J25751	COUPLING, REDUCING, 3/4 X 1/2 SCH 80
20	1	J2416	NIPPLE, 3/4 X CLS, BRG, HEX
21	1	J6230	STRAINER, 3/4"
22	1	T24152	PIPE, 3/4" ID, SCH 80, 5'
23	1	J2617	PLUG, 1/2, SQ HD, BLACK
24	1	T24166C	SOLENOID ASSY, LP, 3/4", MANIFOLD
25	1	J2704	UNION, 3/4, SCH 80
26	1	J2620	PLUG, 3/4, PIPE



UNLESS OTHERWISE SPECIFIED
 .X = ±.010
 .XX = ±.005
 .XXX = ±.001
 FRAC = ± 1/32
 ± = ±

SUKUP MFG. CO.
Sukup SUKUP PARKWAY
 SHEFFIELD, IA. 50475

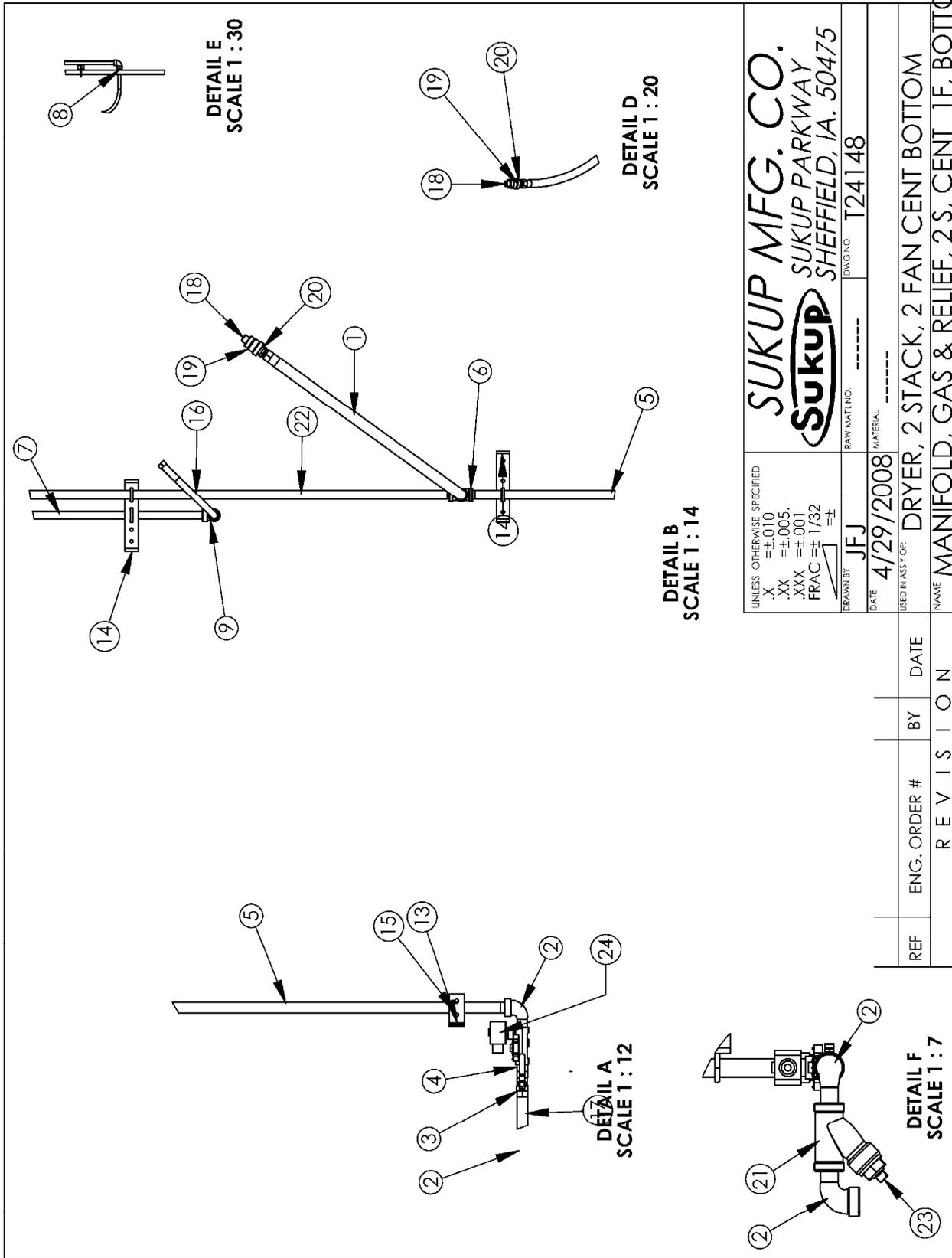
DRAWN BY: JFJ
 DATE: 4/29/2008
 RAW MAT. NO.: -----
 DWG. NO.: T24148
 MATERIAL: -----

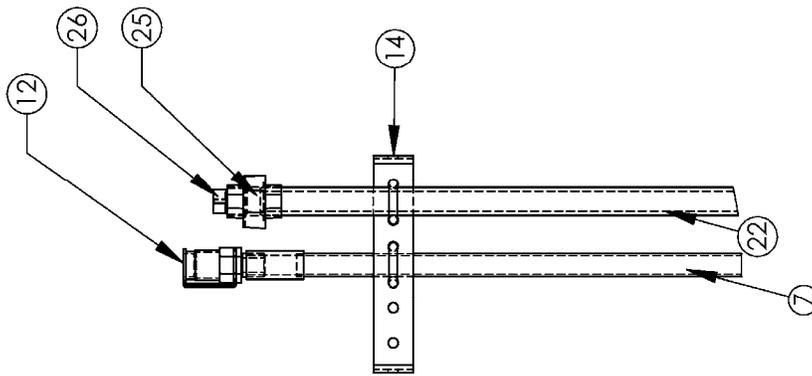
REF	ENG. ORDER #	BY	DATE

USED IN ASSY OF: DRYER, 2 STACK, 2 FAN CENT BOTTOM

NAME: MANIFOLD, GAS & RELIEF, 2 S, CENT 1F, BOTTOM

REVISION





DETAIL C
SCALE 1 : 6

UNLESS OTHERWISE SPECIFIED
 .X = ±.010
 .XX = ±.005.
 .XXX = ±.001
 FRAC = ± 1/32
 = ±

SUKUP MFG. CO.
Sukup
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

DRAWN BY **JFJ**
 DATE **4/29/2008**

RAW MAT. NO. -----
 DWG. NO. **T24148**
 MATERIAL -----

USED IN ASSY OF
DRYER, 2 STACK, 2 FAN CENT BOTTOM

NAME
MANIFOLD, GAS & RELIEF, 2 S, CENT 1F, BOTTOM

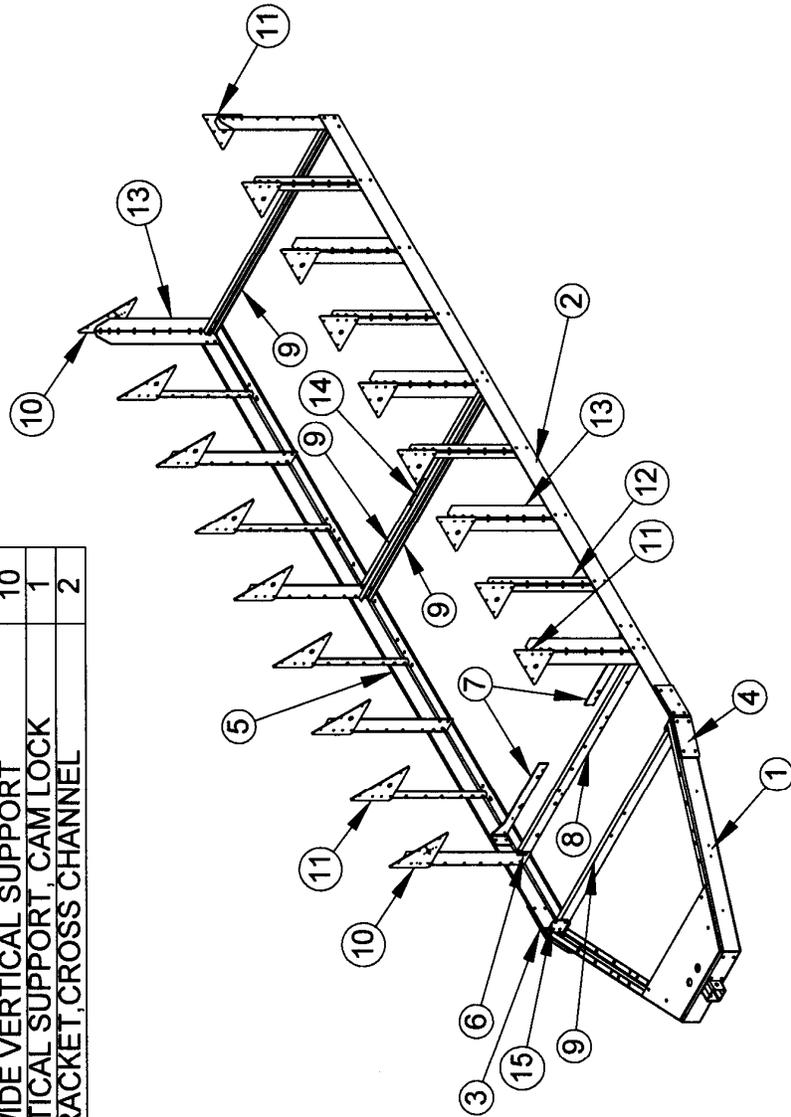
REF	ENG. ORDER #	BY	DATE

R E V I S I O N

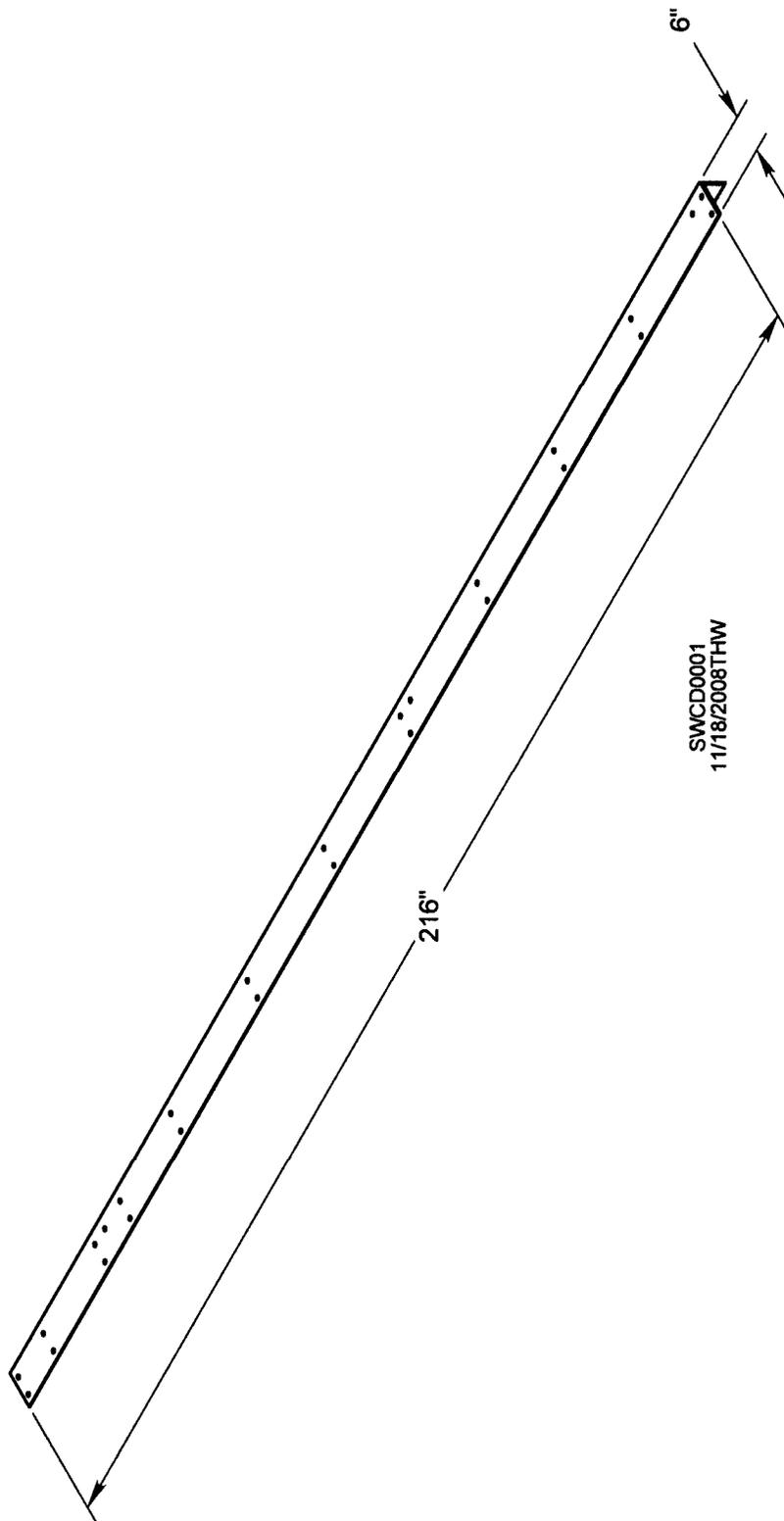
FRAME ASSEMBLY

T16306 FRAME ASSEMBLY FOR 16' CENTRIFUGAL DRYER

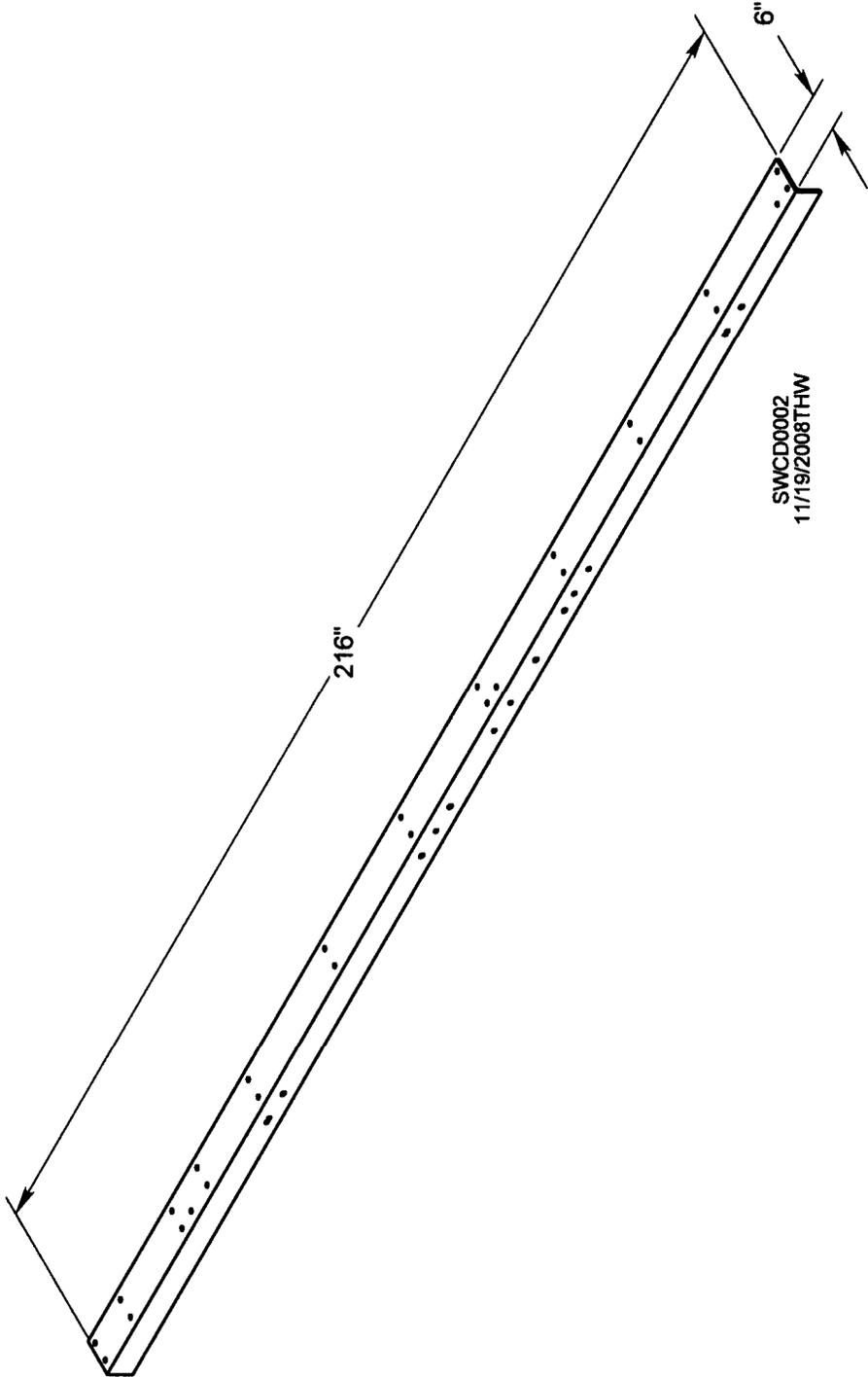
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T24423	HITCH RECEIVER WELDMENT	1
2	T80206	LEFT FRAME ANGLE	1
3	T16332D	PLATE, 3/4" HITCH CONNECTOR, R.H.	1
4	T16321D	PLATE, 3/4" HITCH CONNECTOR, L.H.	1
5	T80205	RIGHT FRAME ANGLE	1
6	T16329	TIGHTENER ANGLE	1
7	T16328	DC MOTOR BRACE	2
8	T16333	FRONT CROSS CHANNEL	1
9	T16325	CROSS CHANNEL	4
10	T16331	PLATE, MAIN CONNECTOR, BOX, CONDUIT	2
11	T16324	MAIN CONNECTOR PLATE	16
12	T16323	NARROW VERTICAL SUPPORT	8
13	T16322	WIDE VERTICAL SUPPORT	10
14	T16389	VERTICAL SUPPORT, CAM LOCK	1
15	T80147	BRACKET, CROSS CHANNEL	2



T80205 RIGHT FRAME ANGLE FOR 16' CENTRIFUGAL DRYER

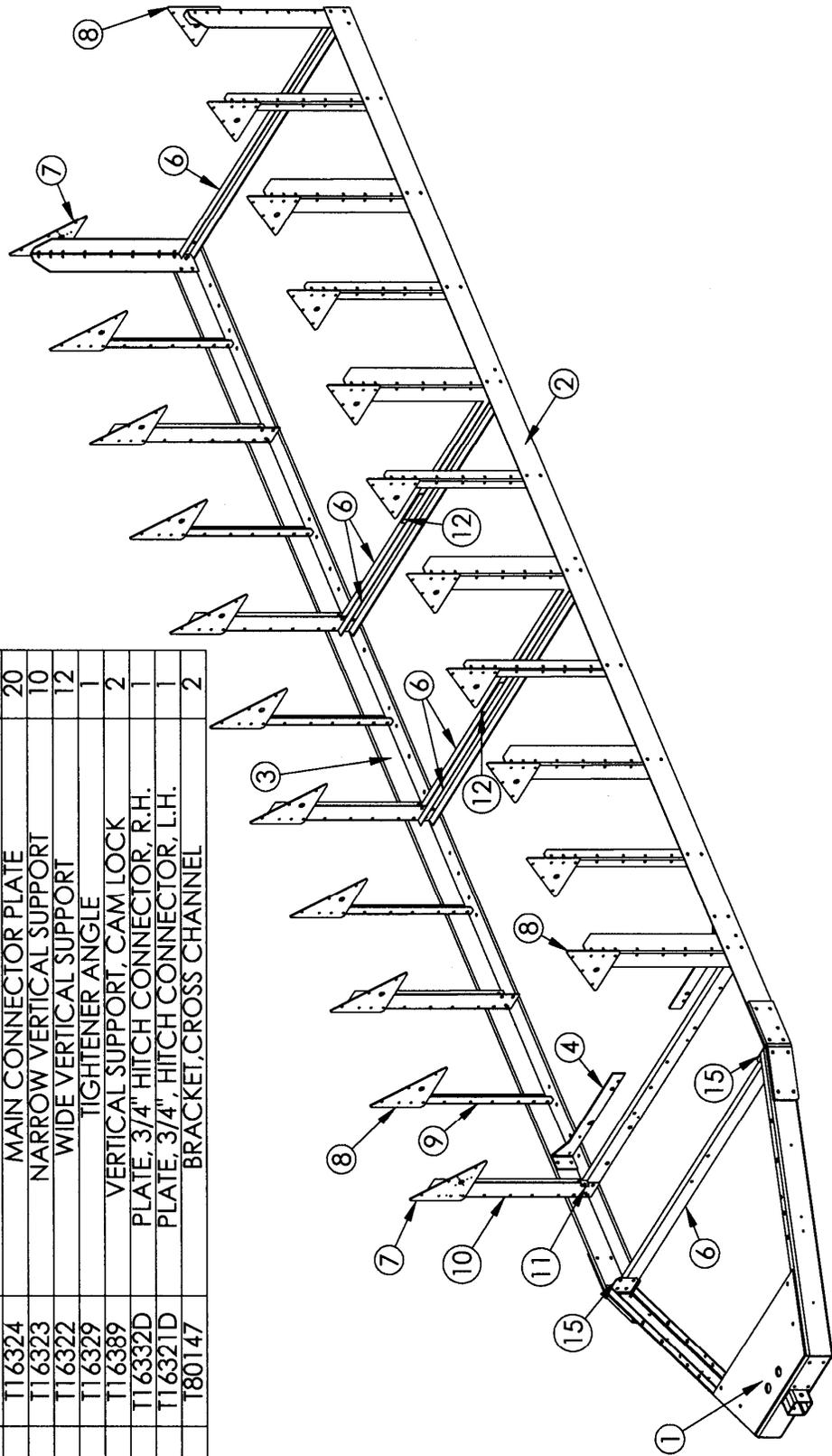


T80206 LEFT FRAME ANGLE FOR 16' CENTRIFUGAL DRYER

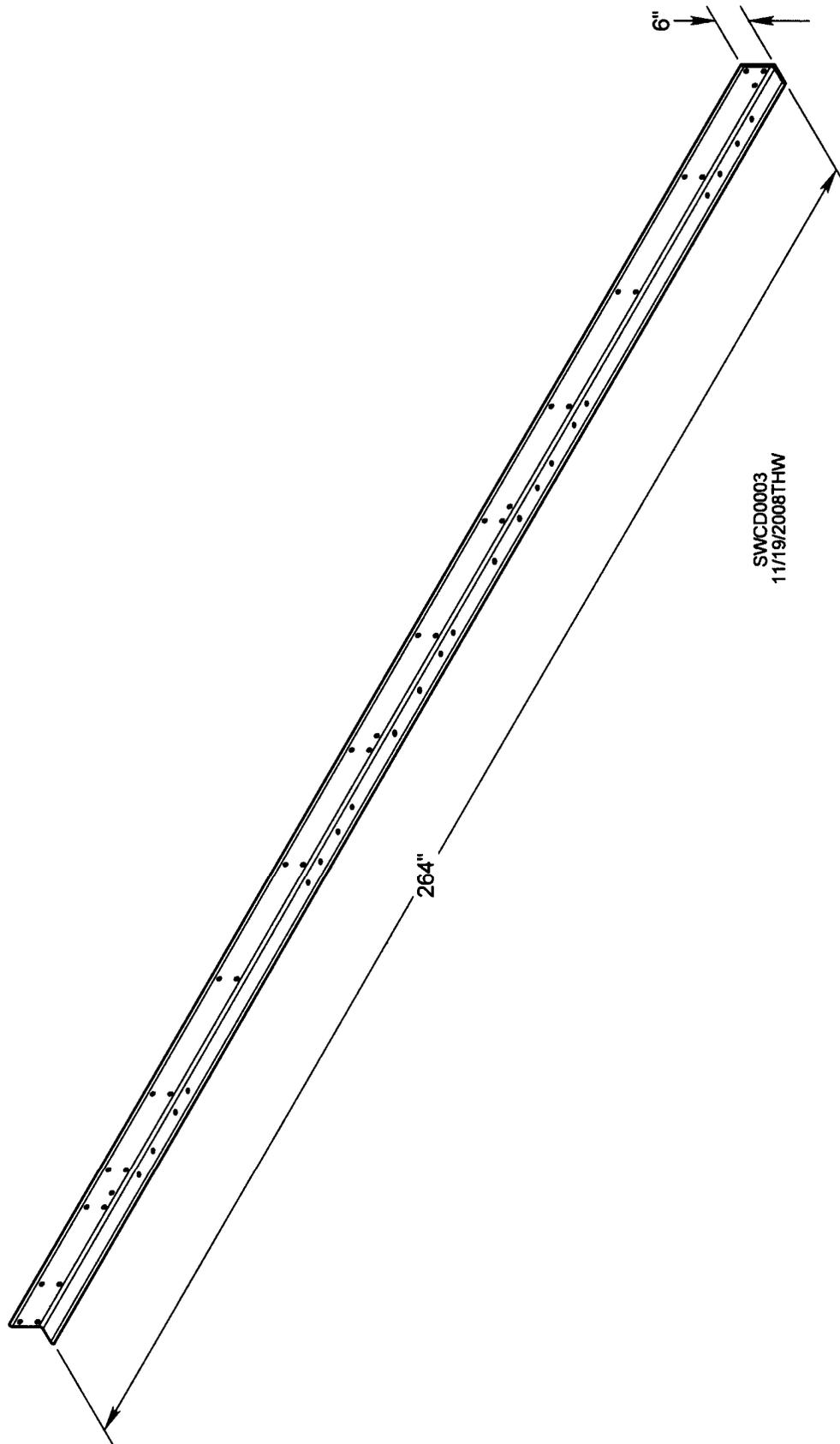


T20306 FRAME ASSEMBLY FOR 20' CENTRIFUGAL DRYER

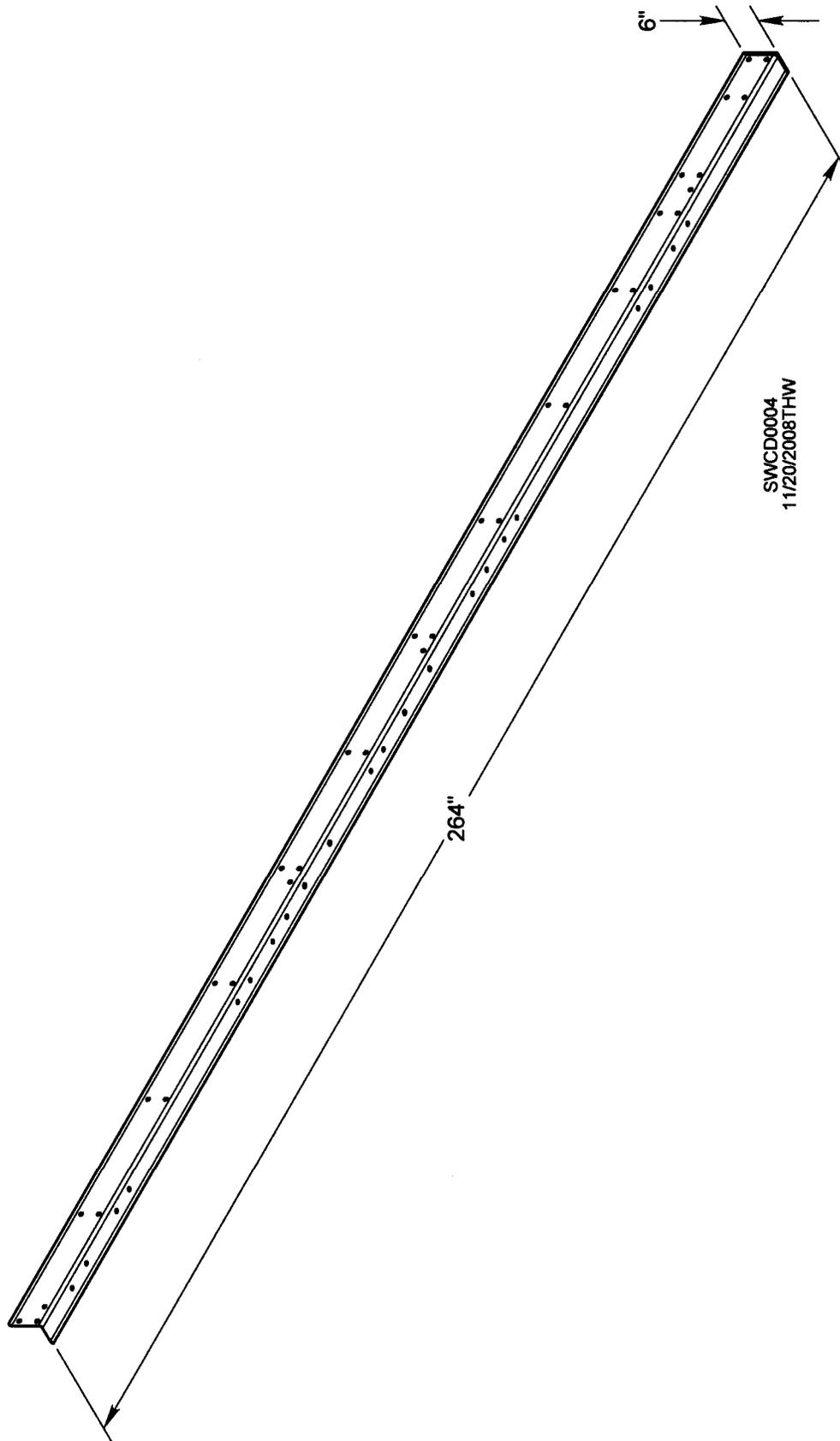
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T24423	HITCH RECEIVER WELDMENT	1
2	T20420	LEFT FRAME ANGLE, 20' CENT DRYER	1
3	T20419	RIGHT FRAME ANGLE, 20' CENT DRYER	1
4	T16328	DC MOTOR BRACE	2
5	T16333	FRONT CROSS CHANNEL	1
6	T16325	CROSS CHANNEL	6
7	T16331	PLATE, MAIN CONNECTOR, BOX, CONDUIT	2
8	T16324	MAIN CONNECTOR PLATE	20
9	T16323	NARROW VERTICAL SUPPORT	10
10	T16322	WIDE VERTICAL SUPPORT	12
11	T16329	TIGHTENER ANGLE	1
12	T16389	VERTICAL SUPPORT, CAM LOCK	2
13	T16332D	PLATE, 3/4" HITCH CONNECTOR, R.H.	1
14	T16321D	PLATE, 3/4" HITCH CONNECTOR, L.H.	1
15	T80147	BRACKET, CROSS CHANNEL	2



T20419 RIGHT FRAME ANGLE FOR 20' CENTRIFUGAL DRYER

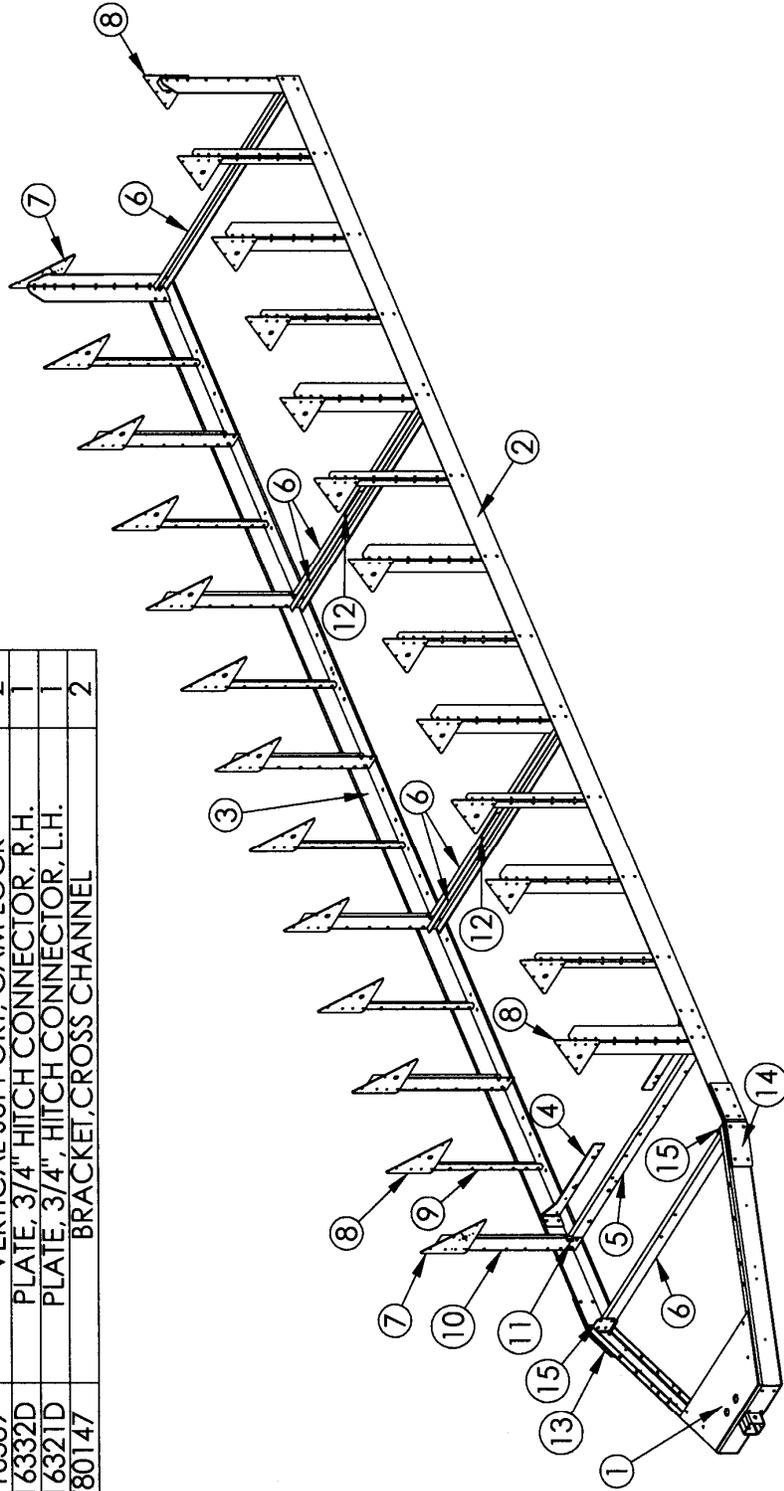


T20420 LEFT FRAME ANGLE FOR 20' CENTRIFUGAL DRYER

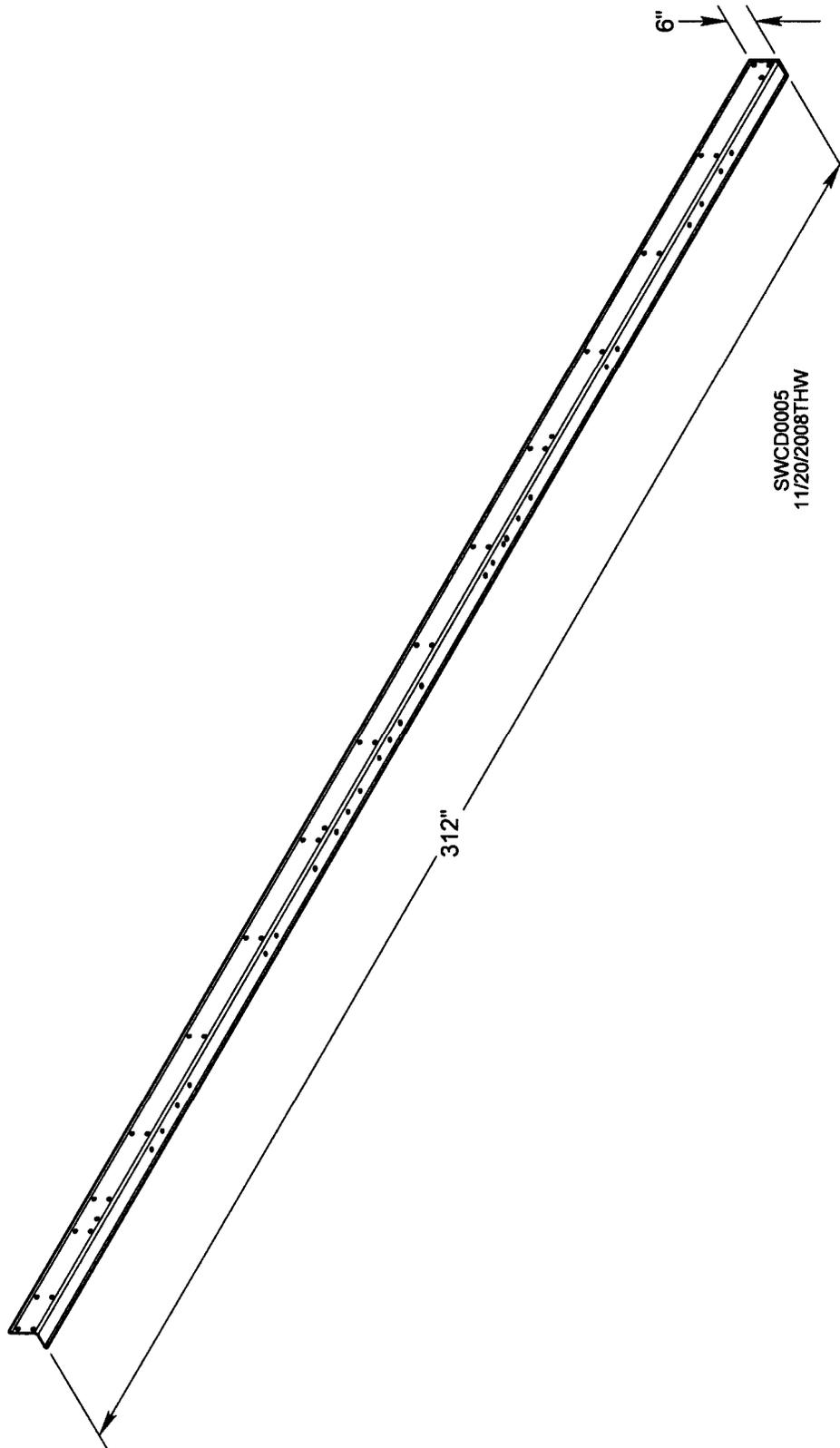


T24306 FRAME ASSEMBLY FOR 24' CENTRIFUGAL DRYER

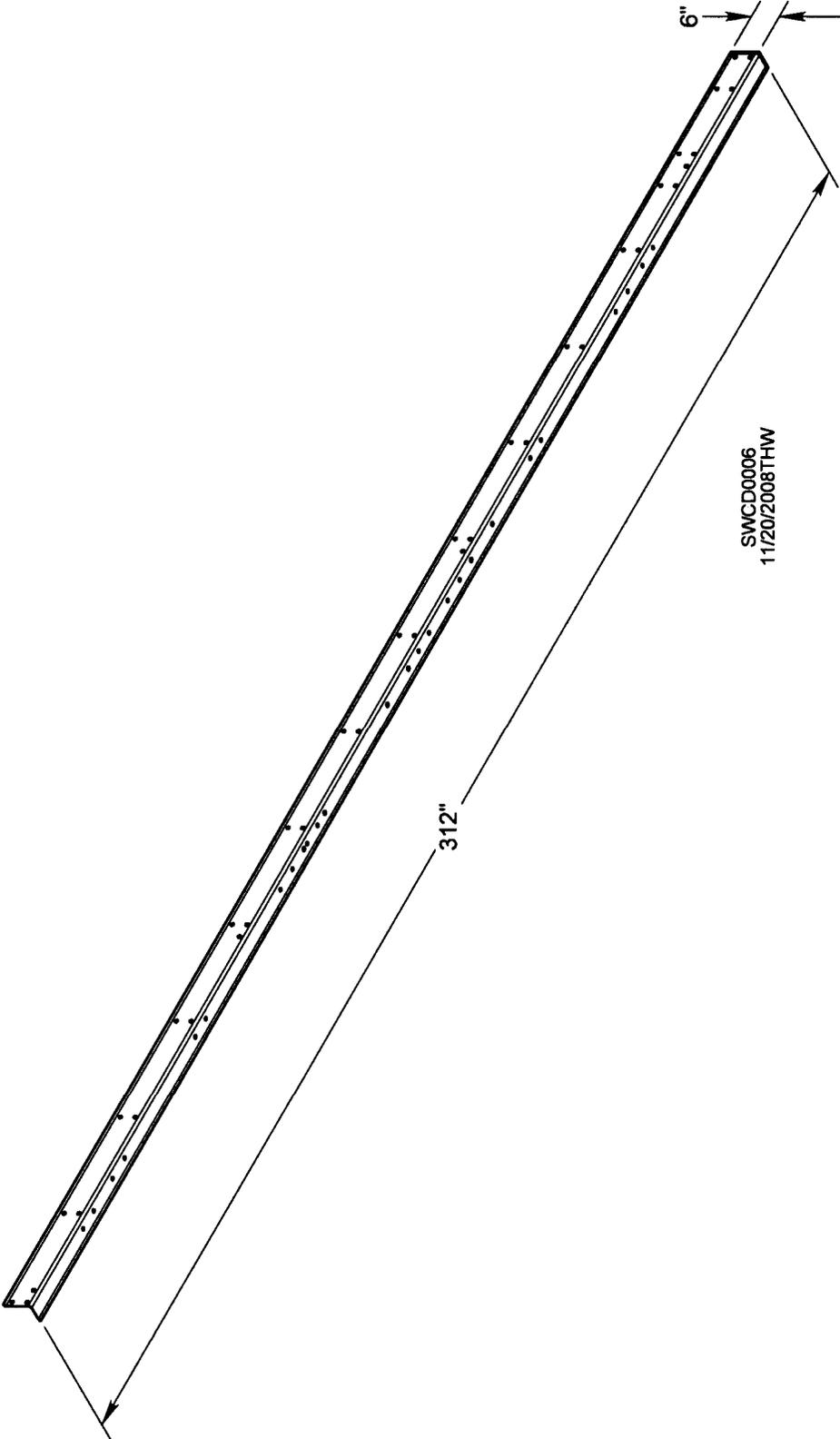
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T24423	HITCH RECEIVER WELDMENT	1
2	T24420	LEFT FRAME ANGLE	1
3	T24419	RIGHT FRAME ANGLE	1
4	T16328	DC MOTOR BRACE	2
5	T16333	FRONT CROSS CHANNEL	1
6	T16325	CROSS CHANNEL	6
7	T16331	PLATE, MAIN CONNECTOR, BOX, CONDUIT	2
8	T16324	MAIN CONNECTOR PLATE	24
9	T16323	NARROW VERTICAL SUPPORT	12
10	T16322	WIDE VERTICAL SUPPORT	14
11	T16329	TIGHTENER ANGLE	1
12	T16389	VERTICAL SUPPORT, CAM LOCK	2
13	T16332D	PLATE, 3/4" HITCH CONNECTOR, R.H.	1
14	T16321D	PLATE, 3/4" HITCH CONNECTOR, L.H.	1
15	T80147	BRACKET, CROSS CHANNEL	2



T24419 RIGHT FRAME ANGLE FOR 24' CENTRIFUGAL DRYER

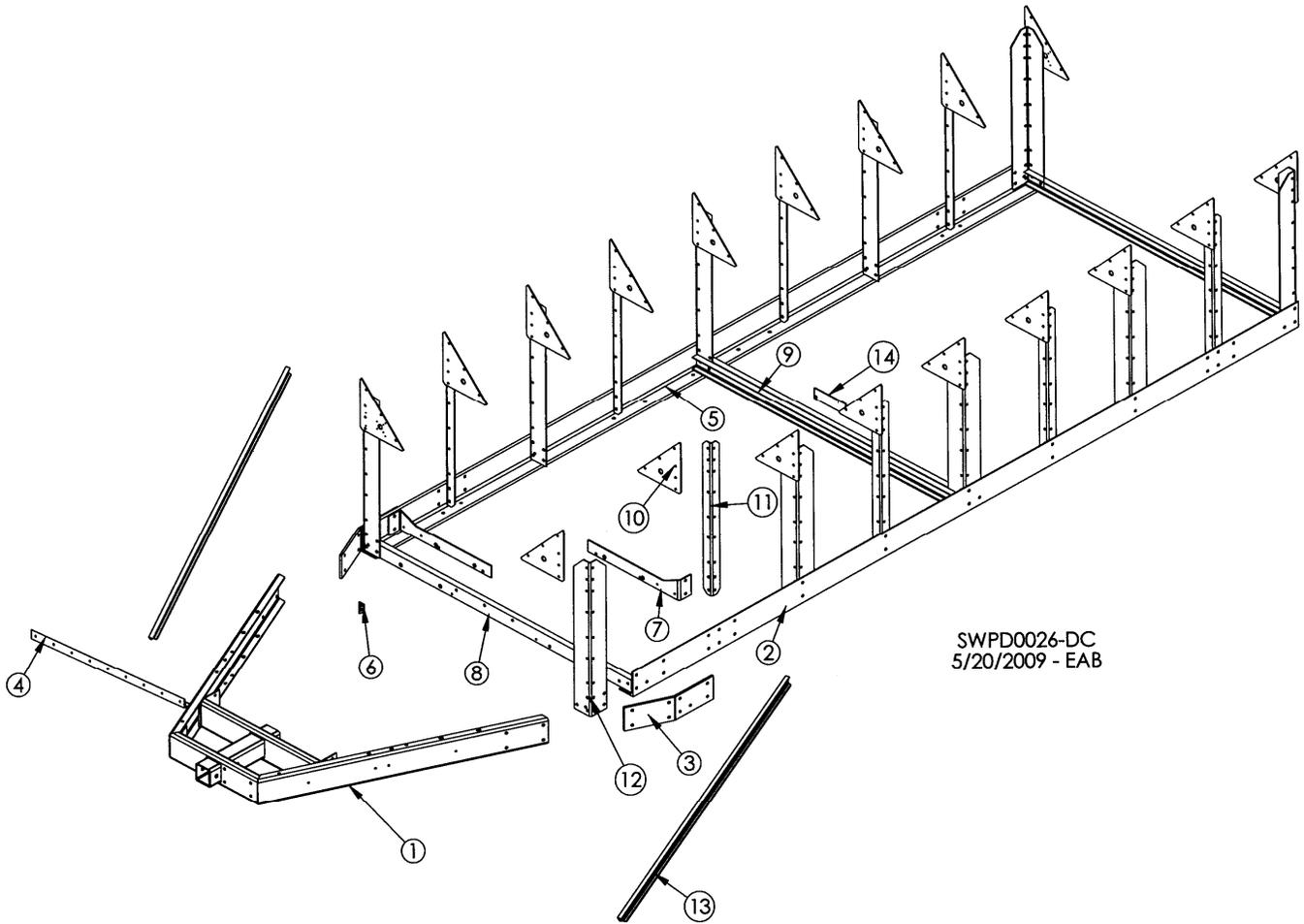


T24420 LEFT FRAME ANGLE FOR 24' CENTRIFUGAL DRYER



FRAME FOR BOTH STANDARD & STACKED DRYERS

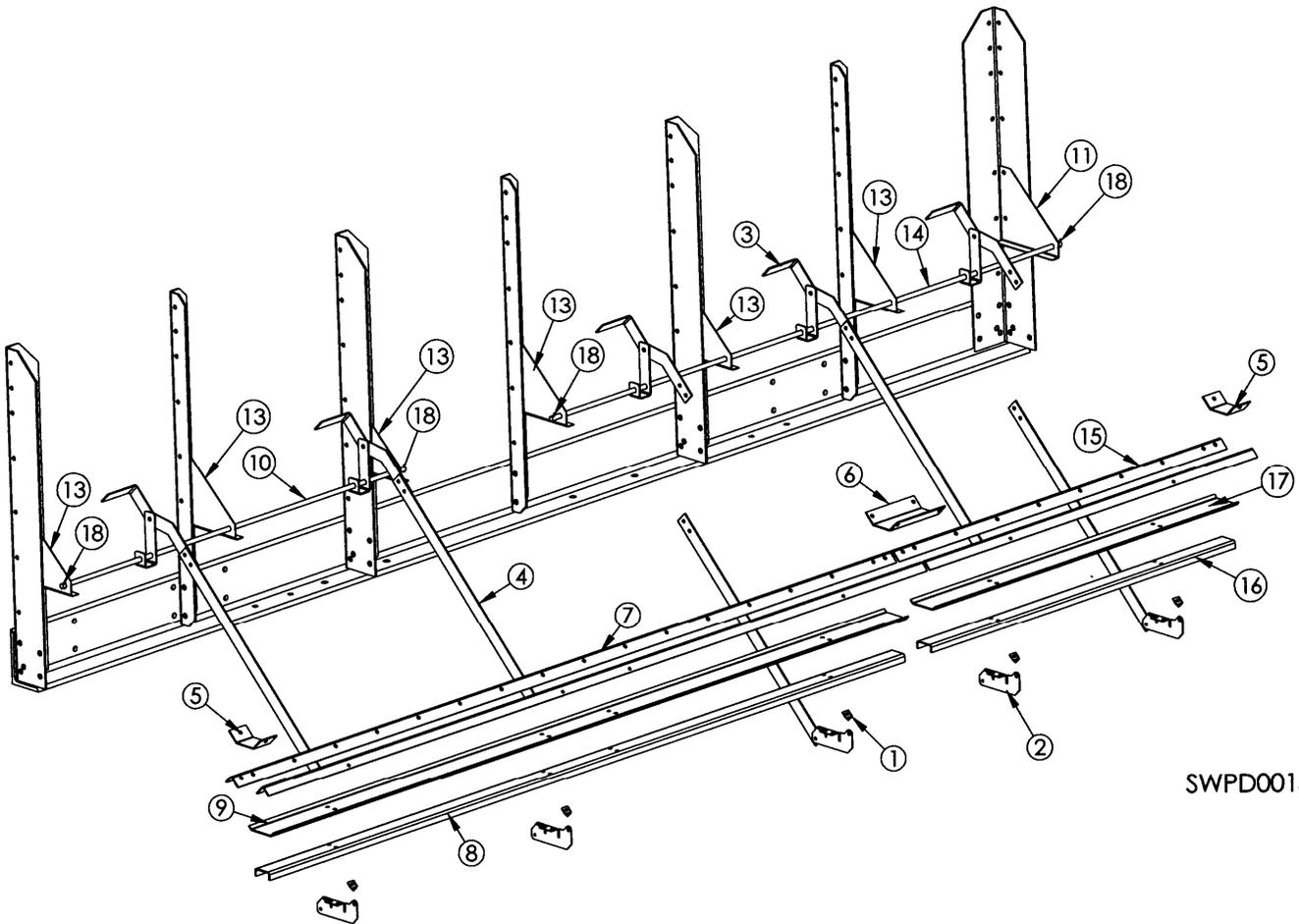
12', 16', 20', 24', & 28'



SWPD0026-DC
5/20/2009 - EAB

REF#	DESCRIPTION	12'		16'		20'		24'		28'	
		QTY	PT #								
1	Hitch Receiver Weldmnt	1	T16310D								
2	Left Frame Angle	1	T12518	1	T16319	1	T20320	1	T24320	1	T28320
3	Connector Plate	2	T16321D								
4	Angle (Fan Support)	1	T16176								
5	Right Frame Angle	1	T12517	1	T16320	1	T20319	1	T24319	1	T28319
6	Tightener Angle	1	T16329								
7	DC Motor Brace	2	T16328								
8	Front Cross Channel	1	T16326								
9	Cross Channel	3	T16325	3	T16325	5	T16325	5	T16325	7	T16325
10	Main Connector Plate	14	T16324	18	T16324	22	T16324	26	T16324	28	T16324
11	Narrow Vertical Support	6	T16323	8	T16323	8	T16323	12	T16323	14	T16323
12	Wide Vertical Support	8	T16322	10	T16322	12	T16322	14	T16322	16	T16322
13	Channel Brace, Frame	2	T12327								
14	Vert. Support, Camlock			1	T16389	2	T16389	2	T16389	3	T16389

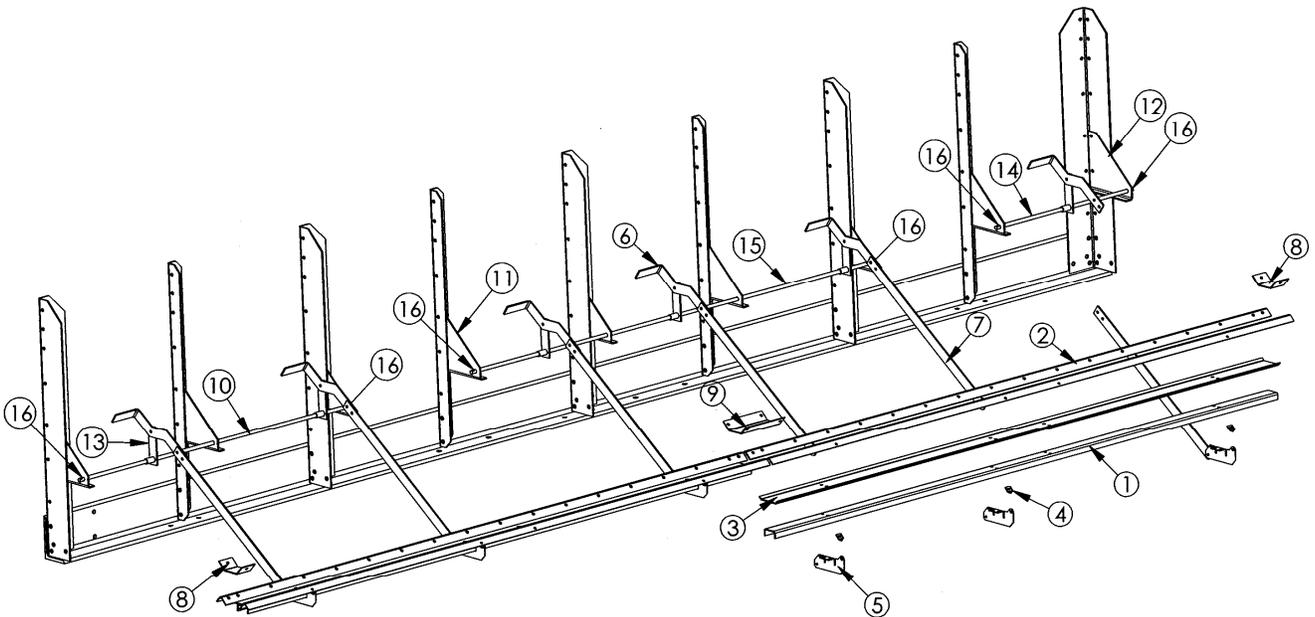
12' CAM LOCK ASSEMBLY



SWPDO015

REF. #	DESCRIPTION	QTY	COMP. #
1	Pivot Bracket	5	T16393
2	Hinge, Bottom Door, Cam Lock	5	T16387
3	Handle	5	T16382
4	Extension Arm, Cam Lock	5	T16386
5	Seal Plate, End, Cam Lock	2	T16386
6	Seal Plate, Mid, Cam Lock	1	T16390
7	8' Angle, Cam Lock	2	T17456
8	8' Door Support, Cam Lock	1	T17454
9	8' Door, Cam Lock	1	T17455
10	Shaft, 49-3/4", Cam Lock	1	T16400
11	Gusset, Rear, Cam Lock	1	T16381
12	Pivot Arm Weldment, Cam Lock	5	T16383
13	Gusset, Front, Cam Lock	6	T16380
14	Shaft, 74", Cam Lock	1	T12516
15	Angle, Cam Lock, 4'	2	T12529
16	Door Support, Cam Lock, 4'	1	T12530
17	Door, Cam Lock, 4"	1	T12528
18	Pin, Cotter, 1/8, 1, PLT	4	J1420

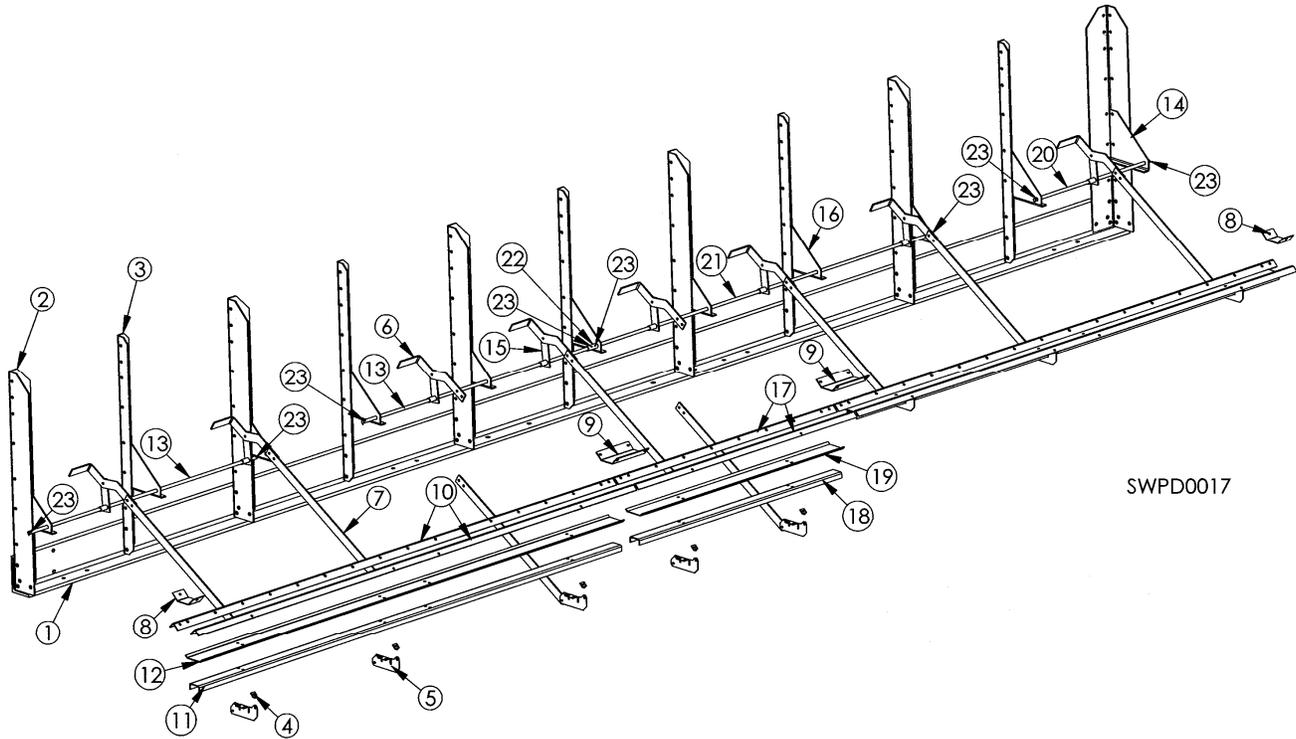
16' CAM LOCK ASSEMBLY



SWPD0016

REF. #	DESCRIPTION	QTY	COMP. #
1	8' Door Support, Cam Lock	2	T17454
2	8' Angle, Cam Lock	4	T17456
3	8' Door, Cam Lock	2	T17455
4	Pivot Bracket	6	T16393
5	Hinge, Bottom Door, Cam Lock	6	T16387
6	Handle, Cam Lock	6	T16382
7	Extension Arm, Cam Lock	6	T16386
8	Seal Plate, End, Cam Lock	2	T16398
9	Seal Plate, Mid, Cam Lock	1	T16390
10	Shaft, 49.75", Cam Lock	1	T16400
11	Gusset, Front, Cam Lock	8	T16380
12	Gusset, Rear, Cam Lock	1	T16381
13	Pivot Arm Weldment, Cam Lock	6	T16383
14	Shaft, 25", Cam Lock	1	T20401
15	Shaft, Cam Lock, 74"	1	T12516
16	Pin, Cotter, 1/8", 1, PLT	6	J1420

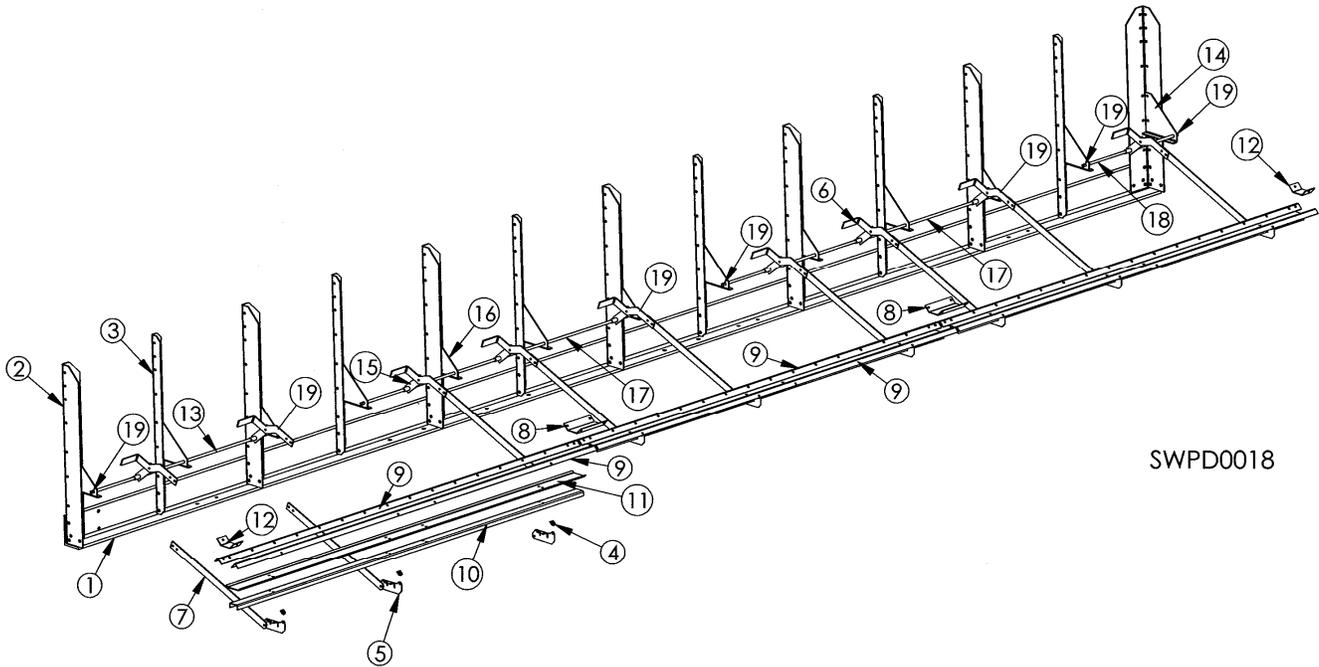
20' CAM LOCK ASSEMBLY



SWPD0017

REF. #	DESCRIPTION	QTY	COMP. #
1	Right Frame Angle	1	T20319
2	Wide Vertical Support	6	T16322
3	Narrow Vertical Support	5	T16323
4	Pivot Bracket	8	T16393
5	Hinge Bottom Door Cam Lock	8	T16387
6	Handle Cam Lock	8	T16382
7	Extension Arm, Cam Lock	8	T16386
8	Seal Plate, End, Cam Lock	2	T16398
9	Seal Plate, Mid, Cam Lock	2	T16390
10	8° Angle, Cam Lock	4	T17456
11	8° Door Support, Cam Lock	2	T17454
12	8° Door, Cam Lock	2	T17455
13	Shaft, 49.75", Cam Lock	2	T16400
14	Gusset, Rear, Cam Lock	1	T16381
15	Pivot Arm Weldment, Cam Lock	8	T16383
16	Gusset, Front, Cam Lock	10	T16380
17	Angle, Cam Lock 4°	2	T12529
18	Door Support, Cam Lock 4°	1	T12530
19	Door, Cam Lock 4°	1	T12528
20	Shaft, 25", Cam Lock	1	T20401
21	Shaft, Cam Lock, 74"	1	T12516
22	Connector, Shaft	1	T20403
23	Pin, Cotter, 1/8, 1, PLT	8	J1420

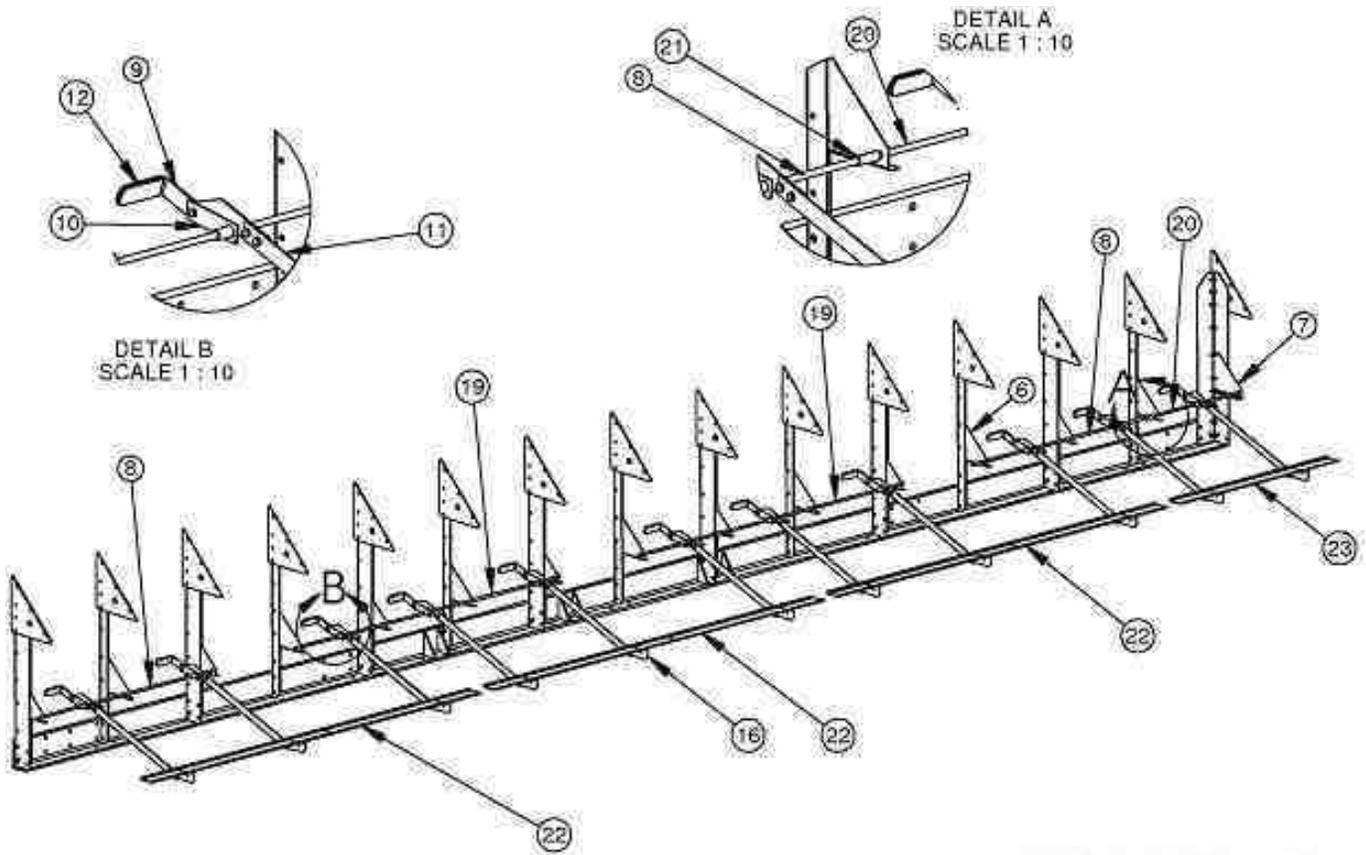
24' CAM LOCK ASSEMBLY



SWPD0018

REF. #	DESCRIPTION	QTY	COMP. #
1	Right Frame Angle	1	T24319
2	Wide Vertical Support	7	T16322
3	Narrow Vertical Support	8	T16323
4	Pivot Bracket	9	T16393
5	Hinge, Bottom Door, Cam Lock	9	T16387
6	Handle, Cam Lock	9	T16382
7	Extension Arm, Cam Lock	9	T16386
8	Seal Plate, Mid, Cam Lock	2	T16390
9	8' Angle, Cam Lock	6	T17456
10	8' Door Support	3	T17454
11	8' Door, Cam Lock	3	T17455
12	Seal Plate, End, Cam Lock	2	T16398
13	Shaft, Cam Lock, 49.75"	1	T16400
14	Gusset, Rear	1	T16381
15	Pivot Arm Weldment	9	T16383
16	Gusset, Front	12	T16380
17	Shaft, Cam Lock, 74"	2	T12516
18	Shaft, Cam Lock, 25"	1	T20401
19	Pin, Cotter, 1/8, 1, PLT	8	J1420

28' CAM LOCK ASSEMBLY



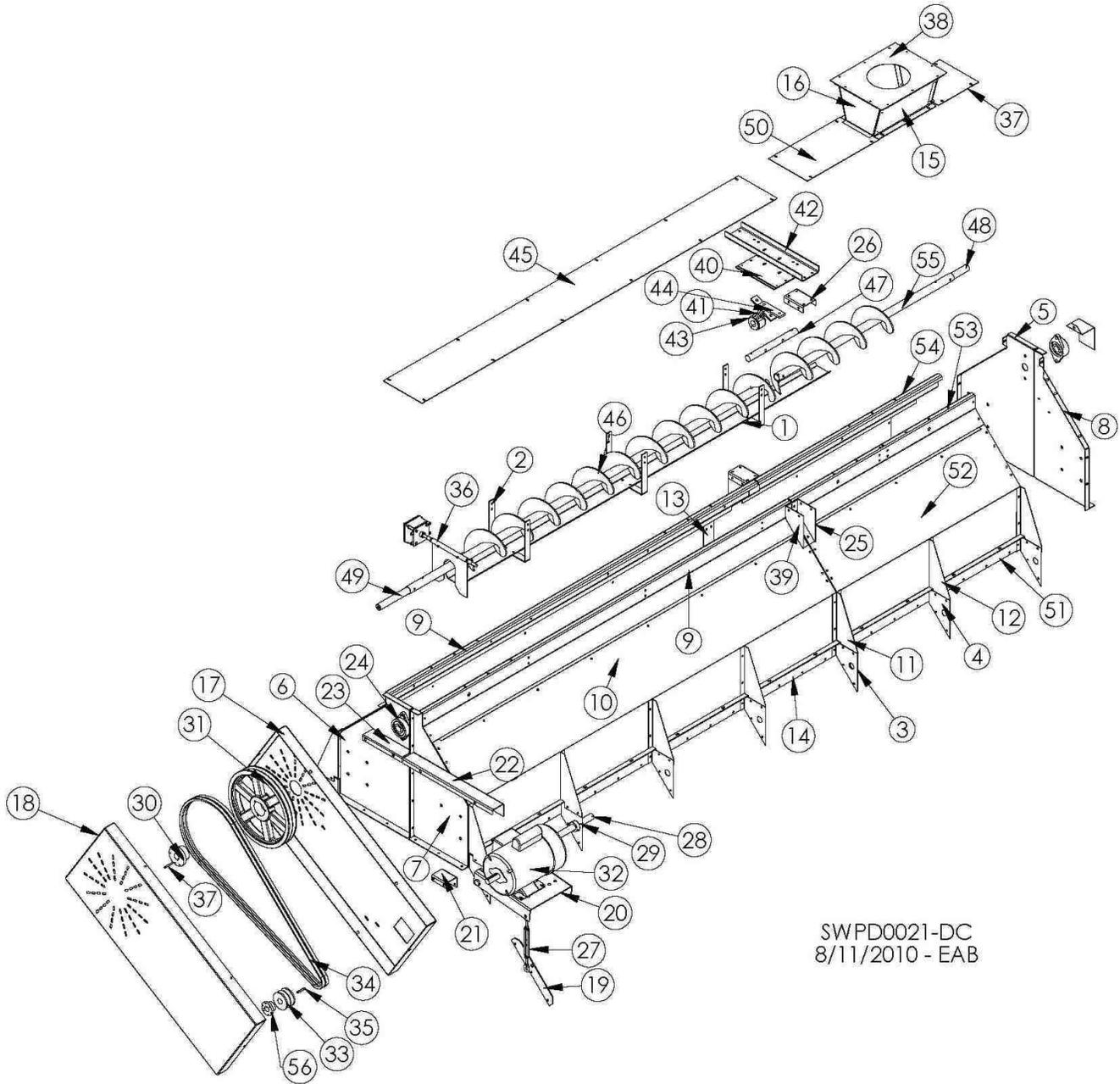
CAMLOCK ASSEMBLY, 28-FT.
SHEET 1 OF 2

SWPD0067-CE
051128JF.J

REF. #	DESCRIPTION	QTY	COMP. #
1	RIGHT FRAME ANGLE WELD	1	T28318
2	WIDE VERTICAL SUPPORT	8	T16322
3	PLATE, MAIN CONNECTOR, BOX, CONDUIT	2	T16331
4	NARROW VERTICAL SUPPORT	7	T16323
5	MAIN CONNECTOR PLATE	13	T16324
6	GUSSET, FRONT, CAM LOCK	14	T16380
7	GUSSET, REAR CAM LOCK	1	T16381
8	SHAFT, LONG CAN-LOCK	2	T16400
9	HANDLE, CAM-LOCK	11	T16382
10	PIVOT ARM WELD, CAM-LOCK	11	T16383
11	EXTENSION ARM, CAM LOCK	11	T16386
12	COVER, PLASTIC, HANGLE, 1 1.2 X 4 LG	11	J23182
13	SCREW, 3/8 -16 X 1, JS500, GD 5	33	J06063
14	NUT, WHIZLOCK, 3/8-16	22	B5962
15	NUT, HEX, 3/8-16, PLT LOCK	11	J1025
16	HINGE, BOTTOM DOOR, CAM LOCK	11	T16387
17	BOLT, 5/16-18 X 3/4" GR 5, HEX WASHER HD, JS500	9	J0536
18	NUT, LOCK, 5/16-18, PLT	11	J1010
19	SHAFT, CAM-LOCK, LONG, 12' '99	2	T12516
20	SHAFT, SHORT, CAM LOCK	1	T20401
21	CONNECTOR, SHAFT	1	T20403
22	8' DOOR, CAM-LOCK 2000	3	T17455
23	DOOR, CAM-LOCK 4' 2000	1	T12528

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12' WET BIN

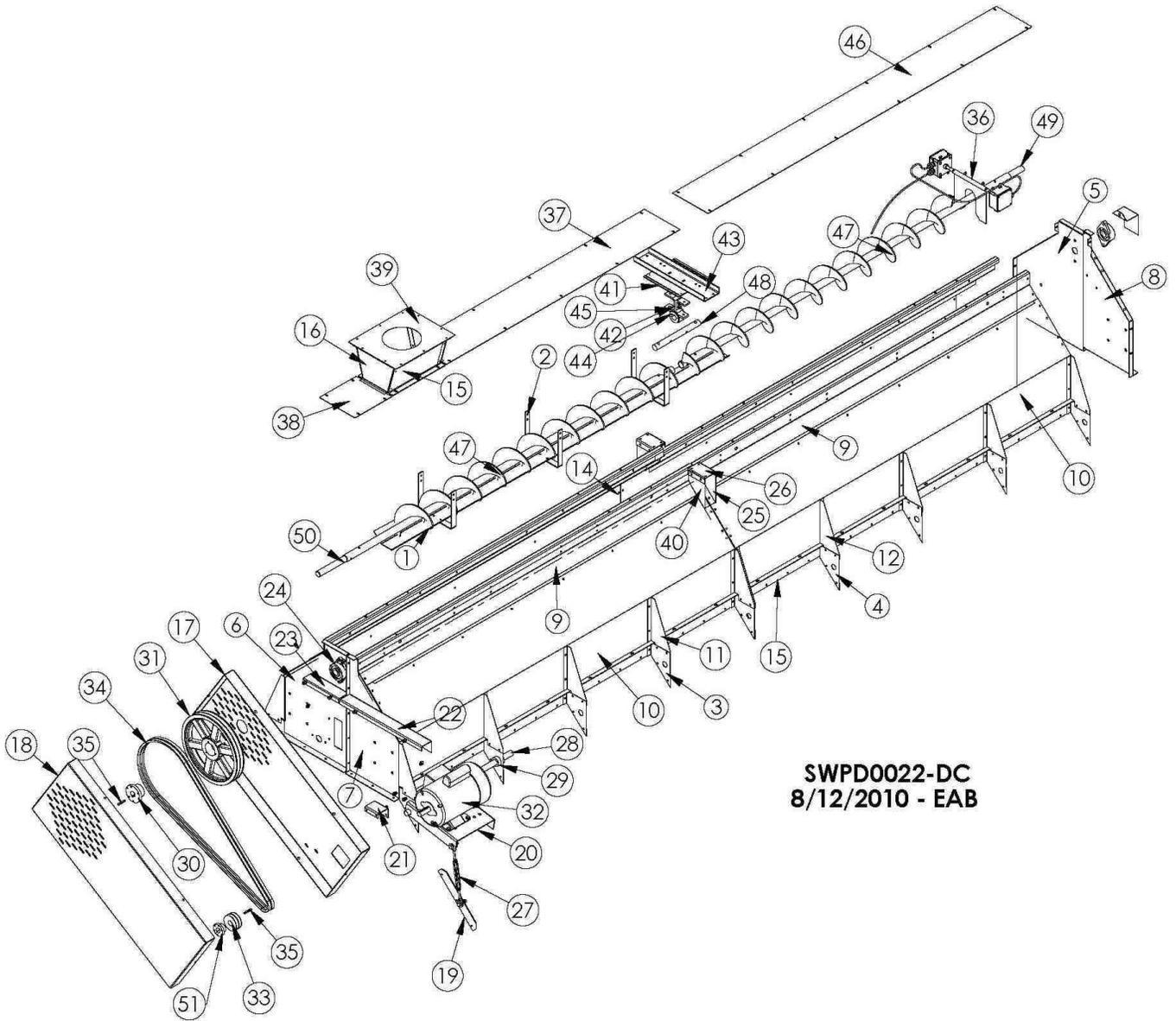


SWPD0021-DC
8/11/2010 - EAB

12' WET BIN

REF. #	DESCRIPTION	QTY	COMP. #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	8	T16117
4	Right Support Gusset	8	T16118
5	RR Wet Bin End Plate	1	T17401
6	RF Wet Bin End Plate	1	T17400
7	LF Wet Bin End Plate	1	T17402
8	LR Wet Bin End Plate	1	T17403
9	Top 8' Panel Fill Switch	2	T17457
10	Wet Bin Side (Stainless, Perf)	2	T17450S
	Wet Bin Side (.094, Galvanized, Perf)	2	T17450
	Wet Bin Side (.063, Galvanized, Perf)	2	T17441W
11	LT Pivot Brace Wet Bin	10	T17410
12	RT Pivot Brace Wet Bin	6	T17411
13	Splice, Wet Bin Side	2	T17412
14	Bolt Down Lip 8' 2000	2	T17453
15	Hopper Side	2	T17935
16	Hopper End	2	T17936
17	Top Auger Shield (Inner)	1	T16256
18	Top Auger Shield (Outer)	1	T16255
19	Plate, Turnbuckle, Connector	1	T16283
20	Top Motor Mount	1	T16277
21	Top Shield Brace	1	T16258
22	Bracket, LF Top Auger Shield	1	T16861
23	Bracket, RF Top Auger Shield	1	T16860
24	Bearing, 1.25, FLG, W/LC, HCFTS207-20	2	J0010
25	Splice Gusset Right	2	T16145
26	Splice Channel Short	2	T16146
27	Turnbuckle, 3/8" x 6"	1	J0904
28	Pivot, Motor Mount, Top	1	T18150
29	Collar, Shaft, 1-3/16"	2	J1338
30	Bushing, 1.25, SK	1	J0410
31	Pulley, 15.75 OD, DBL "B" Gr, SK	1	J03992
32	Motor (US only)	-	-
33	Pulley, 4.15 OD, DBL, B, Cast	1	J03352
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2"	2	F4499
36	Paddle, Assembly, D-C	1	T18262E
37	Lid, Extension, Wet Bin	1	T16159
38	Cover, Hopper	1	T17937
39	Splice Gusset Left	2	T16144
40	Crimp Plate	1	T16142
41	Hanger, Auger, T, 6CH2203	1	J0097
42	Splice Channel	1	T16143
43	Bushing, Wood, 1.25" ID	1	J0096
44	Spacer, T-Hanger, Top Auger	1	T16096
45	Lid, Wet Holding Bin	1	T16158
46	Top Auger	1	T16428
47	Stub Shaft	1	F4720
48	Bottom Auger Shaft	1	G73291
49	Auger Shaft, Top Front	1	T16436
50	Lid, Bin, Wet HLD. 12"	1	T12519
51	Bolt Down Lip, 4'	2	T12524
52	Side, Wet Bin, 4' (Galvanized, Perf)	2	T12525
	Side, Wet Bin, 4' (Stainless, Perf)	2	T12525S
	Side, Wet Bin, 4' (.063, Galvanized, Perf)	2	T12536W
53	Top 4' Panel (LR) 12'	1	T12526
54	Top 4' Panel (RR) 12'	1	T12527
55	4' Rear, Top Auger	1	T12503
56	Bushing, 28 mm	1	J04275

16' WET BIN

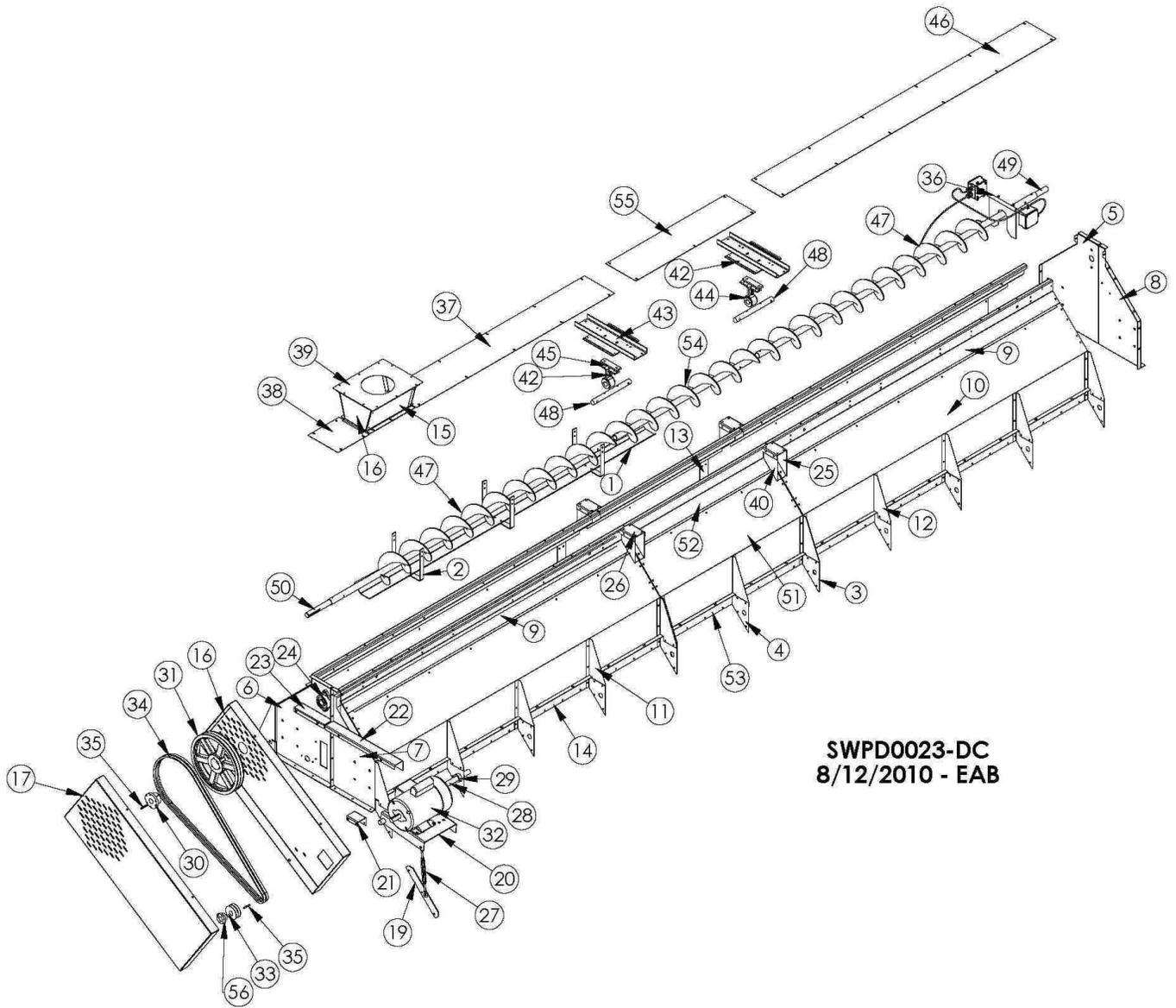


SWPD0022-DC
8/12/2010 - EAB

16' WET BIN

REF. #	DESCRIPTION	QTY	COMP. #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	12	T16117
4	Right Support Gusset	8	T16118
5	RR Wet Bin End Plate	1	T17401
6	RF Wet Bin End Plate	1	T17400
7	LF Wet Bin End Plate	1	T17402
8	LR Wet Bin End Plate	1	T17403
9	Top 8' Panel Fill Switch	4	T17457
10	Wet Bin Side (Stainless, Perf)	4	T17450S
	Wet Bin Side (.094, Galvanized, Perf)	4	T17450
	Wet Bin Side (.063, Galvanized, Perf)	4	T17441W
11	LT Pivot Brace Wet Bin	12	T17410
12	RT Pivot Brace Wet Bin	8	T17411
13	Splice, Wet Bin Side	2	T17412
14	Bolt Down Lip 8', 2000	4	T17453
15	Hopper Side	2	T17935
16	Hopper End	2	T17936
17	Top Auger Shield (Inner)	1	T16256
18	Top Auger Shield (Outer)	1	T16255
19	Plate, Turnbuckle, Connector	1	T16283
20	Top Motor Mount	1	T16277
21	Top Shield Brace	1	T16258
22	Bracket, LF Top Auger Shield	1	T16861
23	Bracket, RF Top Auger Shield	1	T16860
24	Bearing, 1.25, FLG, W/LC, HCFTS207 - 20	2	J0010
25	Splice Gusset Right	2	T16145
26	Channel, Splice, Short	2	T16146
27	Turnbuckle, 3/8" x 6"	1	J0904
28	Pivot, Motor Mount, Top	1	T18150
29	Collar, Shaft, 1-3/16"	2	J1338
30	Bushing, 1.25 SK	1	J0410
31	Pulley, 15.75OD, Double "B" Gr. SK	1	J03992
32	Motor (US only)	-	-
33	Pulley, 4.15 OD, Double, B, Cast	1	J03352
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly, D-C	1	T18262E
37	Lid, Wet Holding Bin	1	T16157
38	Lid, 10.5", Extension, Wet Bin	1	T16159
39	Cover, Hopper	1	T17937
40	Splice Gusset Left	2	T16144
41	Crimp Plate	1	T16142
42	Hanger, Auger, T, 6CH2203	1	J0097
43	Splice Channel	1	T16143
44	Bushing, Wood, 1.25" ID	1	J0096
45	Spacer, T-Hanger, Top auger	1	T16096
46	Lid, 92-1/2" Wet Holding Bin	1	T16158
47	Top Auger	2	T16428
48	Shaft, 8' Hanger Bearing	1	F4720
49	Shaft, 1.25" x 9"	1	G73291
50	Shaft, Top Front, 12-3/4"	1	T16436
51	Bushing, 28 mm	1	J04275

20' WET BIN

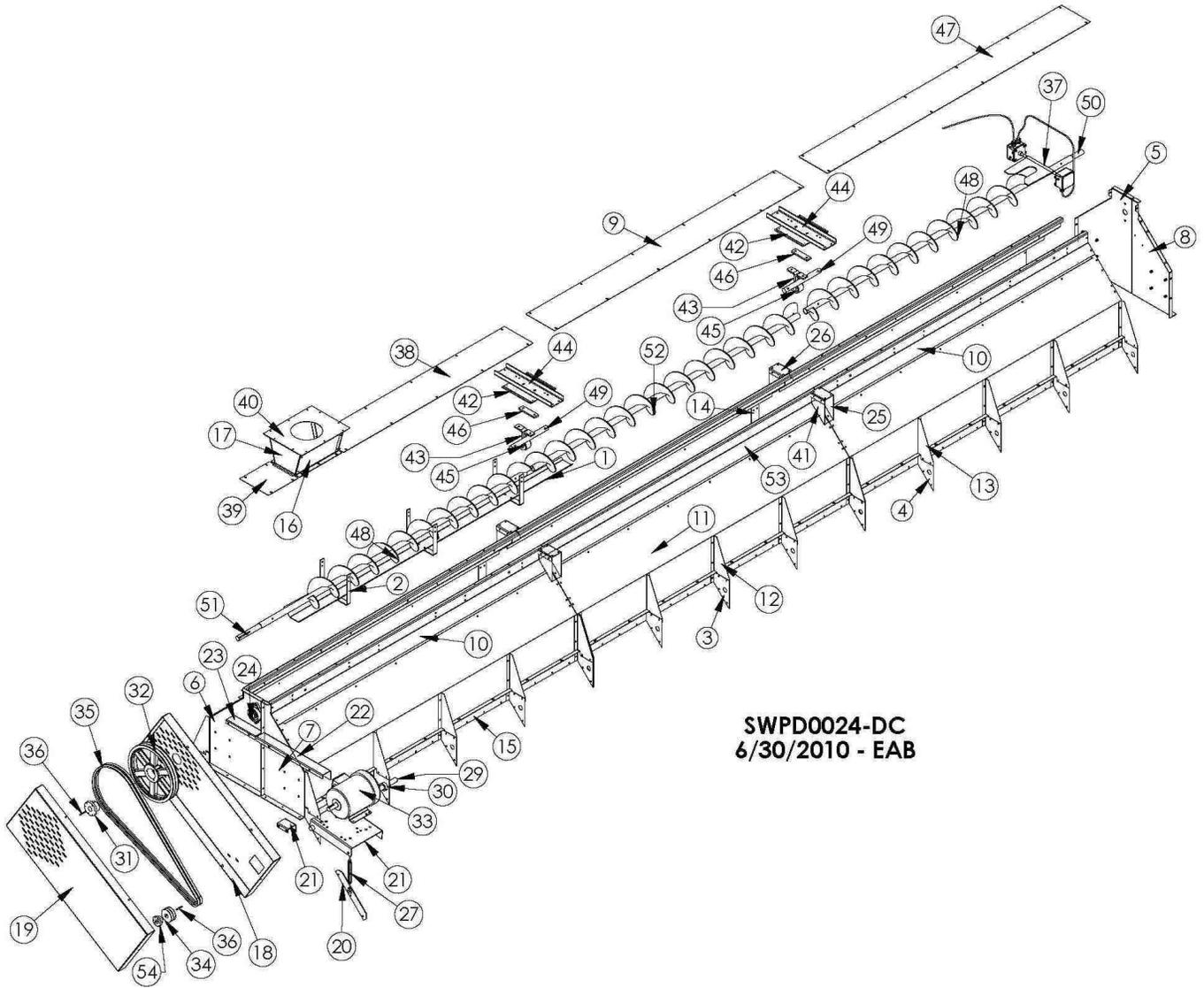


SWPD0023-DC
8/12/2010 - EAB

20' WET BIN

REF. #	DESCRIPTION	QTY	COMP. #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	16	T16117
4	Right Support Gusset	10	T16118
5	RR Wet Bin End Plate	1	T17401
6	RF Wet Bin End Plate	1	T17400
7	LF Wet Bin End Plate	1	T17402
8	LR Wet Bin End Plate	1	T17403
9	Top 8' Panel Fill Switch	4	T17457
10	Wet Bin Side (Stainless, Perf)	4	T17450S
	Wet Bin Side (.094, Galvanized, Perf)	4	T17450
	Wet Bin Side (.063, Galvanized, Perf)	4	T17441W
11	LT Pivot Brace Wet Bin	12	T17410
12	RT Pivot Brace Wet Bin	8	T17411
13	Splice, Wet Bin Side	2	T17412
14	Bolt Down Lip 8', 2000	4	T17453
15	Hopper Side	2	T17935
16	Hopper End	2	T17936
17	Top Auger Shield (Inner)	1	T16256
18	Top Auger Shield (Outer)	1	T16255
19	Plate, Turnbuckle, Connector	1	T16283
20	Top Motor Mount	1	T16277
21	Top Shield Brace	1	T16258
22	Bracket, LF Top Auger Shield	1	T16861
23	Bracket, RF Top Auger Shield	1	T16860
24	Bearing, 1.25, FLG, W/LC, HCFTS207 - 20	2	J0010
25	Splice Gusset Right	2	T16145
26	Channel, Splice, Short	2	T16146
27	Turnbuckle, 3/8" x 6"	1	J0904
28	Pivot, Motor Mount, Top	1	T18150
29	Collar, Shaft, 1-3/16"	2	J1338
30	Bushing, 1.25 SK	1	J0410
31	Pulley, 15.75OD, Double "B" Gr. SK	1	J03992
32	Motor (US only)	-	-
33	Pulley, 4.15 OD, Double, B, Cast	1	J03352
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly, D-C	1	T18262E
37	Lid, Wet Holding Bin	1	T16157
38	Lid, 10.5", Extension, Wet Bin	1	T16159
39	Cover, Hopper	1	T17937
40	Splice Gusset Left	2	T16144
41	Crimp Plate	1	T16142
42	Hanger, Auger, T, 6CH2203	1	J0097
43	Splice Channel	1	T16143
44	Bushing, Wood, 1.25" ID	1	J0096
45	Spacer, T-Hanger, Top auger	1	T16096
46	Lid, 92-1/2" Wet Holding Bin	1	T16158
47	Top Auger	2	T16428
48	Shaft, 8' Hanger Bearing	2	F4720
49	Shaft, 1.25" x 9"	1	G73291
50	Shaft, Top Front, 12-3/4"	1	T16436
51	Side, Wet Bin, 4', 2000	2	T12525
	Side, Wet Bin, 4' (.063, Galvanized, Perf)	2	T12536W
52	Top 4' Panel (LR) 12'	2	T20526
53	Bolt Down Lip, 4'	2	T12524
54	Top Middle Auger 20'	1	T16427
55	Lid, Wet Holding Bin 20'	1	T20158
56	Bushing, 28 mm	1	J04275

24' WET BIN

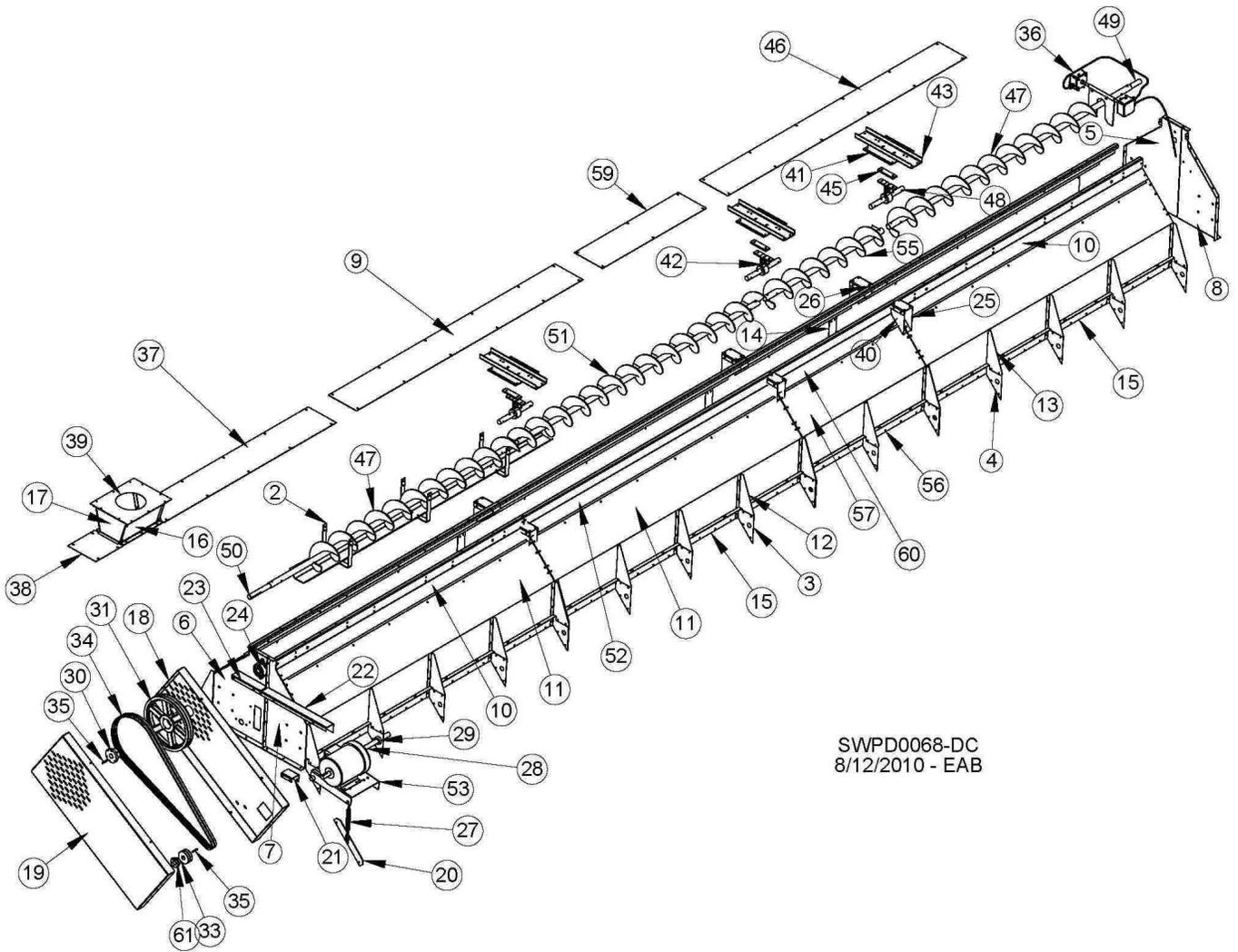


SWPD0024-DC
6/30/2010 - EAB

24' WET BIN

REF. #	DESCRIPTION	QTY	COMP. #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	18	T16117
4	Right Support Gusset	12	T16118
5	RR Wet Bin End Plate	1	T17401
6	RF Wet Bin End Plate	1	T17400
7	LF Wet Bin End Plate	1	T17402
8	LR Wet Bin End Plate	1	T17403
9	Lid, 87-3/4" Wet Holding Bin	1	T16167
10	Top 8' Panel Fill Switch	4	T17457
11	Wet Bin Side (Stainless, Perf)	6	T17450S
	Wet Bin Side (.094, Galvanized, Perf)	6	T17450
	Wet Bin Side (.063, Galvanized, Perf)	6	T17441W
12	LT Pivot Brace Wet Bin	18	T17410
13	RT Pivot Brace Wet Bin	12	T17411
14	Splice, Wet Bin Side	4	T17412
15	Bolt Down Lip 8', 2000	6	T17453
16	Hopper Side	2	T17935
17	Hopper End	2	T17936
18	Top Auger Shield (Inner)	1	T16256
19	Top Auger Shield (Outer)	1	T16255
20	Plate, Turnbuckle, Connector	1	T16283
21	Top Motor Mount	1	T16277
22	Top Shield Brace	1	T16258
23	Bracket, LF Top Auger Shield	1	T16861
24	Bracket, RF Top Auger Shield	1	T16860
25	Bearing, 1.25, FLG, W/LC, HCFTS207 - 20	2	J0010
26	Splice Gusset Right	4	T16145
27	Channel, Splice, Short	4	T16146
28	Turnbuckle, 3/8" x 6"	1	J0904
29	Pivot, Motor Mount, Top	1	T18150
30	Collar, Shaft, 1-3/16"	2	J1338
31	Bushing, 1.25 SK	1	J0410
32	Pulley, 15.75OD, Double "B" Gr. SK	1	J03992
33	Motor (US only)	-	-
34	Pulley, 4.15 OD, Double, B, Cast	1	J03352
35	Belt, B95	2	J0252
36	Key, 1/4 x 1/4 x 2	2	F4499
37	Paddle, Assembly, D-C	1	T18262E
38	Lid, Wet Holding Bin	1	T16157
39	Lid, 10.5", Extension, Wet Bin	1	T16159
40	Cover, Hopper	1	T17937
41	Splice Gusset Left	4	T16144
42	Crimp Plate	2	T16142
43	Hanger, Auger, T, 6CH2203	2	J0097
44	Splice Channel	2	T16143
45	Bushing, Wood, 1.25" ID	2	J0096
46	Spacer, T-Hanger, Top auger	2	T16096
47	Lid, 92-1/2" Wet Holding Bin	1	T16158
48	Top Auger	2	T16428
49	Shaft, 8' Hanger Bearing	2	F4720
50	Shaft, 1.25" x 9"	1	G73291
51	Shaft, Top Front, 12-3/4"	1	T16436
52	Auger, Bottom Front, 93-1/2"	1	T16430
53	Top 8' Panel (LR&RF) 2000	2	T24451
54	Bushing, 28 mm	1	J04275

28' WET BIN

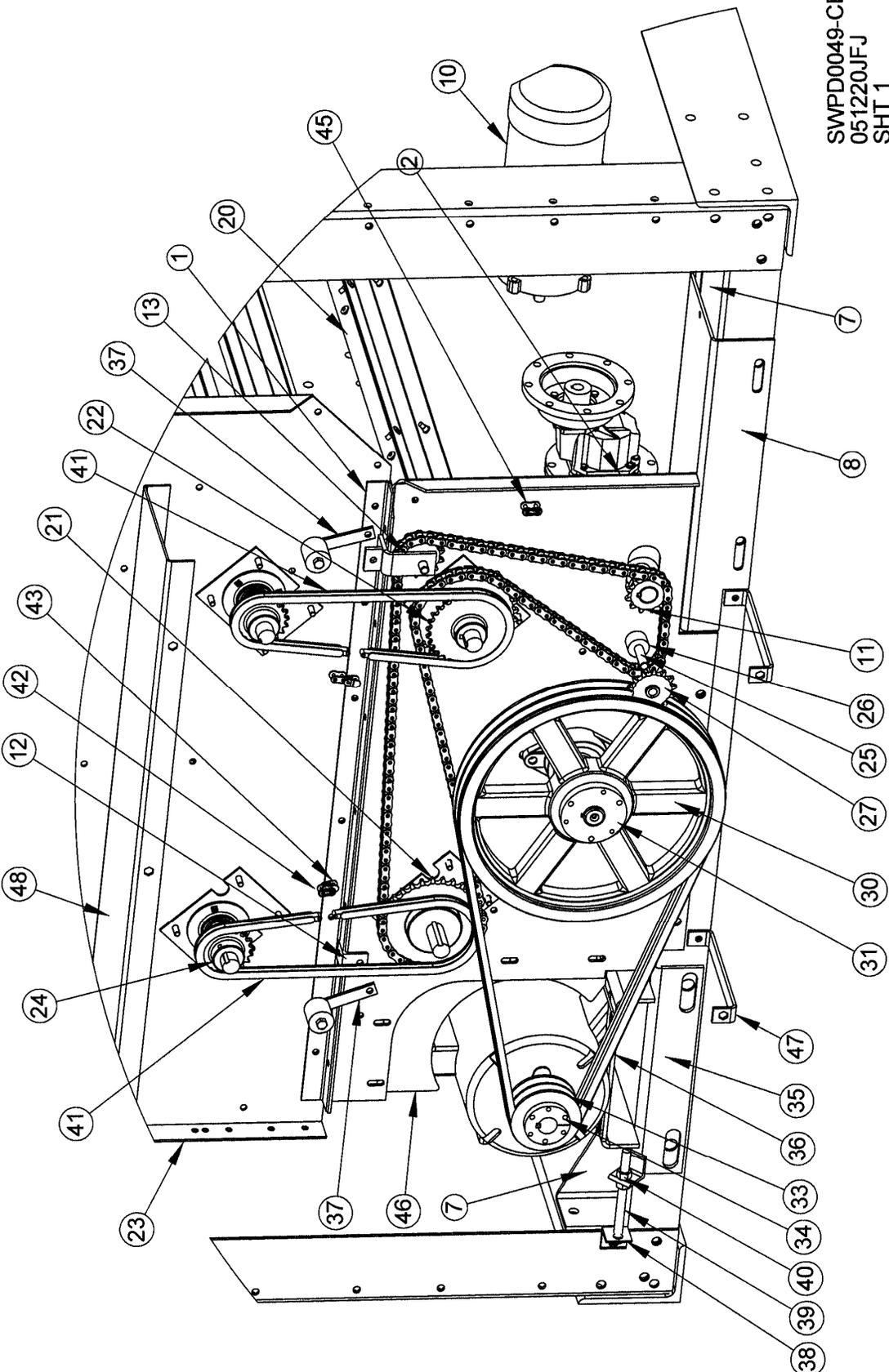


SWPD0068-DC
8/12/2010 - EAB

28' WET BIN

REF #	DESCRIPTION	QTY	COMP #
1	TRASH PAN	1	T16235
2	SUPPORT, TRASH PAN	3	T16236
3	LEFT SUPPORT GUSSET	20	T16117
4	RIGHT SUPPORT GUSSET	16	T16118
5	RR WET BIN END PLATE	1	T17401
6	RF WET BIN END PLATE	1	T17400
7	LF WET BIN END PLATE	1	T17402
8	LR WET BIN END PLATE	1	T17403
9	LID 87-3/4" WET HOLDING BIN	1	T16167
10	TOP 8' PANEL	4	T17457
11	WET BIN SIDE PERF, 2000	6	T17450S
	WET BIN SIDE (.063, GALV, PERF)	6	T17441W
12	LT PIVOR BRACE WET BIN	20	T17410
13	RT PIVOR BRACE WET BIN	16	T17411
14	SPLICE, WET BIN SIDE	6	T17412
15	BOLT DOWN LIP 8' 2000	6	T1745
16	HOPPER SIDE	2	T17935
17	HOPPER END	2	T17936
18	TOP AUGER SHIELD (INNER)	1	T16256
19	TOP AUGER SHIELD (OUTER)	1	T16255
20	PLATE, TURNBUCKLE, MTR MNT	11	T16283
21	TOP SHIELD BRACE	1	T16258
22	BRACKET, LF TOP AUGER SHIELD	1	T16861
23	BRACKET, LF TOP AUGER SHIELD	1	T16860
24	BRACKET, RF TOP AUGER SHIELD	2	J0010
25	SPLICE GUSSET RIGHT	6	T16145
26	CHANNEL, SPLICE, SHORT	6	T16146
27	TURNBUCKLE, 3/8" X 6"	1	J0904
28	PIVOT, MOTOR MOUNT, TOP	1	T18150
29	COLLAR, SHAFT, 1 3/16"	2	J1338
30	BUSHING, 1 1/4" SK	1	J0410
31	PULLEY, 15.75OD, DBL "B" GR, SK	1	J03992
32	Motor (US only)	-	-
33	PULLEY, 4.15 OD, DBL, B, CAST	1	J03352
34	BELT, B95	2	J0252
35	KEY, 1/4 X 1/4 X 2	2	F4499
36	PADDLE, ASSY, D-C	1	T18262E
37	LID, WET HOLDING BIN	1	T16157
38	LID, 10.5", EXTENSION, WET BIN	1	T16159
39	COVER, HOPPER	1	T17937
40	SPLICE GUSSET LEFT	6	T16144
41	CRIMP PLATE	3	T16142
42	HANGER, AUGER, T, 6CH2203	3	J0097
43	SPLICE CHANNEL	3	T16143
44	BUSHING, WOOD, 1.25" I.D.	3	J0096
45	SPACER, T-HANGER, TOP AUGER	3	T16096
46	LID 92 1/2" WET HOLDING BIN	2	T16158
47	TOP AUGER	2	T16428
48	SHAFT, 8" HANGER BEARING	3	F4720
49	SHAFT, 1.25" X 9"	1	G73291
50	SHAFT, TOP FRONT, 12 3/4"	1	T16436
51	AUGER, BOTTOM FRONT, 93 1/2"	1	T16430
52	TOP 8' PANEL	2	T24451
53	MOTOR MOUNT, TOP LOAD	1	T16277
54	PLATE, COVER RF GARNER END	1	T17415
55	TOP MIDDLE AUGER (20 FT)	1	T16427
56	BOLT DOWN LIP, 4 FT 2000	2	T12524
57	SIDE, WET BIN, 4FT 2000	2	T12525
	SIDE, WET BIN, 4' (.063, GALV, PERF)	2	T12536W
58	PLATE, SHORT SPLICE	6	T16141
59	LID, WET HOLD BIN 40.25"	1	T20158
60	TOP 4' PANEL (LR) 12FT 2000	2	T20526
61	BUSHING, 28 mm	1	J04275

METERING ROLLS & UNLOAD AUGER DRIVES

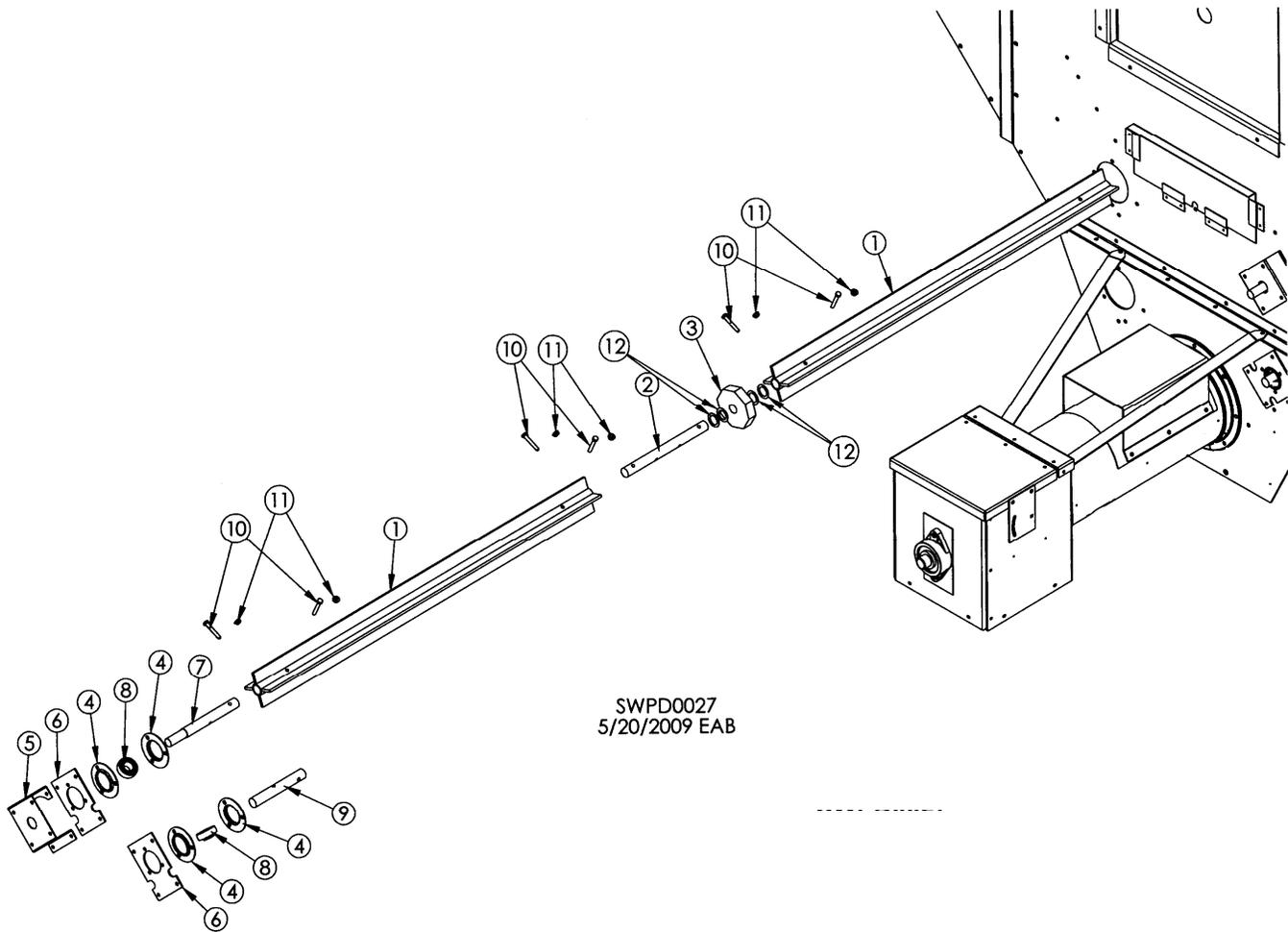


SWPD0049-CE
051220JFJ
SHT 1

METERING ROLLS & UNLOAD AUGER DRIVES

REF#	DESCRIPTION	QTY	COMP#	REF#	DESCRIPTION	QTY	COMP#
1	Splice, Bottom Angle (2005)	1	T17964	26	Spacer, Sprocket	2	T16282
2	Plate, Bottom Front End (2005)	1	T17963	27	Sprocket, Idler, 50-13	2	J1685
3	Front Cross Channel	1	T16326	28	Shaft, Top Front, 12-3/4"	1	T16436
4	Wide Vertical Support	2	T16322	29	Bearing, 1.25, FLG, W/LC, HCFTS207-20	1	J0010
5	Left Frame Angle, Jacks	1	T12518	30	Pulley, 15.75OD, Dbl "B" GR, SK	1	J03992
6	Right Frame Angle, Jacks	1	T12517	31	Bushing, 1-1/4" SK	1	J0410
7	DC Motor Brace	2	T16328	33	Pulley, 4.15"OD, 2B38SH	1	J03352
8	Mount, Motor DC (2005)	1	T17284	34	Bushing, 28MM SH	1	J04275
9	Reducer, Speed, 150:1 (2005)	1	J3682	35	Unload Motor Mount Weldment	2	T16290
10	Motor, 1 HP, 230V AC, 1750 RPM TEFC	1	H1143	36	Belt, B x 73, (15.75 x 4.15) 28'	2	J02392
11	Sprocket, 50B12, 1.125" BR	1	J16612		Belt, 12' + 16'	2	J0246
12	Chain Tightener Bracket	1	T16274	37	Chain Tightener	2	T7367
13	Bracket Weldment, Idler Sprocket	1	T17965	38	Tightener Angle	1	T16329
14	Meter Plate	4	T17920	39	Bolt, 1/2-13 x 6, PLT, GR5, TAP	1	J0765
15	Bolt, 5/16-18, 1.00, PLT, G5, HHWZ	16	J0537	40	Nut, Hex, 1/2-13, PLT	2	J1040
16	Nut, Tinnernan, 5/16-18	16	J1009	41	Chain, #40, 73 Links	2	T16800
17	Flangette, 3-hole, for 205 Brg. (BRH52MS)	8	J0098	42	Chain, Link, #40 Connector	2	J1745
18	Brg., 1", Center, FH205-16, W/L CLR	4	J0005	43	Chain, Link, #40 Offset, 1/2 Link	2	J1750
19	Front Shaft, Meter Roll	4	T16266	44	Chain, #50, 157 Links, 2005	1	T16803
20	Metering Roll Assy. 8', Galv.	4	T16297	45	Chain, Link, #50 Connector	1	J1760
21	Sprocket, 50B30, 1.000" BR	2	J1678	46	Shield, Motor, 7-1/2 Hp, 28'	1	T17970
22	Sprocket, 40B, 30-Tooth, 1" Bore, Keyed	2	J1649		Shield, 12' + 16'	1	T17928
23	Panel, Front End, 2/3-1/3, 38"-28"	1	T24820	47	Brace, Front Shield	2	T16412
24	Sprocket, 40B, 20-Tooth, 1" Bore, Keyed	2	J16487	48	Front Shield Mounting Bracket	1	T16411
25	Screw, 1/2-13, 3, 6PLT, GR5, HHCS	2	J0750	49	Front Chain Shield	1	T16410

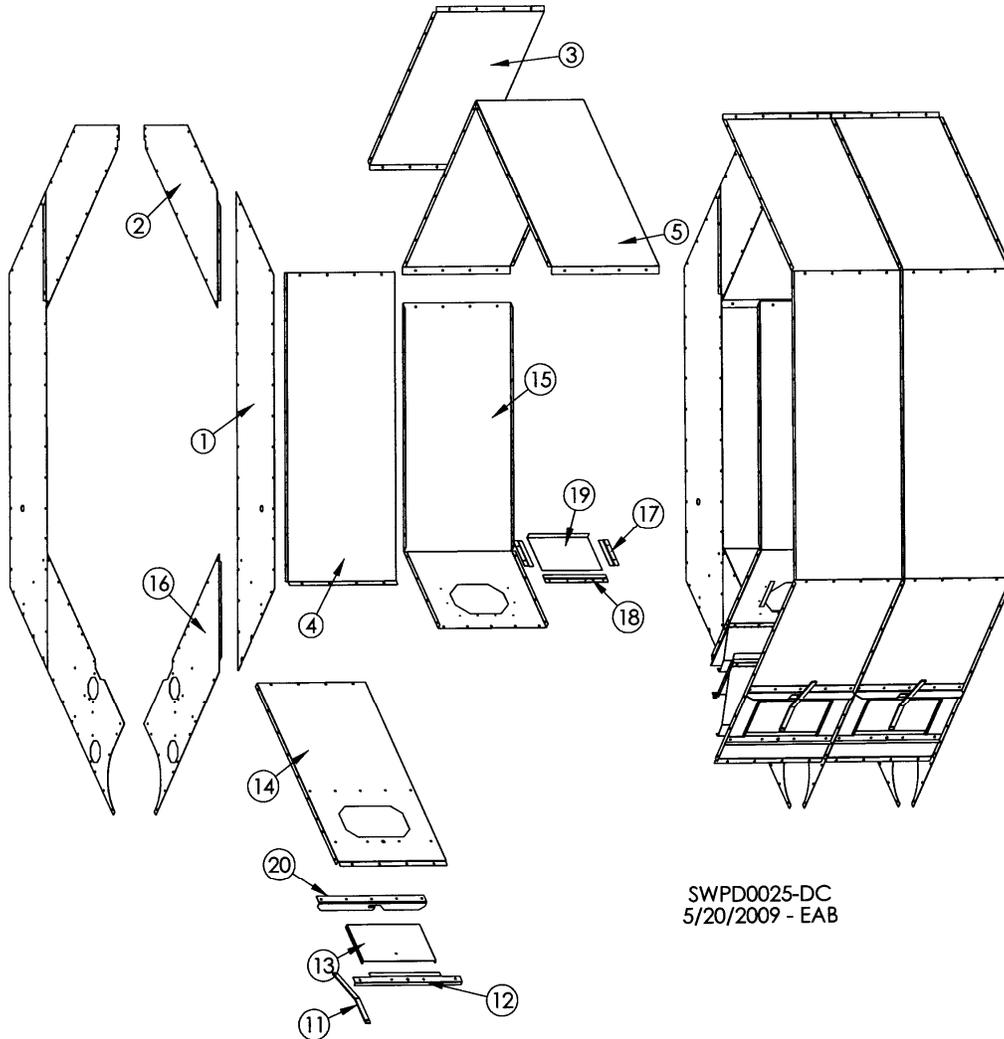
DRIVE END OF DRYERS, SINGLE FAN - BACK END



SWPD0027
5/20/2009 EAB

REF. #	DESCRIPTION	COMP. #
1	Metering Roll Assembly, 8'	T16297
	Metering Roll Assembly, 4'	T16298
2	Connecting Shaft, Meter Roll	T16269
3	Bushing, Wooden, Octagon, 1" ID	J1245
4	Flangette, for 205 Bearing	J0098
5	Encoder Bracket	T17921
6	Meter plate	T17920
7	Top Back Shaft, Meter Roll	T16267
8	Bearing, 1", Center, FH205-16, W/L CLR	J0005
9	Bottom Back Shaft, Meter Roll	T16268
10	Screw, 5/16-18, 2, PLT, G5, HHCS	J0585
11	Nut, 5/16-18, PLT, HHWZ	J1110
12	Bushing, Mach, 1-18GA	J1266

COLUMN PARTS

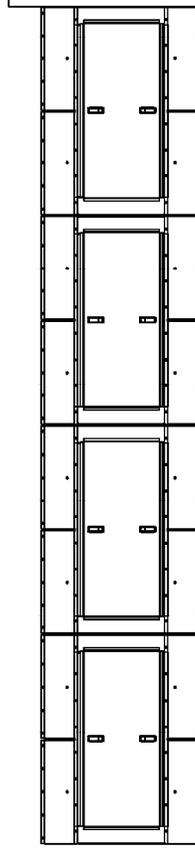
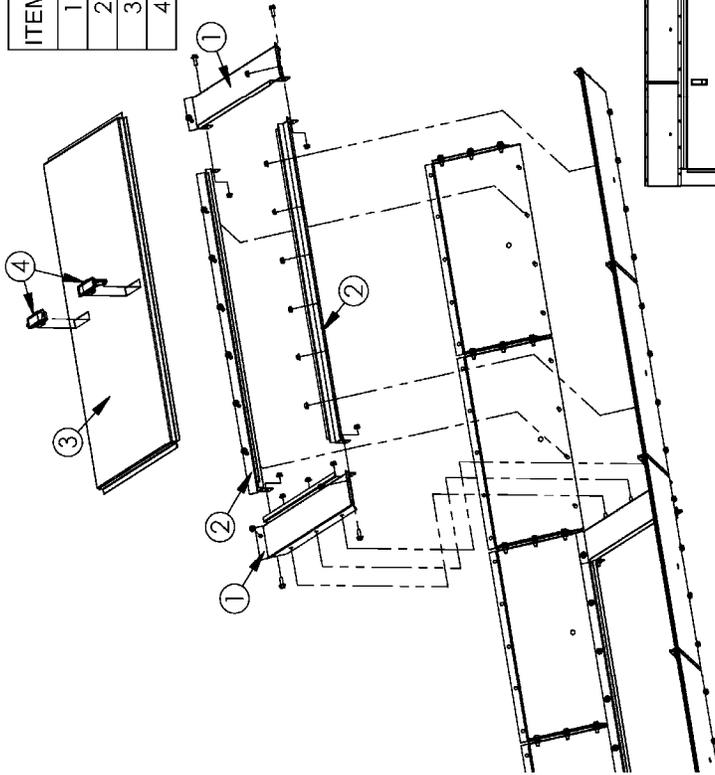


SWPD0025-DC
5/20/2009 - EAB

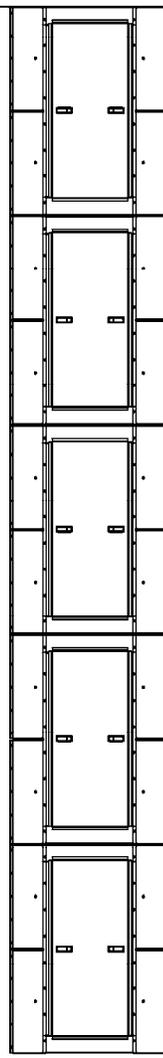
REF#	DESCRIPTION	12'		16'		20'		24'		28'	
		QTY	COMP#								
1	Side Divider	10	T16110	14	T16110	18	T16110	22	T16110	26	T16110
2	Upper Divider	10	T16111	14	T16111	18	T16111	22	T16111	26	T16111
3	Outer Top Perf Panel (Ss)	12	T16105S	16	T16105S	20	T16105S	24	T16105S	28	T16105S
	Outer Top Perf Panel (Galv)	12	T16105	16	T16105	20	T16105	24	T16105	28	T16105
	Outer Top Perf Panel (.063 Galv)	12	T17503W	16	T17503W	20	T17503W	24	T17503W	28	T17503W
4	Outside Mid Perf Panel (SS)	12	T16104S	16	T16104S	20	T16104S	24	T16104S	28	T16104S
	Outside Mid Perf Panel (Galv.)	12	T16104	16	T16104	20	T16104	24	T16104	28	T16104
	Outsd Mid Perf Panel (.063 Galv)	12	T17504W	16	T17504W	20	T17504W	24	T17504W	28	T17504W
5	Top Inner Perforated Panel	6	T16114	8	T16114	10	T16114	12	T16114	14	T16114
	Top Inner Perf Panel (.063 Galv)	6	T17414W	8	T17414W	10	T17414W	12	T17414W	14	T17414W
11	Latch	12	T17906	16	T17906	20	T17906	24	T17906	28	T17906
12	Support Latch Strap	12	T17907	16	T17907	20	T17907	24	T17907	28	T17907
13	Outer Cleanout Door	12	T17908	16	T17908	20	T17908	24	T17908	28	T17908
	Outer Cleanout Door (.063 Galv)	12	T17913W	16	T17913W	20	T17913W	24	T17913W	28	T17913W
14	Bottom Outer Perf Panel (SS)	12	T17909S	16	T17909S	20	T17909S	24	T17909S	28	T17909S
	Btm Outer Perf Panel (Galv.)	12	T17909	16	T17909	20	T17909	24	T17909	28	T17909
	Btm Outer Perf Panel (.063 Galv)	12	T17919W	16	T17919W	20	T17919W	24	T17919W	28	T17919W
15	Inner Side Perforated Panel	12	T17910	16	T17910	20	T17910	24	T17910	28	T17910
	Inner Side Perf Panel (.063 Galv)	12	T17510WAM	16	T17510WAM	20	T17510WAM	24	T17510WAM	28	T17510WAM
16	Lower Divider	10	T17924	14	T17924	18	T17924	22	T17924	28	T17924
17	Side Rail, Inner Access	24	T16219	32	T16219	40	T16219	48	T16219	56	T16219
18	Bottom Rail, Inner Access	12	T16220	16	T16220	20	T16220	24	T16220	28	T16220
19	Inner Access Door	12	T16221	16	T16221	20	T16221	24	T16221	28	T16221
	Inner Access Door (.063 Galv)	12	T16225W	16	T16225W	20	T16225W	24	T16225W	28	T16225W
20	Door Latch Bracket	12	T17657	16	T17657	20	T17657	24	T17657	28	T17657

CENTRIFUGAL DRYER INNER CLEAN OUT PANEL ASSEMBLY

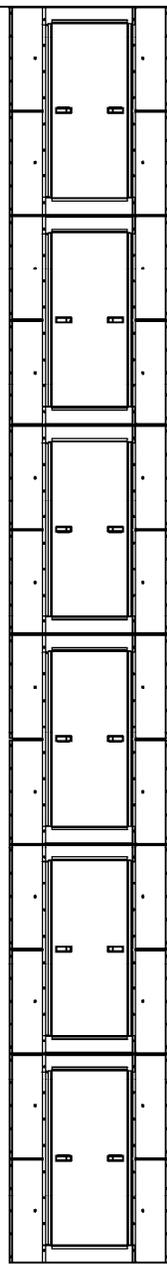
ITEM #	PART #	16' DRYER	20' DRYER	24' DRYER	DESCRIPTION
1	T17931	8	10	12	END, DOOR FRAME
2	T17932	8	10	12	DOOR FRAME SIDE
3	T17929C	4	5	6	PANEL, DOOR, 4' FOR J2308 LATCH
4	J2308	8	10	12	ADJUSTABLE LATCH, LEVER, FLUSH C2-32-35



16' DRYER



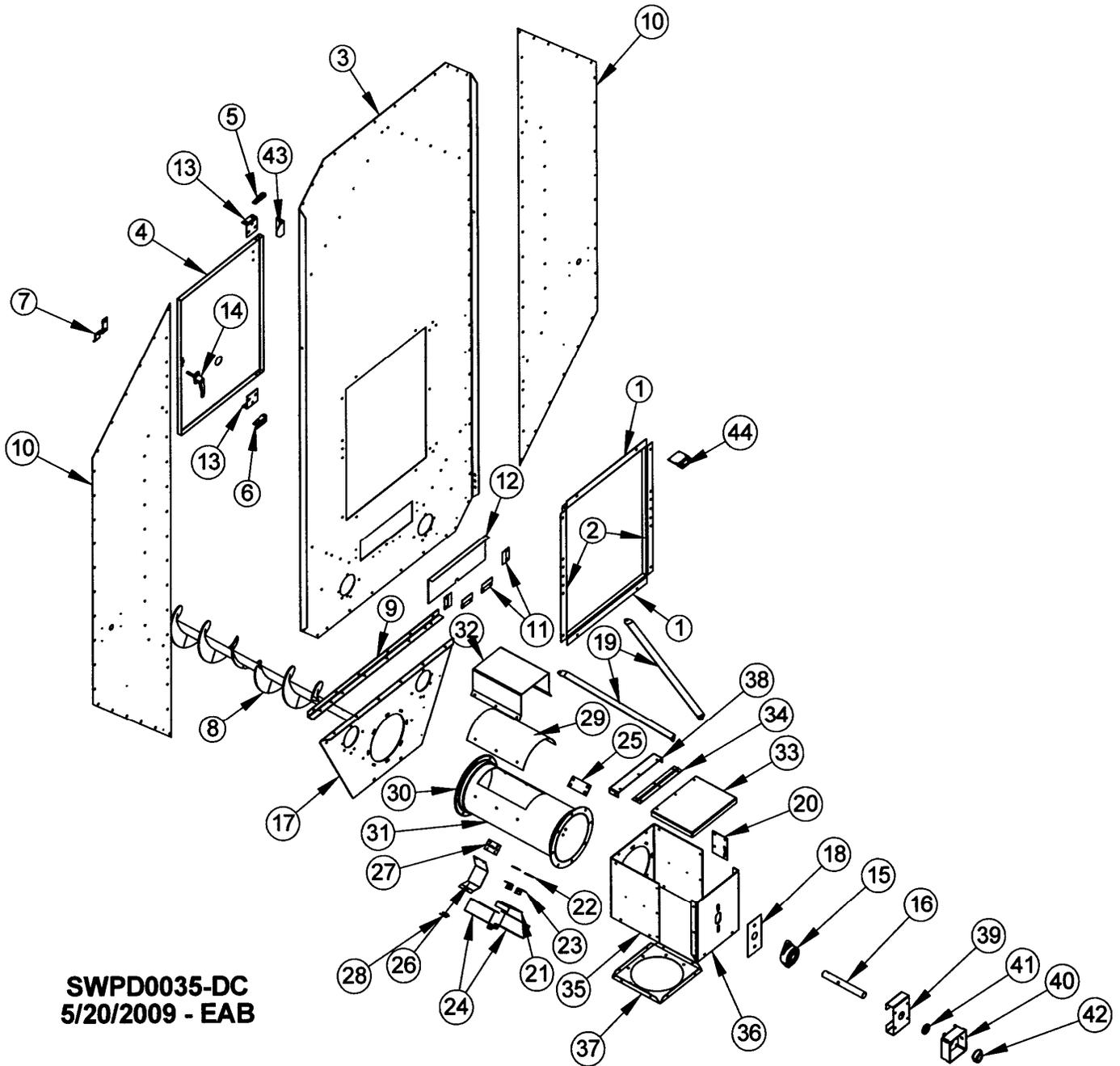
20' DRYER



24' DRYER

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BACK METERING ROLLS SINGLE FAN – BACK END

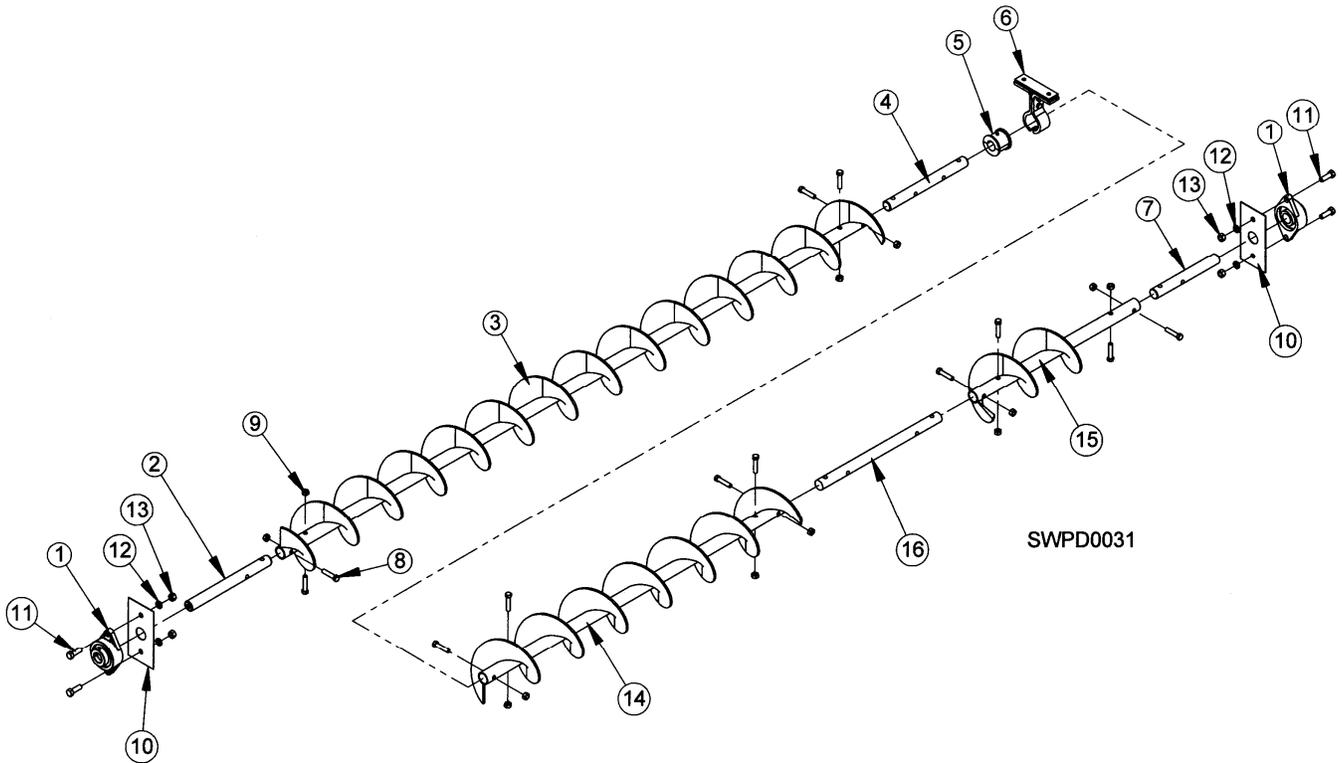


SWPD0035-DC
5/20/2009 - EAB

SINGLE FAN - BACK END

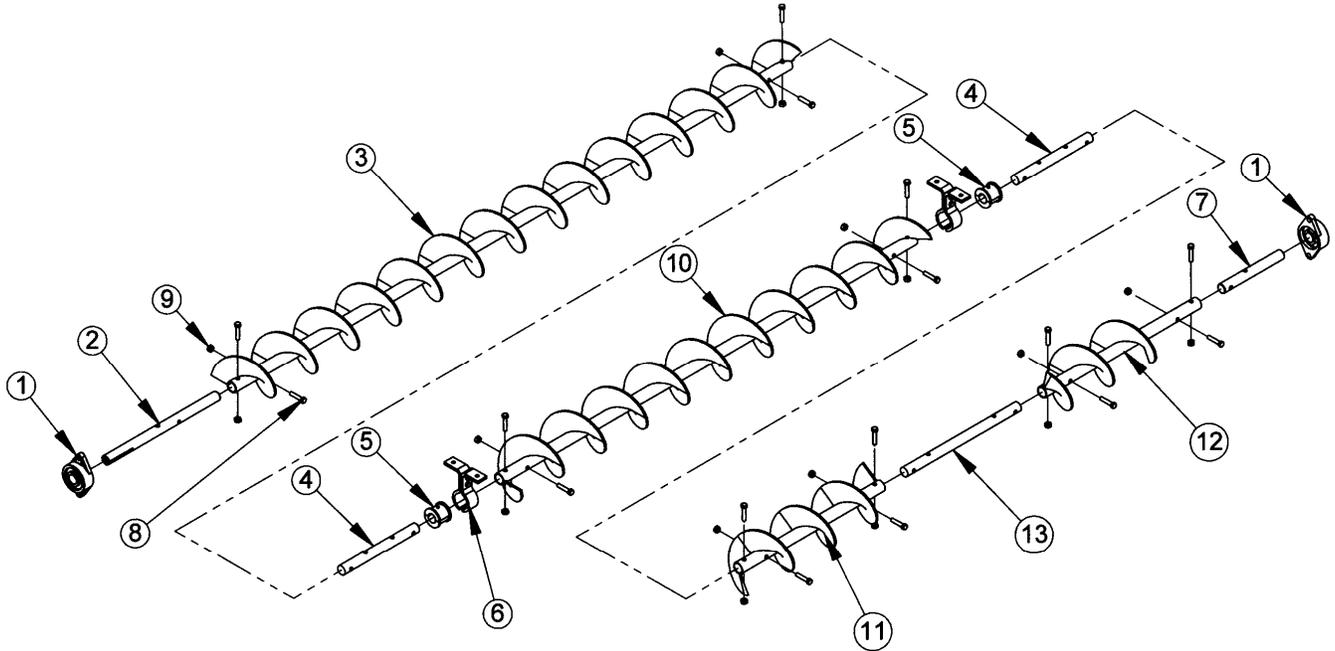
COMP. #	DESCRIPTION	QTY	COMP. #
1	Edging Top & Bottom, Door	2	T16136
2	Edging Sides, Back Door	2	T16137
3	Back End Plate	1	T17916
4	Access Door	1	T16147
5	Top Hinge, Access Door	1	T16149
6	Bottom Hinge, Access Door	1	T16150
7	Catch, Rear Access Door	1	T16151
8	Bottom Back Auger	1	T16431
9	Bottom Angle Splice	1	T17925
10	Side End Plate	2	T16101
11	Side Rail, Blowout Door	4	T16154
12	Blowout Door	1	T17658
13	Hinge Bracket	2	T16148
14	Handle, Locking, #GD303	1	J2313
15	Bearing, 1.25, Flange, W/LC, HCFTS207-20	1	J0010
16	Bottom Auger Shaft, 1, 1.25" x 10"	1	T17251
17	Back Bottom End Plate	1	T25521
18	Bearing Shim Plate	1	T25682
19	Brace for Unload Auger	2	T25681
20	Mercury Switch Plate	1	T16358
21	Gate, Sample Spout	1	T17652
22	Spacer, Sample Spout	2	T17653
23	Sample Spout Angle	2	T17651
24	Spout, Sample	2	T17655
25	Cover, Sample Spout, (Unload)	1	T17663
26	Strap, Moisture Sensor - Back	1	T17850
27	Hinge, Moisture Sensor- Back	1	T17851
28	Latch, 3-10 LL, 2-57-1625-07-00	1	J2310
29	Cover, Tube, Rear Discharge	1	T25679
30	Ring, 10" Flange	2	J6610
31	Tube, Discharge	1	T25677
32	Step, Unload Tub	1	T25678
33	Lid, Sump Box	1	T25672
34	Hinge, Sump Box	1	T25676
35	Front-Sides, Sump box	1	T25670
36	Back Plate, Sump Box	1	T25671
37	Bottom, Sump Box	1	T25674
38	Lid Hinge Side, Sump Box	1	T25675
39	Bracket, Prox. Switch, Unload Auger	1	T17252
40	Box, Prox. Switch, Unload Auger	1	T17263
41	Seal, 2" OD, 1-1/4" ID, CR #12481	1	J7023
42	Target, Prox. Switch, Unload Auger	1	T17256
43	Angle, Switch Accuation	1	T80216
44	Bracket, Switch Mounting	1	T80215

12' BOTTOM AUGER



REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	1	T16430
4	Shaft, Stub	1	F4720
5	Bushing, Wood, 1.25", I.D.	1	J0096
6	Hanger, Auger, T, 6CH2203	1	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
8	Screw, 7/16-14, 2, PLT	12	J0718
9	Nut, Lock, 7/16"-14, PLT	12	J1034
10	Bearing Shim Plate	2	T25682
11	Screw, 1/2-13, 1.5, GR 5 HHCS	4	J0730
12	Washer, Lock, 1/2, PLT	4	J1215
13	Nut, Hex, 1/2-13, PLT	4	J1040
14	Auger, Bottom, Rear, 47.50"	1	T12492
15	Auger, Bottom, Std Unld Ext	1	T12493
16	Shaft, Auger, Moisture Sensor	1	F4723

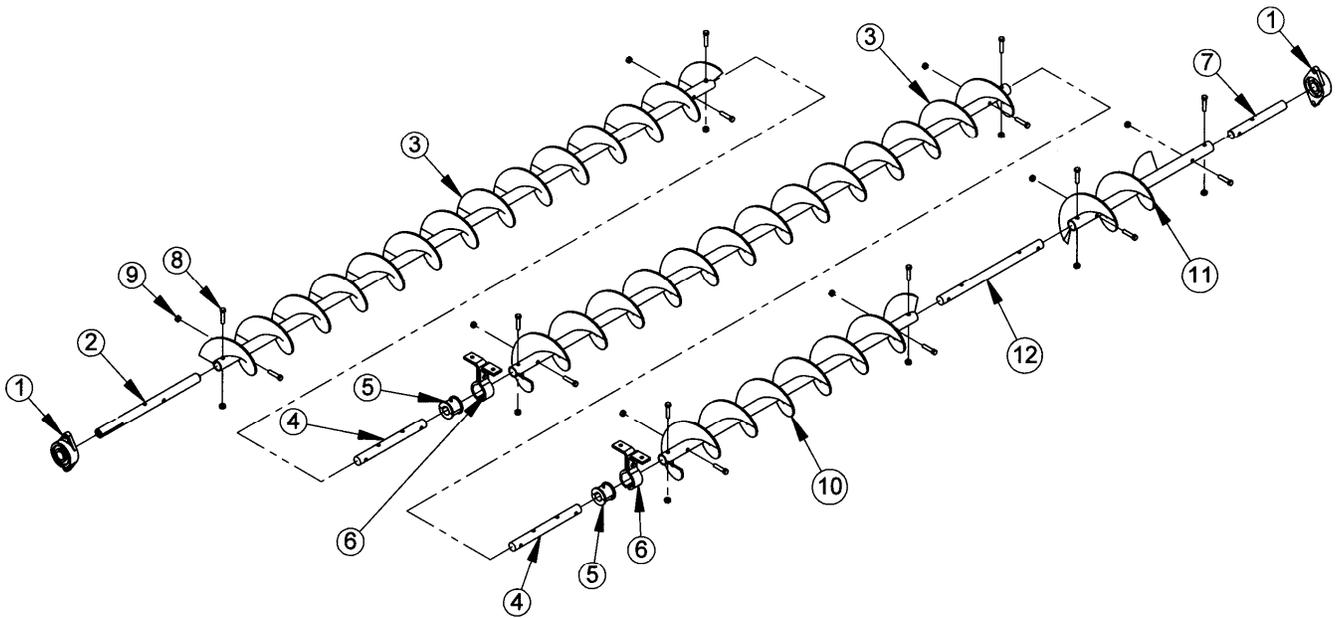
16' BOTTOM AUGER



SWPD0032

REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	1	T16430
4	Shaft, 8", Hanger Bearing	2	F4720
5	Bushing, Wood, 1.25", I.D.	2	J0096
6	Hanger, Auger, T, 6CH2203	2	J0097
7	Shaft, 1.25" x 10"	1	T17251
8	Screw, 7/16-14, 2, PLT	16	J0718
9	Nut, Lock, 7/16-14, PLT	16	J1034
10	Auger, Bottom Middle, 69-1/2"	1	T16432
11	Auger, Bottom Rear, 24"	1	T12498
12	Auger, Bottom, Std Unld Ext	1	T12493
13	Shaft, Auger, Moisture Sensor	1	F4723

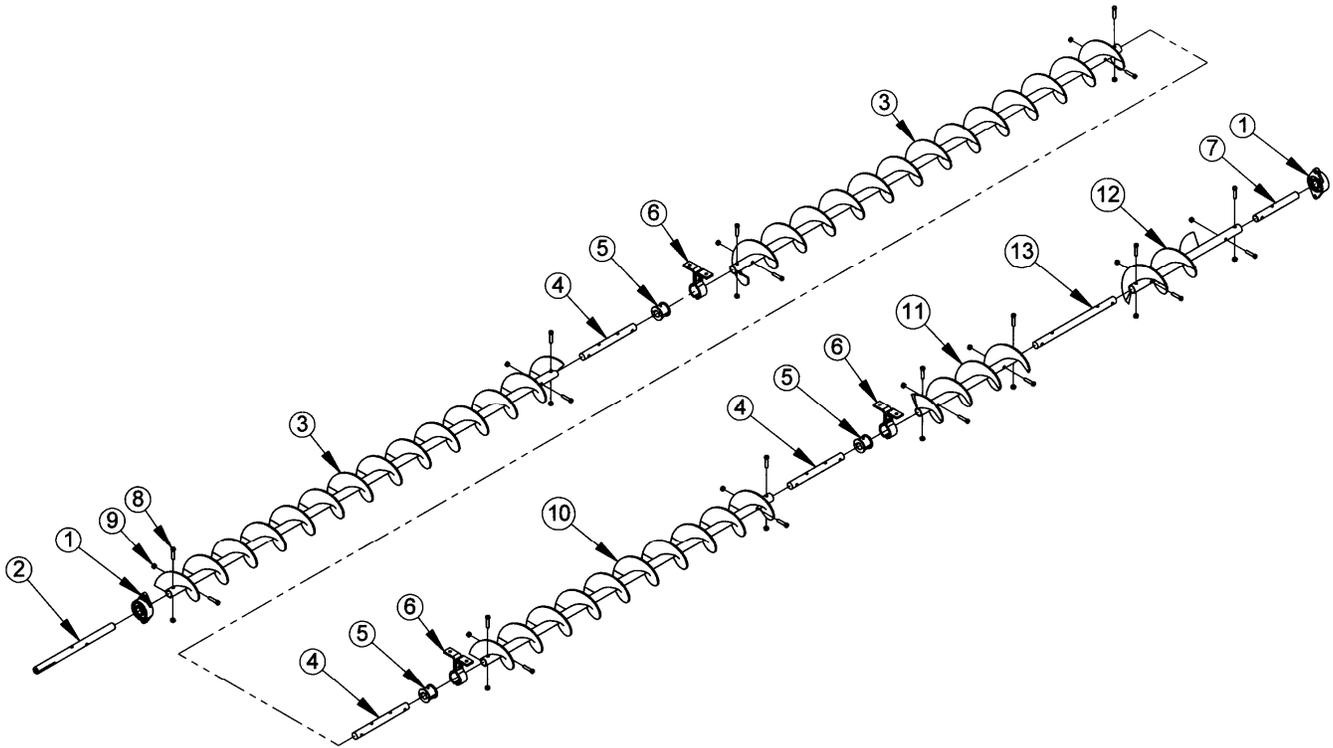
20' BOTTOM AUGER



SWPD0033

REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	2	T16430
4	Shaft, 8" Hanger Bearing	2	F4720
5	Bushing, Wood, 1.25" I.D.	2	J0096
6	Hanger, Auger, T, 6CH2203	2	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
8	Screw, 7/16-14, 2, PLT	16	J0718
9	Nut, Lock, 7/16-14, PLT	16	J1034
10	Auger, Bottom Rear, 47.50"	1	T12492
11	Auger, Bottom, Std Unld Ext	1	T12493
12	Shaft, Auger, Moisture Sensor	1	F4723

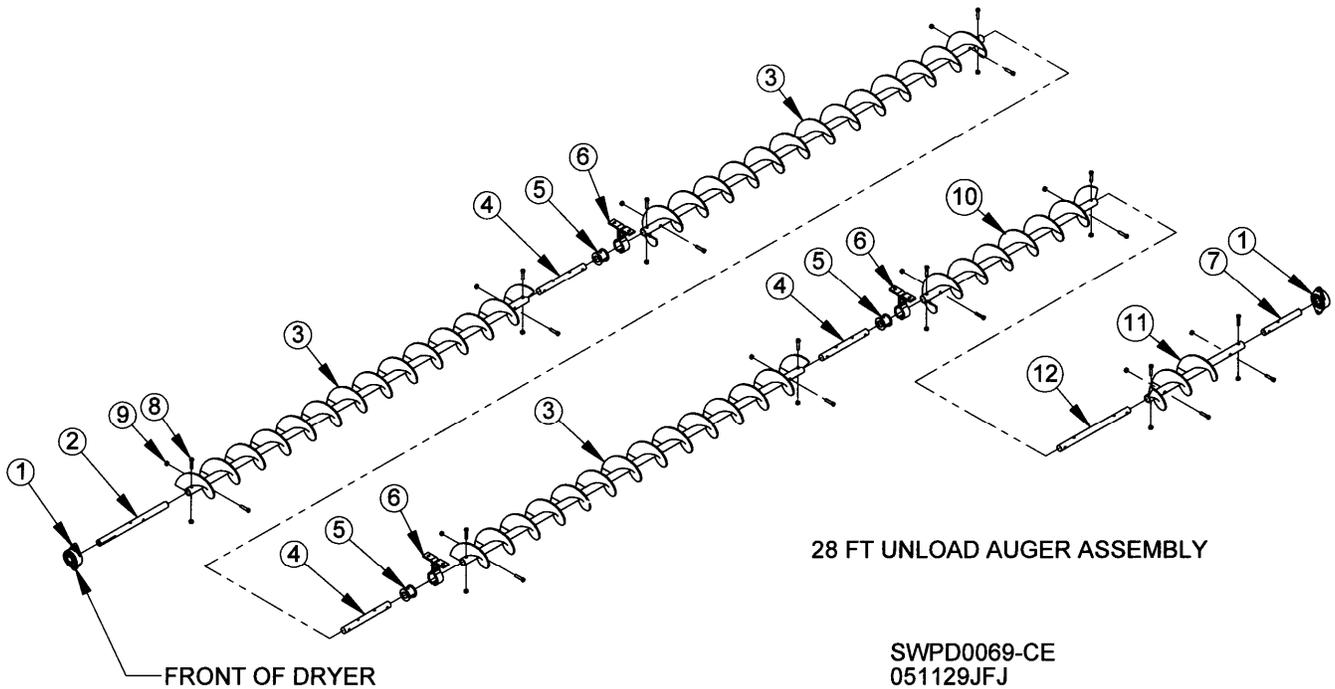
24' BOTTOM AUGER



SWPD0034

REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	2	T16430
4	Shaft, 8" Hanger Bearing	3	F4720
5	Bushing, Wood, 1.25" I.D.	3	J0096
6	Hanger Auger, T, 6CH2203	3	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
8	Screw, 7/16-14, 2, PLT	20	J0718
9	Nut, Lock, 7/16-14, PLT	20	J1034
10	Auger, Bottom Middle, 69-1/2"	1	T16432
11	Auger, Bottom Rear, 24"	1	T12498
12	Auger, Bottom, Std Unld Ext	1	T12493
13	Shaft, Auger, Moisture Sensor	1	F4723

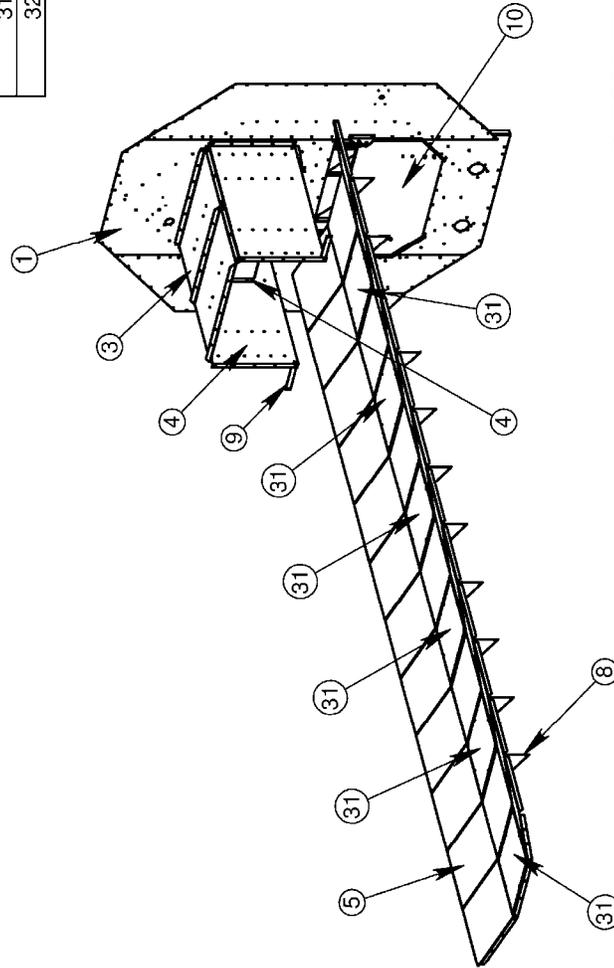
28' BOTTOM AUGER



REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	3	T16430
4	Shaft, 8" Hanger Bearing	3	F4720
5	Bushing, Wood, 1.25" I.D.	3	J0096
6	Hanger Auger, T, 6CH2203	3	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
8	Screw, 7/16-14, 2, PLT	20	J0718
9	Nut, Lock, 7/16-14, PLT	20	J1034
10	Auger, Bottom Rear, 47.50"	1	T12492
11	Auger, Bottom, Std Unld Ext	1	T12493
12	Shaft, Auger, Moisture Sensor	1	F4723

CE, DC LAYOUT

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T80150	FRONT END PLATE, CENT. FAN
2	2	T116101	SIDE END PLATE
3	2	T80151	TOP PANEL, HEATER SHIELD
4	2	T80241	PANEL, SIDE, TUNNEL EXTEN
5	6	T24600	DIVIDER, PLENUM
6	6	T80144	DIVIDER W/ CUTOUT, PLENUM
8	22	T24601	GUSSET, PLENUM DIVIDER
9	2	T80240	BRKT. EXTENSION TO PERF
10	1	T43941	BAFFLE PANEL
31	6	T80260	COVER, PLENUM DIVIDER, FLAT
32	1	T80258	STAGNATOR 14IN, CFD, CENT DC



DXF CREATED:

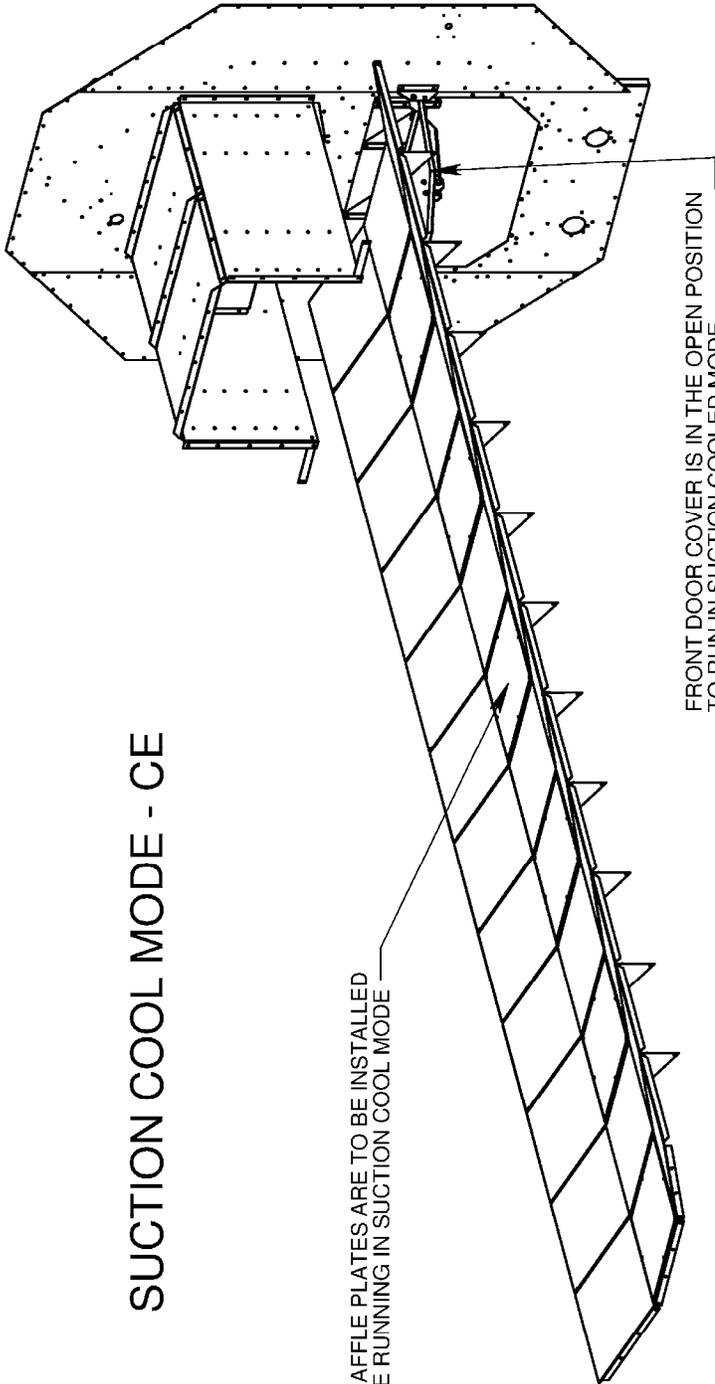
TOLERANCE UNLESS SPECIFIED
 .X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ANGLE = ± 1°

SUKUP MFG. CO.
Sukup
 SUKUP PARKWAY
 SHEFFIELD, IA. 50475

DRAWN BY	JFJ	RAW MATL. NO.	-----	PART NO.	T115713C
DATE	4/15/2008	MATERIAL	-----	WEIGHT	
USED IN ASSY OF	CONT FLOW DRYER	DESCRIPTION	PANEL, FRONT, FAN SUPT, SUCT COOL DRYER	SHEET:	4 OF 6

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SUCTION COOL MODE - CE



ALL BAFFLE PLATES ARE TO BE INSTALLED WHILE RUNNING IN SUCTION COOL MODE

FRONT DOOR COVER IS IN THE OPEN POSITION TO RUN IN SUCTION COOLED MODE

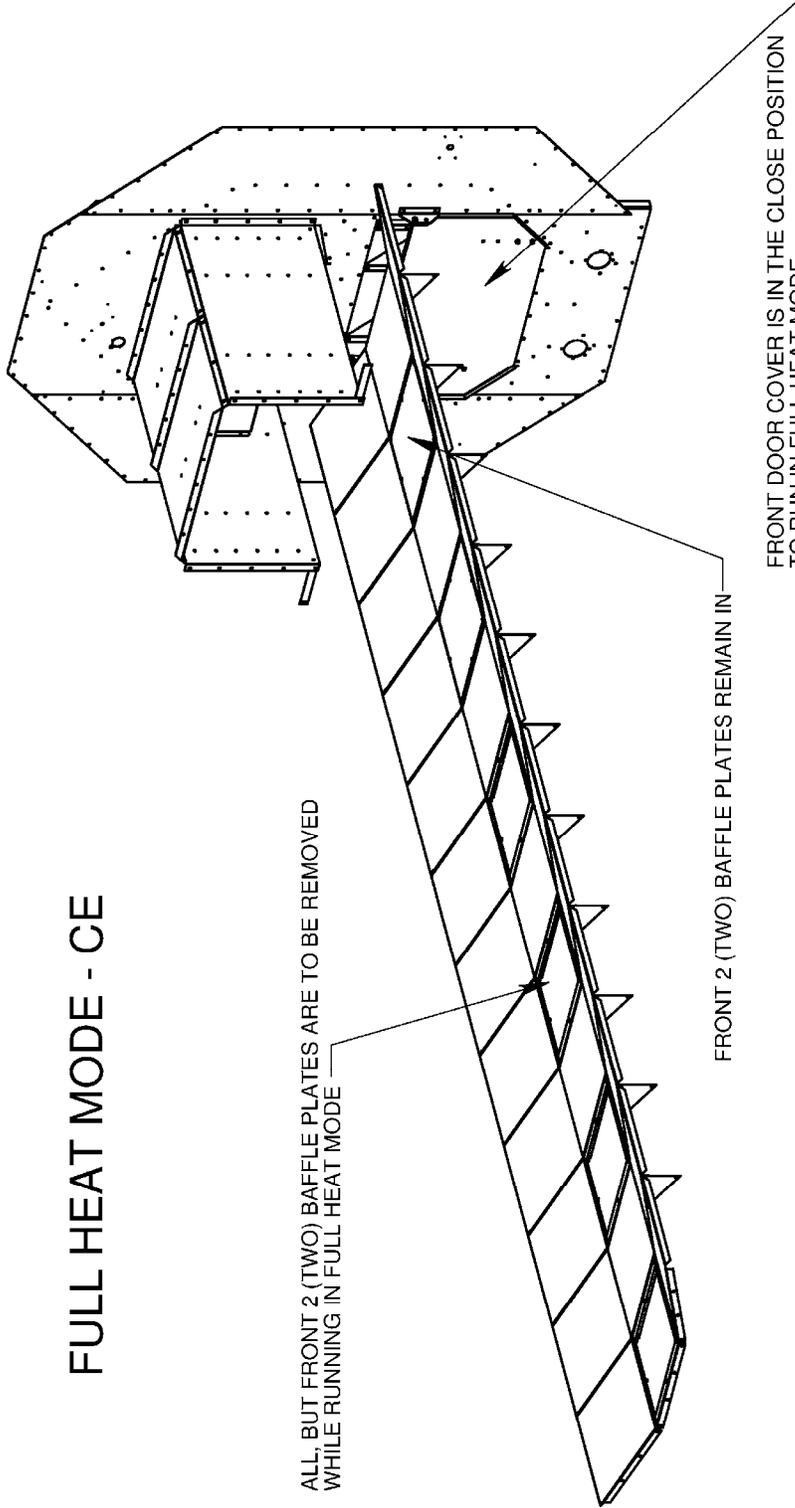
DXF CREATED:

TOLERANCE UNLESS SPECIFIED
 .X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ∠ = ± 1°

<p>SUKUP MFG. CO. SUKUP PARKWAY SHEFFIELD, IA. 50475</p>	
DRAWN BY: JFJ	PART NO. T15713C
DATE 4/15/2008	MATERIAL
USED IN ASSY OF: CONT FLOW DRYER	
DESCRIPTION: PANEL, FRONT, FAN SUPT, SUCT COOL DRYER	
SHEET: 6 OF 6	

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FULL HEAT MODE - CE



DXF CREATED:

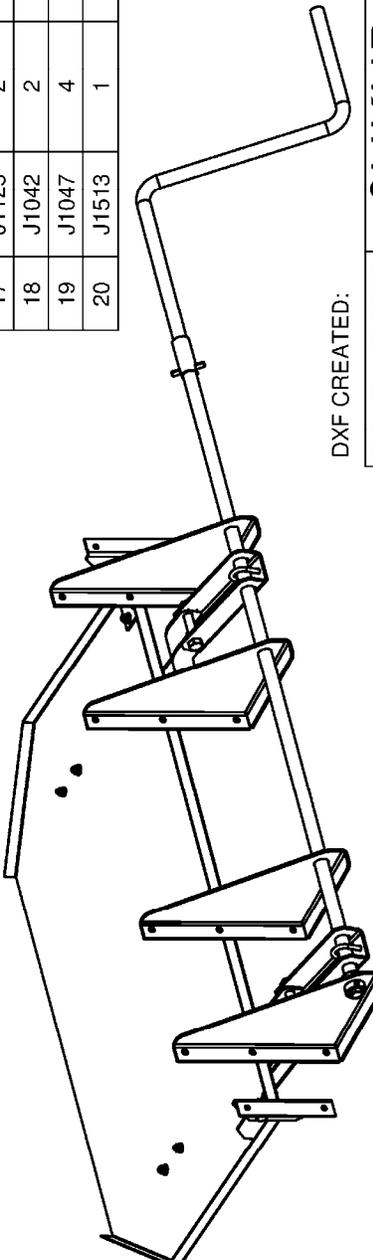
TOLERANCE UNLESS SPECIFIED
 X = ± .050
 XX = ± .010
 XXX = ± .005
 FRAC = ± 1/32
 ∠ = ± 1°

 SUKUP MFG. CO. SUKUP PARKWAY SHEFFIELD, IA. 50475	
DRAWN BY: JFJ	PART NO. T15713C
DATE: 4/15/2008	MATERIAL: -----
USED IN ASSY OF: CONT FLOW DRYER	
DESCRIPTION: PANEL, FRONT, FAN SUPT., SUCT COOL DRYER	
SHEET: 5 OF 6	

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ITEM NO.	PART NUMBER	EXPLODED VW/QT.	DESCRIPTION
1	T43941	1	BAFFLE PANEL
2	T43942	1	HINGE BAFFLE PANEL, RIGHT
3	T43943	1	HINGE BAFFLE PANEL, LEFT
4	T43944	2	HINGE, FRONT END PLATE
5	T43945	2	LINKAGE BRACKET, PANEL
6	T43946	2	LINKAGE ARM SHORT
7	T43947	2	LINKAGE ARM LONG
8	T43948	4	PIVOT BRACKET
9	T43949	1	PIVOT ROD
10	T43952	1	PIVOT HANDLE WELDMENT
11	J0810	2	U-BOLT, 5/16-18, 1 1/16"ID 1.75D
12	J0795	4	SCREW 5/8-11 X 3 1/2
13	J1335	2	1" SHAFT COLLAR
14	J0605	8	SCREW, 3/8-16, 3/4, PLT
15	J1017	8	NUT, 3/8-16 FLANGE WHIZLOK
16	J0728	2	SCREW, 1/2-13, 1.25, PLT
17	J1125	2	WASHER, FLAT, 1/2
18	J1042	2	NUT, 1/2-13, PLT, GR8, LOCK
19	J1047	4	NUT, 5/8 - 11 TOP LOCK
20	J1513	1	ROLL PIN, 3/8 X 2 1/2"



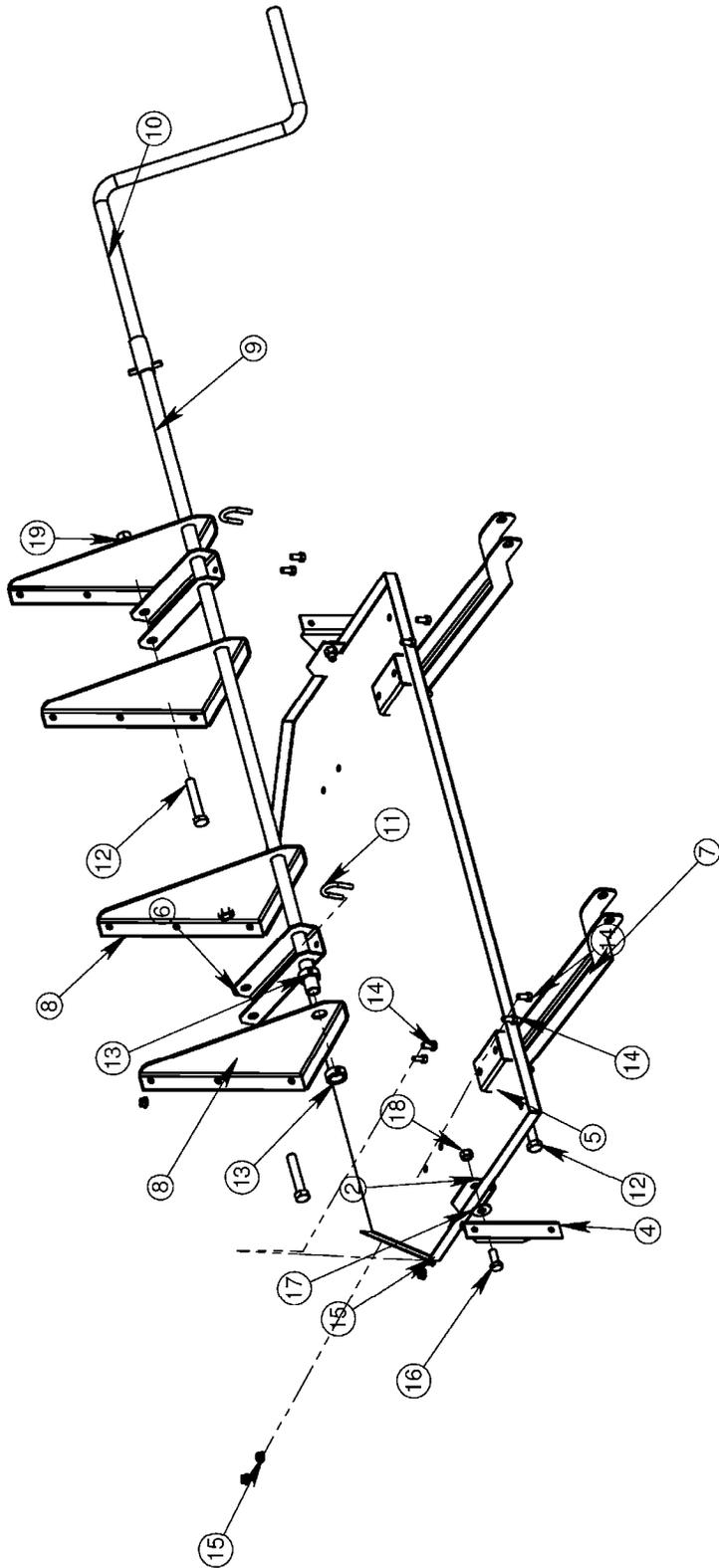
DXF CREATED:

TOLERANCE UNLESS SPECIFIED
.X = ± .050
.XX = ± .010
.XXX = ± .005
FRAC = ± 1/32
ANGLE = ± 1°

SUKUP MFG. CO.
Sukup
SUKUP PARKWAY
SHEFFIELD, IA. 50475

DRAWN BY	KGJ	RAW MAT'L NO.	PART NO. T43940
DATE	10/30/2009	MATERIAL	
USED IN ASS'Y OF:	AIR BAFFLE, CENTRIFUGAL DRYER	WEIGHT	82.76
DESCRIPTION	AIR BAFFLE ASSEMBLY		SHEET: 1 OF 2

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DXF CREATED:

TOLERANCE UNLESS SPECIFIED
 X = ± .050
 .XX = ± .010
 .XXX = ± .005
 FRAC = ± 1/32
 ∠ = ± 1°

DRAWN BY: KGJ

RAW MAT'L NO. PART NO. T43940

DATE: 10/30/2009

MATERIAL:

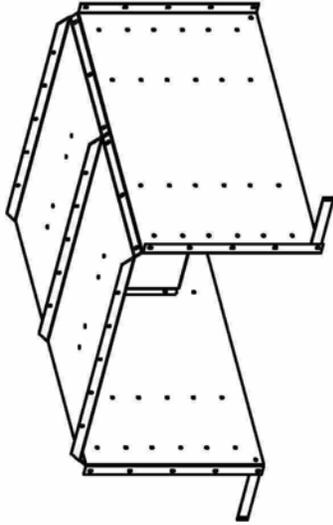
USED IN ASSEMBLY OF: AIR BAFFLE, CENTRIFUGAL DRYER WEIGHT: 82.76

DESCRIPTION: AIR BAFFLE ASSEMBLY SHEET: 2 OF 2

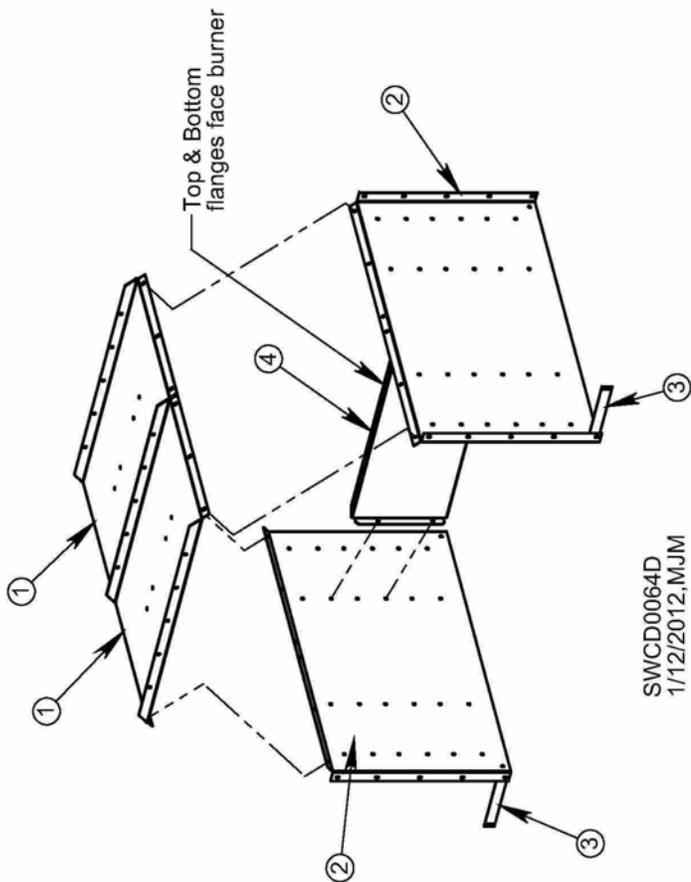
REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			

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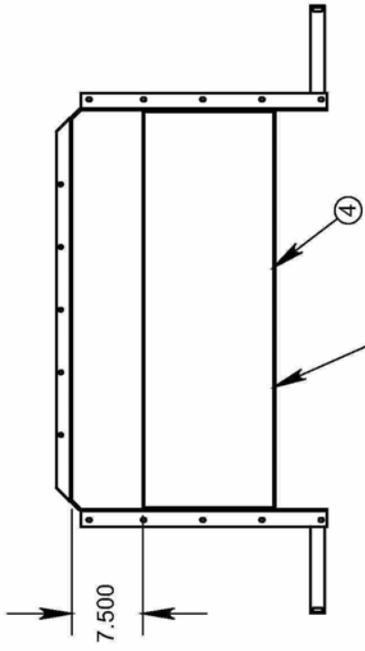
INNER PLENUM DUCTWORK, CE, DC



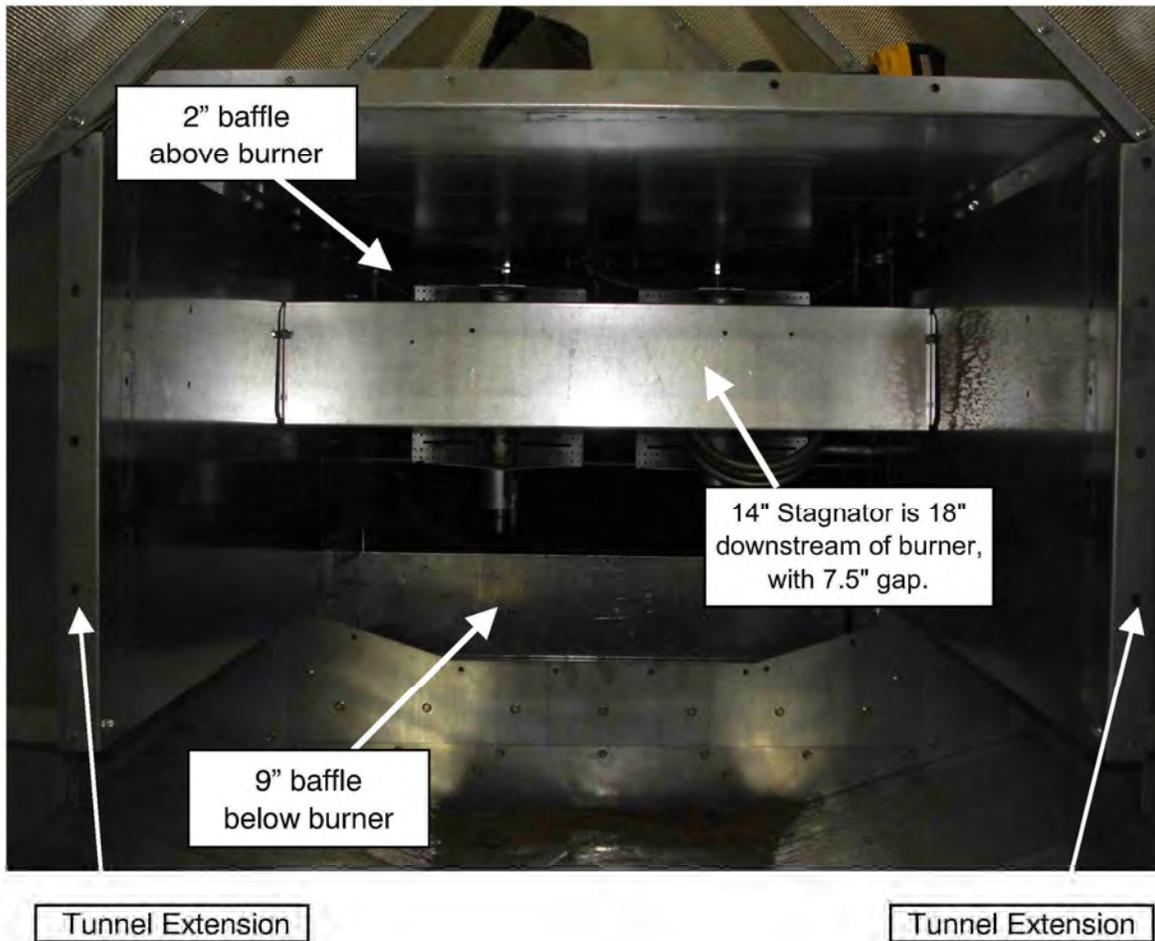
ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80151	TOP PANEL, HEATER SHIELD
2	2	T80241	PANEL, SIDE, TUNNEL EXTEN
3	2	T80240	BRKT. EXTENSION TO PERF
4	1	T80258	STAGNATOR 14IN., CFD., CENT DC



SWCD0064D
1/12/2012, MJM

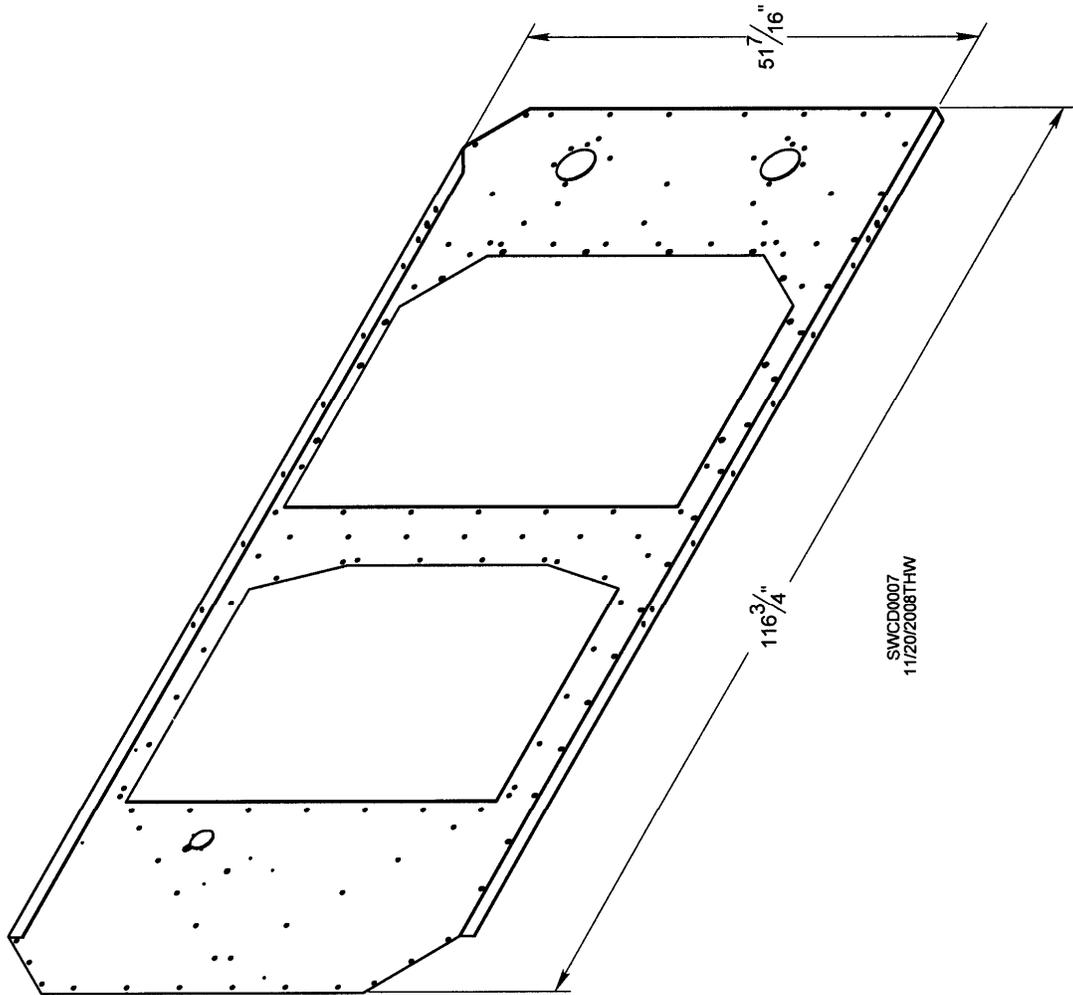


NOTCH IN T80258 IS ON BOTTOM SIDE WHEN INSTALLED PROPERLY

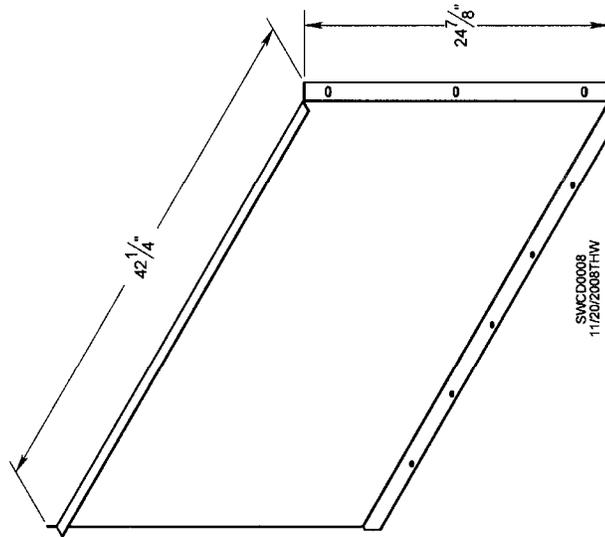


Pictured here are baffle and stagnator configurations for the Dancorn heater in Continuous Flow Dryers with centrifugal fans. The 9" baffle is placed in bottom of heater box directly below orifices of burner. The 2" baffle is located at top of heater box, above orifices of burner. The 14" stagnator is placed 18" downstream of burner in the tunnel extension, with a 7.5" gap between it and roof of the tunnel extension.

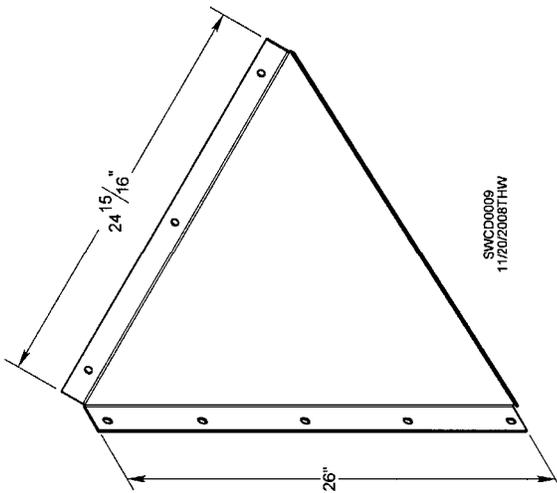
T80150 FRONT END PLATE



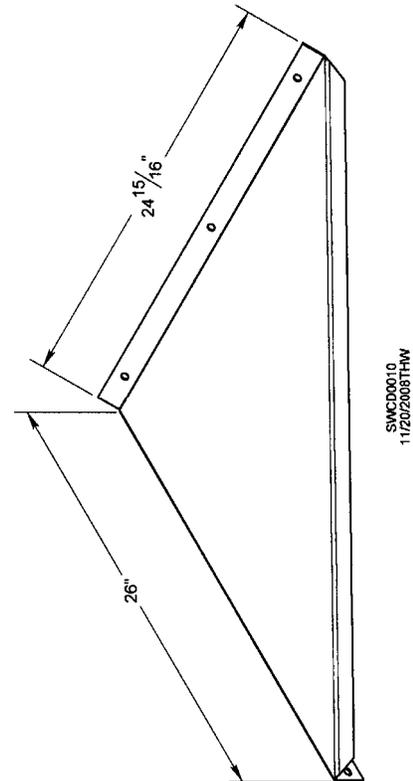
T80151 TOP PANEL, HEATER SHIELD



T80152 LEFT PANEL, HEATER SHIELD

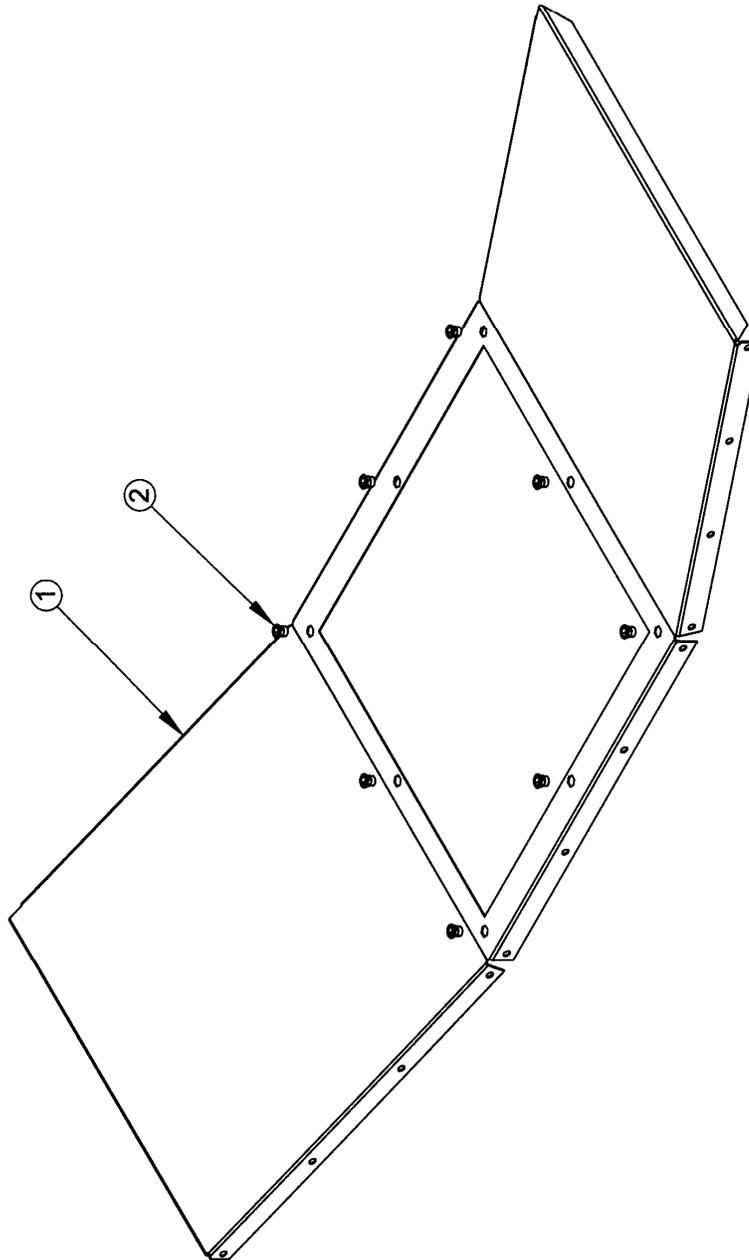


T80153 RIGHT PANEL, HEATER SHIELD

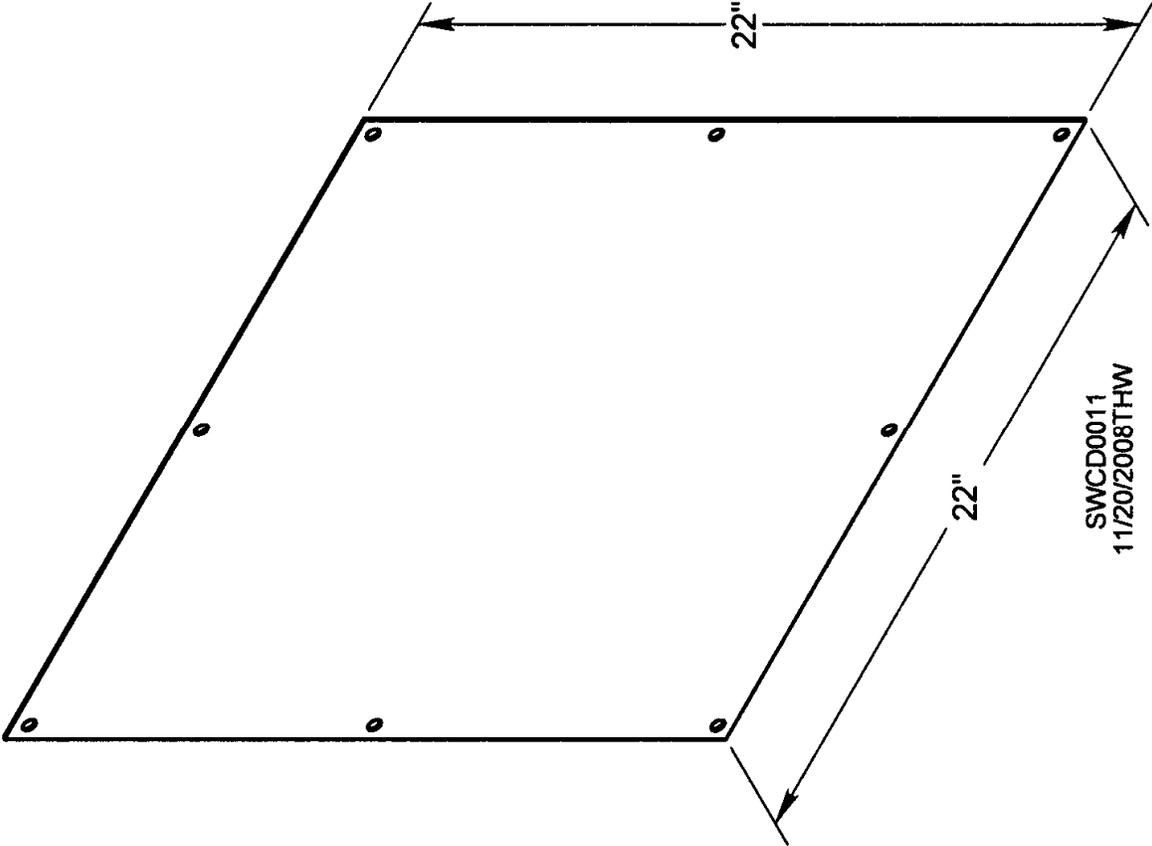


T80144AM DIVIDER WITH HOLE ASSEMBLY

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T80144	DIVIDER W/ CUTOUT, PLENUM
2	8	J1007	NUT, RIVET, 5/16"-18

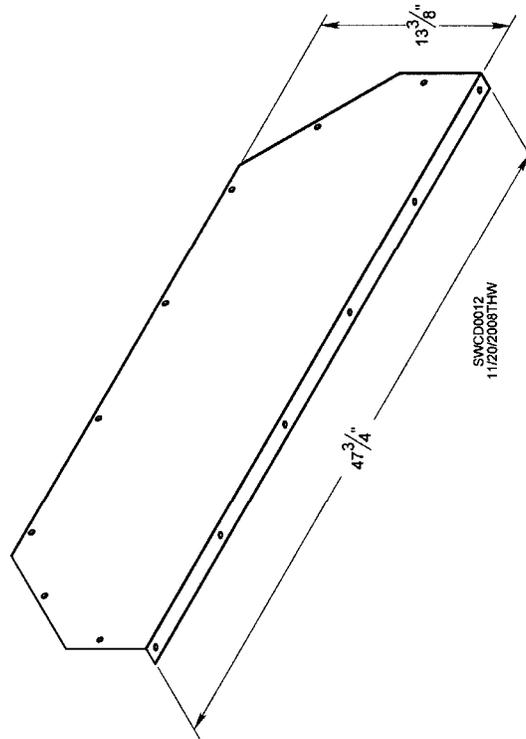


T80145 COVER, PLENUM DIVIDER W/CUTOUT

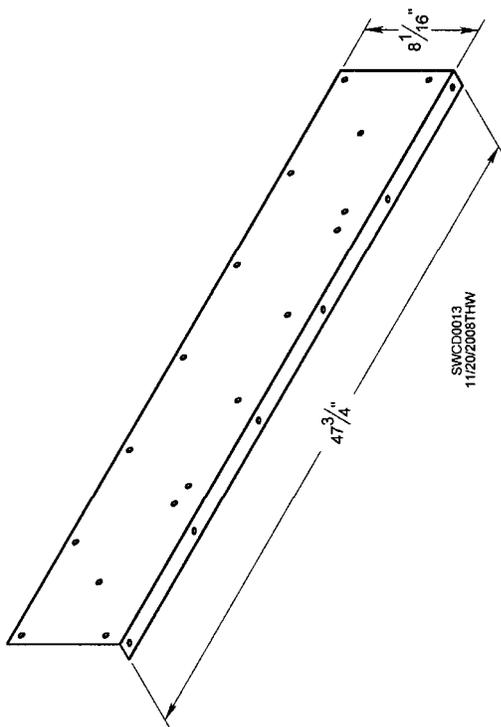


SWCD0011
11/20/2008THW

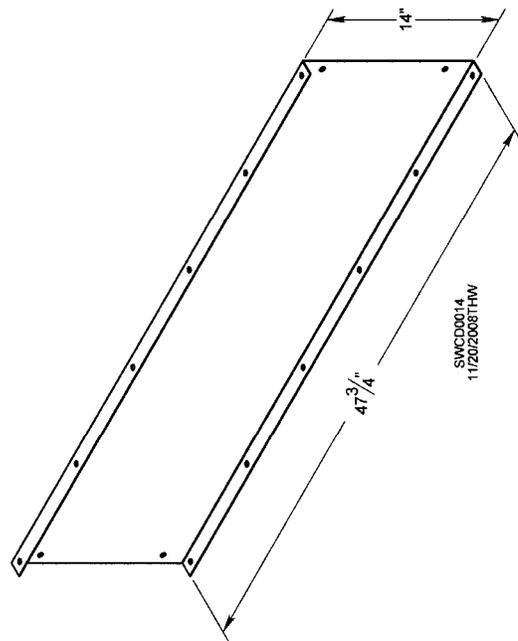
T80127 LOWER SEAL PLATE



T80128 UPPER SEAL PLATE

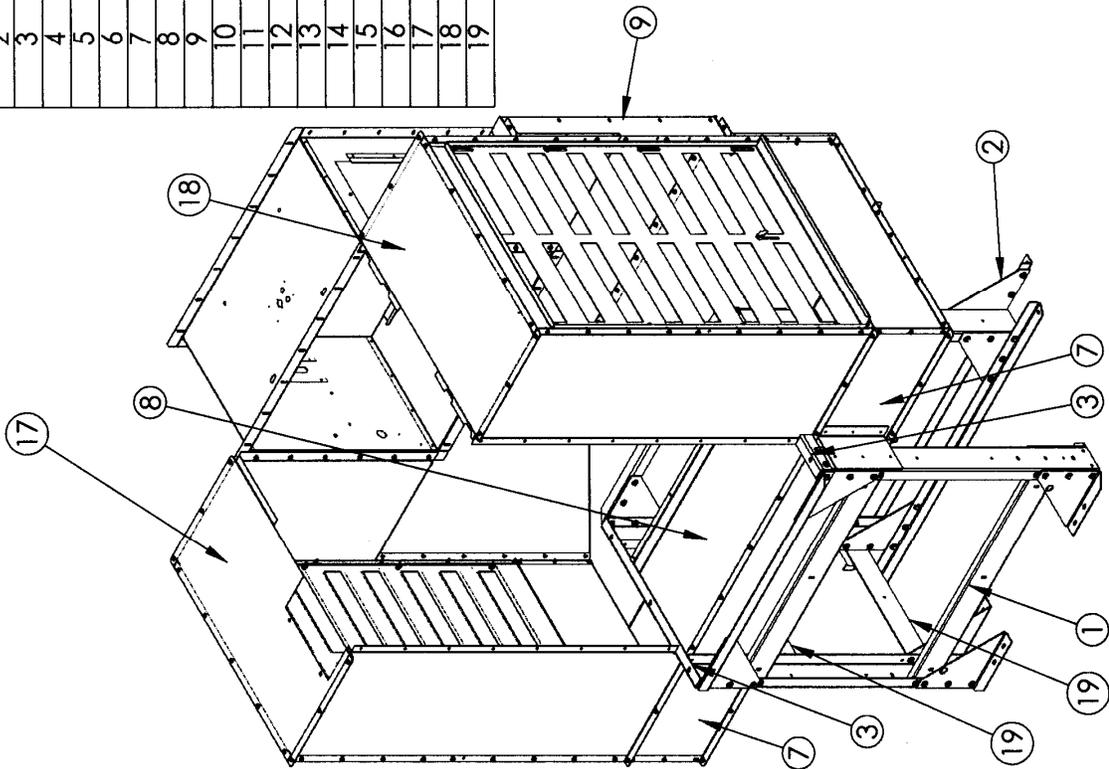


T80129 MIDDLE SEAL PLATE



T15743C DRYER FRONT FAN SUPPORT

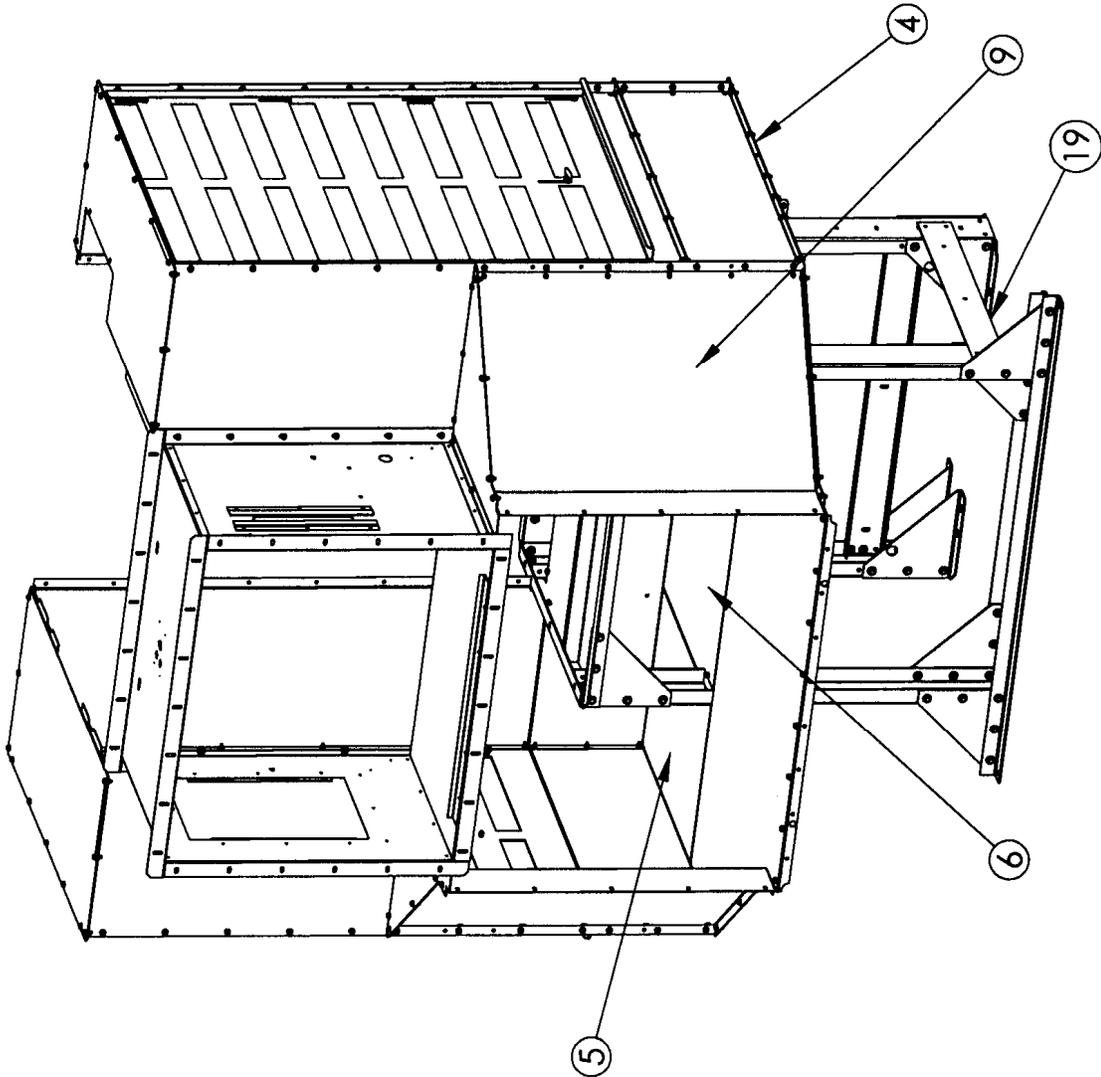
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80160	FRAME HEATER SUPPORT, BACK	1
2	T80161	FRAME HEATER SUPPORT, FRONT	1
3	T80139	HOZT SIDE, BLOWER MOUNT FRAME	2
4	T801052	LOWER PANEL ASSY, RH	1
5	T80105	LOWER PANEL ASSY, LH	1
6	T80123	BOTTOM CENTER PANEL, BLOWER DUCT	1
7	T80115	FRONT PANEL, BLOWER INTAKE DUCT	1
8	T80116	UPPER MID PANEL, BLOWER INTAKE DUCT	1
9	T80164	DUCTWORK, SUCT COOL DRYER CONNECTION	1
10	J0606	SCREW, 3/8 - 16, 1, PLT	8
11	J1025	NUT, HEX, 3/8-16, PLT LOCK	8
12	J1117	WASHER, FLAT, 3/8, PLT	16
13	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	106
14	J1110	NUT, WHIZ, 5/16-13	106
15	T80166	MOUNTING PLATE, HEATER CONTROL BOX	2
16	T80200	BRACKET, DRYER DUCTWORK FRONT SUPPORT	2
17	T80163	INTAKE PLENUM, RH	1
18	T80162	INTAKE PLENUM, LH	1
19	T80219	MOUNTING PLATE, MANUAL CONTROL BOX	2



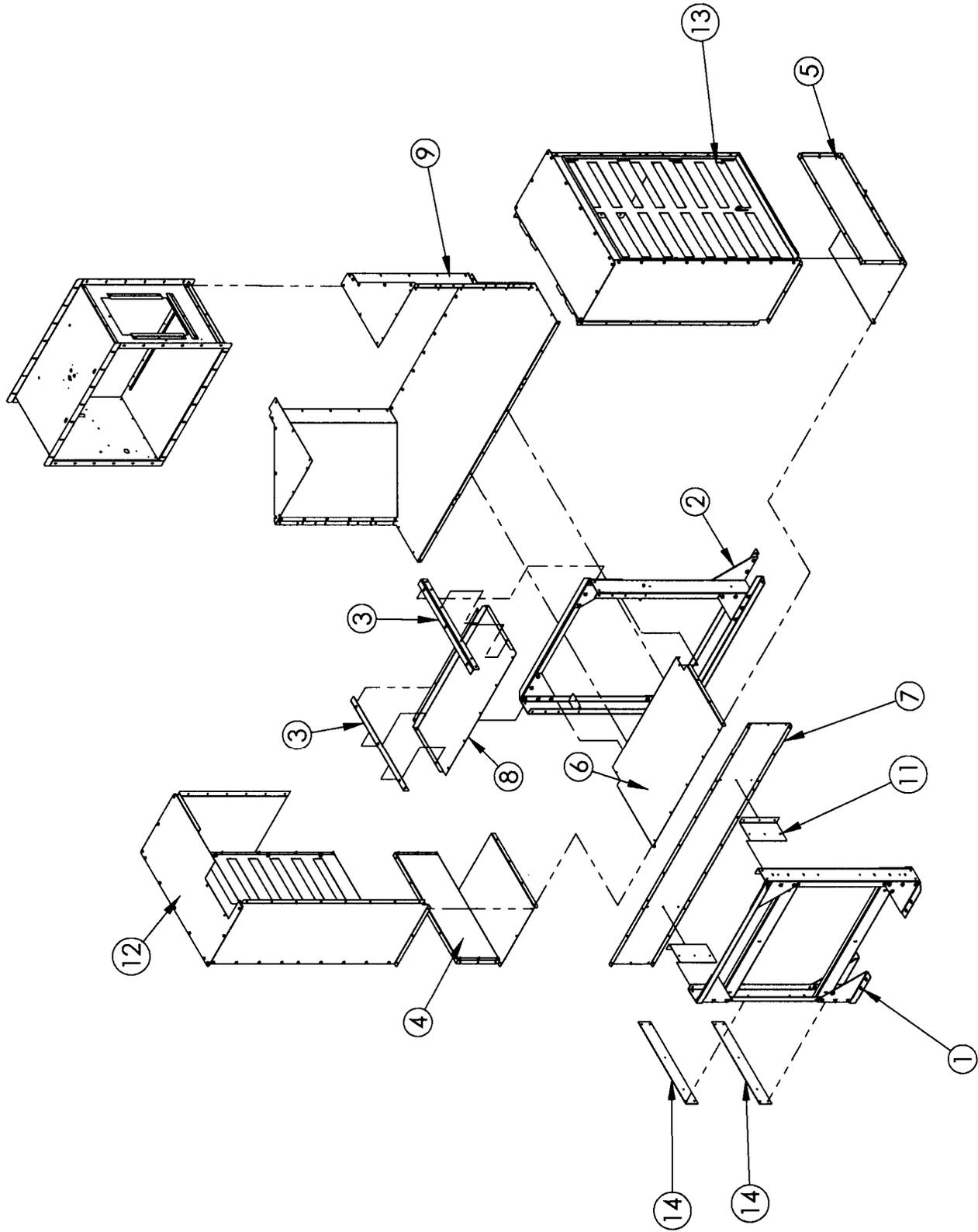
T15743C DRYER FRONT FAN SUPPORT

ITEM NO.	PART NO.	DESCRIPTION	QTY.	ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80160	FRAME HEATER SUPPORT, BACK	1	12	J1117	WASHER,FLAT,3/8,PLT	16
	T80137	FRONT LEG, BLOWER MOUNT FRAME	2	13	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	106
	T80155	LF BRACKET,FRONT LEGS, BLOWER MNT FRM	2	14	J1110	NUT,WHIZ,5/16-13	106
	T80135	CHANNEL, POWER BOX MOUNT	2	15	T80166	MOUNTING PLATE, HEATER CONTROL BOX	2
	T80138	GUSSET PLATE, BLOWER MOUNT FRAME	2	16	T80200	BRACKET, DRYER DUCTWORK FRONT SUPPORT	2
	T80140	HOZT BASE 1, BLOWER MOUNT FRAME	1	17	T80163	INTAKE PLENUM, RH	1
	T80156	RT BRACKET,FRONT LEGS, BLOWER MNT FRM	2	T80101	AIR PANEL, STATIONARY ASSEM	1	
	J0616	SCREW,3/8-16,1.25",PLT	26	T80102	AIR PANEL, STATIONARY	1	
	J1117	WASHER,FLAT,3/8,PLT	52	T80103	END FLANGE, AIR PANEL	2	
	J1025	NUT,HEX,3/8-16,PLT LOCK	26	J0892	1/4" X 5/8" HUCKBOLT	12	
2	T80161	FRAME HEATER SUPPORT, FRONT	1	J0893	SLEEVE, HUCKBOLT, 1/4"	12	
	T80136	REAR LEG, BLOWER MOUNT FRAME	2	T80110	RT SIDE PANEL, BLOWER INTAKE DUCT	1	
	T80138	GUSSET PLATE, BLOWER MOUNT FRAME	6	T80117	RT TOP PANEL, BLOWER INTAKE DUCT	1	
	T80126	CLIP, CENTER BOTTM PANEL, BLOWER DUCT	2	T80109	RT FRONT SIDE PANEL, BLOWER INTAKE DUCT	1	
	T80141	HOZT BASE 2, BLOWER MOUNT FRAME	1	J1007	NUT,RVET,5/16"-18	9	
	T80142	HOZT BASE 3, BLOWER MOUNT FRAME	1	14167	KNOB,PLASTIC, 5/16-18 X 3/4"	1	
	J0616	SCREW,3/8-16,1.25",PLT	20	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	25	
	J1025	NUT,HEX,3/8-16,PLT LOCK	30	J1110	NUT,WHIZ,5/16-13	25	
	J1117	WASHER,FLAT,3/8,PLT	60	T80204	AIR PANEL ASSEMBLY, ADJUSTABLE	1	
	J0606	SCREW, 3/8-16,1,PLT	10	T80104	AIR PANEL, ADJUSTABLE	1	
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	2	J70955	VINYL EDGE GUARD 13/32X35/64	1	
	J1110	NUT,WHIZ,5/16-13	2	J1111	WASHER,FLAT,5/16	16	
	T80140	HOZT BASE 1, BLOWER MOUNT FRAME	1	J0550	SCREW,5/16-18,1.25,PLT,GR5	8	
3	T80139	HOZT SIDE, BLOWER MOUNT FRAME	2	J1010	NUT, LOCK, 5/16-18, PLT	8	
4	T801052	LOWER PANEL ASSY, RH	1	18	T80162	INTAKE PLENUM, LH	1
	T80107	END FLANGE	2	T80101	AIR PANEL, STATIONARY ASSEM	1	
	T80106	LOWER PANNEL	1	T80102	AIR PANEL, STATIONARY	1	
	J0892	1/4" X 5/8" HUCKBOLT	6	T80103	END FLANGE, AIR PANEL	2	
	J0893	SLEEVE, HUCKBOLT, 1/4"	6	J0892	1/4" X 5/8" HUCKBOLT	12	
	T80124	BOTTOM LEFT PANEL, BLOWER DUCT	1	J0893	SLEEVE, HUCKBOLT, 1/4"	12	
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	4	T80204	AIR PANEL ASSEMBLY, ADJUSTABLE	1	
	J1110	NUT,WHIZ,5/16-13	4	T80104	AIR PANEL, ADJUSTABLE	1	
5	T80105	LOWER PANEL ASSY, LH	1	J70955	VINYL EDGE GUARD 13/32X35/64	1	
	T80107	END FLANGE	2	T80119	LT SIDE PANEL, BLOWER INTAKE DUCT	1	
	T80106	LOWER PANNEL	1	T80118	LF FRONT PANEL, BLOWER INTAKE DUCT	1	
	J0892	1/4" X 5/8" HUCKBOLT	6	T80120	LT TOP PANEL, BLOWER INTAKE DUCT	1	
	J0893	SLEEVE, HUCKBOLT, 1/4"	6	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	25	
	T80125	BOTTOM RIGHT PANEL, BLOWER DUCT	1	J1110	NUT,WHIZ,5/16-13	25	
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	4	J1007	NUT,RVET,5/16"-18	9	
	J1110	NUT,WHIZ,5/16-13	4	J0550	SCREW,5/16-18,1.25,PLT,GR5	8	
6	T80123	BOITOM CENTER PANEL, BLOWER DUCT	1	J4167	KNOB,PLASTIC, 5/16-18 X 3/4"	1	
7	T80115	FRONT PANEL, BLOWER INTAKE DUCT	1	J1111	WASHER,FLAT,5/16	16	
8	T80116	UPPER MID PANEL, BLOWER INTAKE DUCT	1	J1010	NUT, LOCK, 5/16-18, PLT	8	
9	T80164	DUCTWORK, SUCT COOL DRYER CONNECTION	1	19	T80219	MOUNTING PLATE, MANUAL CONTROL BOX	2
	T80111	TRANSITION TOP PANEL	2				
	T80121	BOTTOM ANGLE, BLOWER TRANS-END,PLT	1				
	T80122	BOTTOM PANEL, BLOWER TRANSITION	1				
	T80112	TRANSITION SIDE PANEL	2				
	T80113	PANEL, TRANSITION SIDE PANEL	1				
	T80114	END FLANGE, TRANSITION SIDE PANEL	1				
	J0892	1/4" X 5/8" HUCKBOLT	6				
	J0893	SLEEVE, HUCKBOLT, 1/4"	6				
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	24				
	J1110	NUT,WHIZ,5/16-13	24				
10	J0606	SCREW, 3/8-16,1,PLT	8				
11	J1025	NUT,HEX,3/8-16,PLT LOCK	8				

T15743C DRYER FRONT FAN SUPPORT

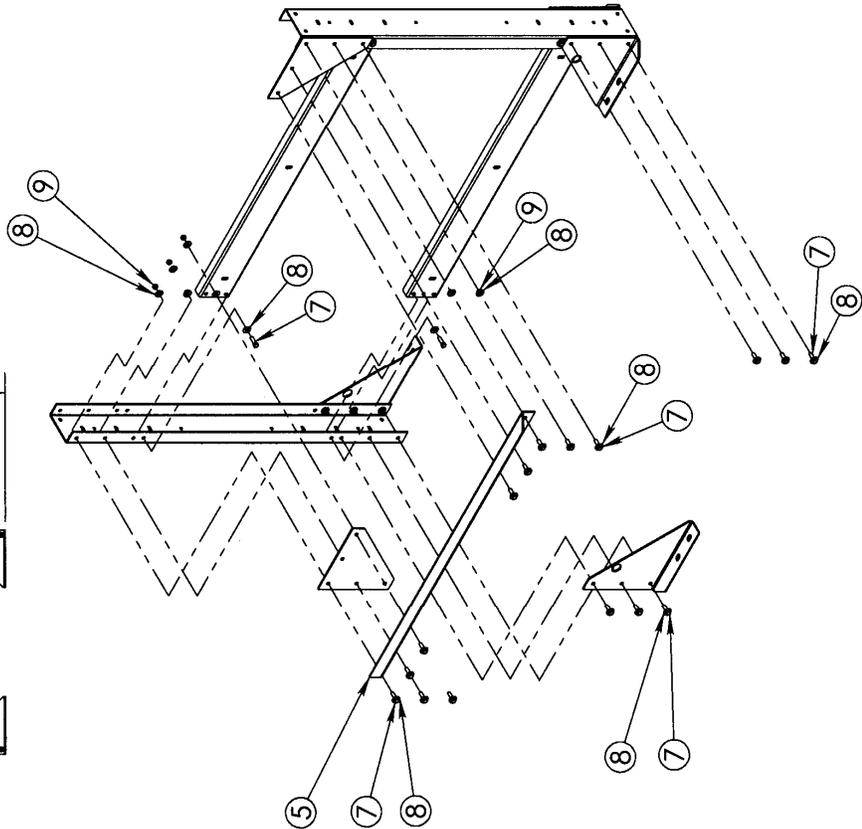
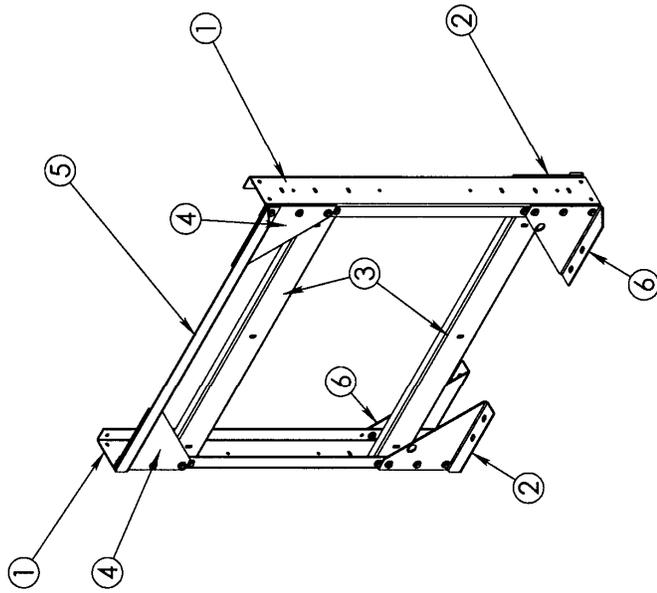
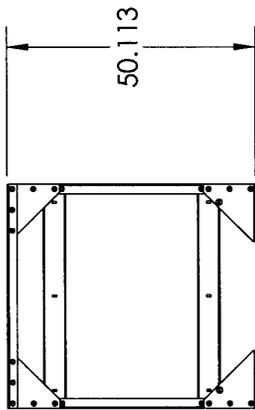


T15743C DRYER FRONT FAN SUPPORT



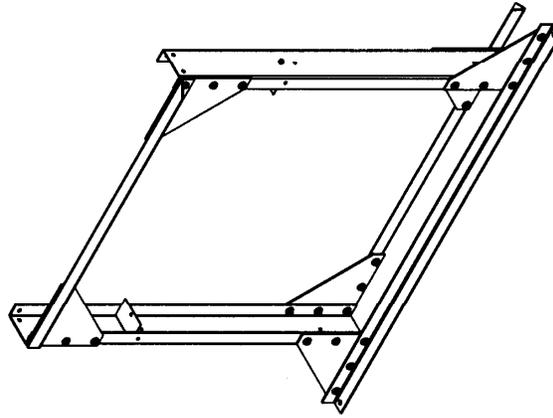
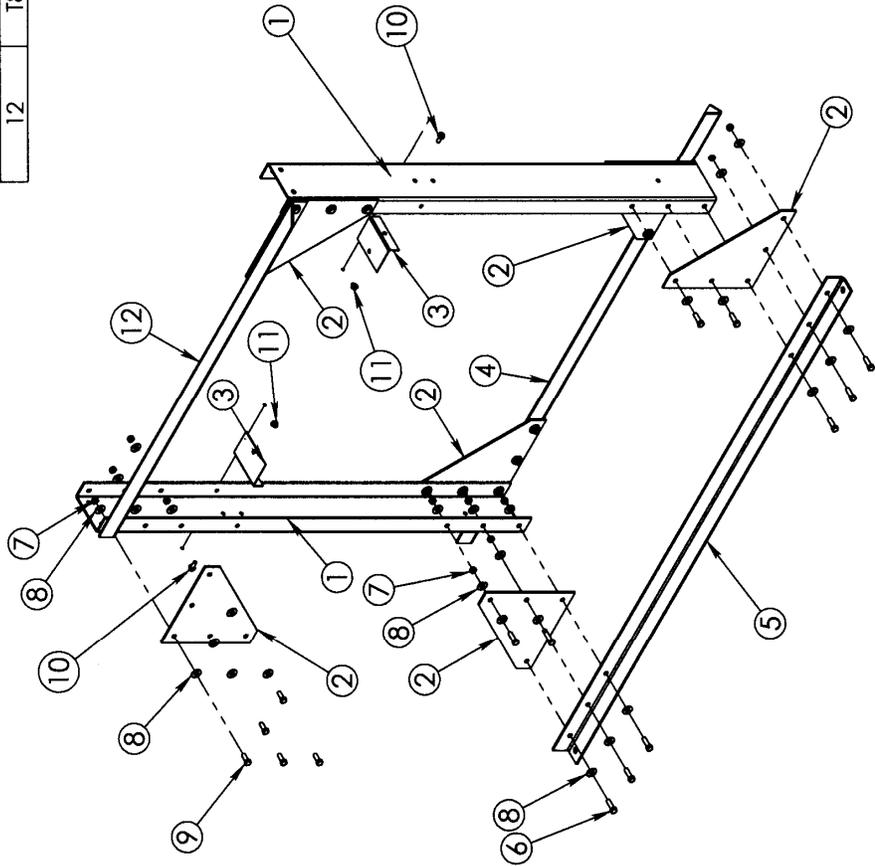
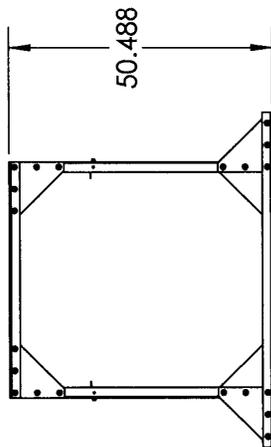
T80160 FRAME FAN SUPPORT, BACK

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80137	FRONT LEG, BLOWER MOUNT FRAME	2
2	T80155	LF BRACKET, FRONT LEGS, BLOWER MNT FRM	2
3	T80135	CHANNEL, POWER BOX MOUNT	2
4	T80138	GUSSET PLATE, BLOWER MOUNT FRAME	2
5	T80140	HOZT BASE 1, BLOWER MOUNT FRAME	1
6	T80156	RT BRACKET, FRONT LEGS, BLOWER MNT FRM	2
7	J0616	SCREW, 3/8-16, 1.25", PLT	26
8	J1117	WASHER, FLAT, 3/8, PLT	52
9	J1025	NUT, HEX, 3/8-16, PLT LOCK	26

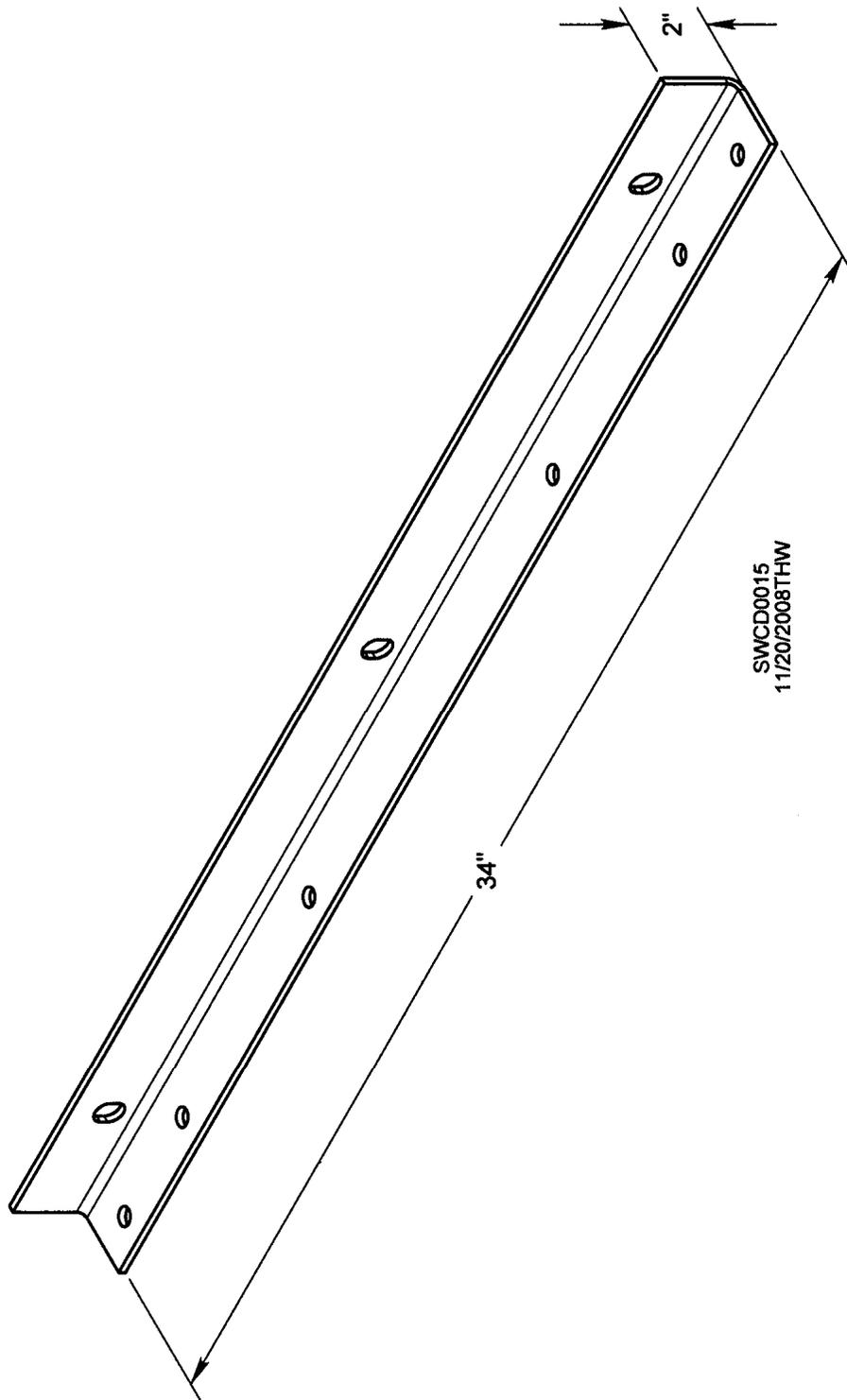


T80161 FRAME FAN SUPPORT, FRONT

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80136	REAR LEG, BLOWER MOUNT FRAME	2
2	T80138	GUSSET PLATE, BLOWER MOUNT FRAME	6
3	T80126	CLIP, CENTER BOTTM PANEL, BLOWER DUCT	2
4	T80141	HOZT BASE 2, BLOWER MOUNT FRAME	1
5	T80142	HOZT BASE 3, BLOWER MOUNT FRAME	1
6	J0616	SCREW, 3/8-16, 1.25", PLT	20
7	J1025	NUT, HEX, 3/8-16, PLT LOCK	30
8	J1117	WASHER, FLAT, 3/8, PLT	60
9	J0606	SCREW, 3/8-16, 1, PLT	10
10	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	2
11	J1110	NUT, WHIZ, 5/16-13	2
12	T80140	HOZT BASE 1, BLOWER MOUNT FRAME	1

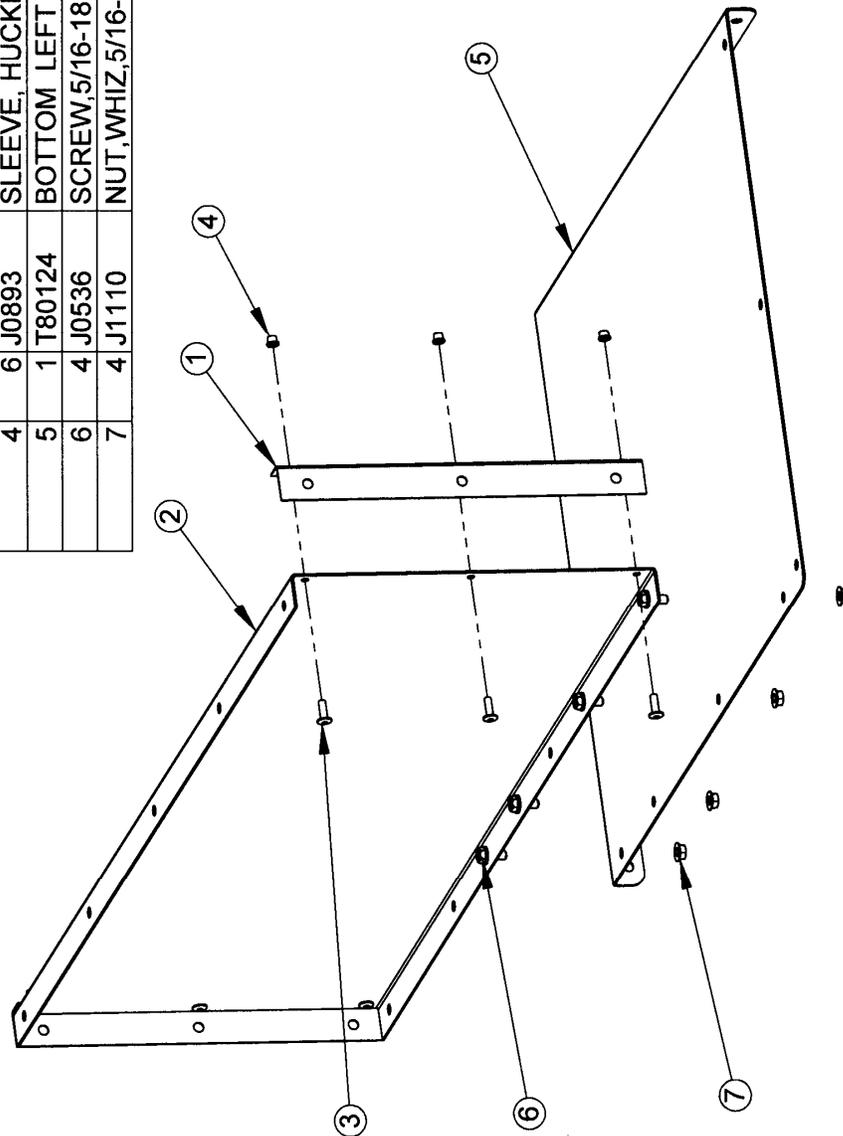


T80139 HORIZONTAL SIDE BLOWER MOUNT FRAME



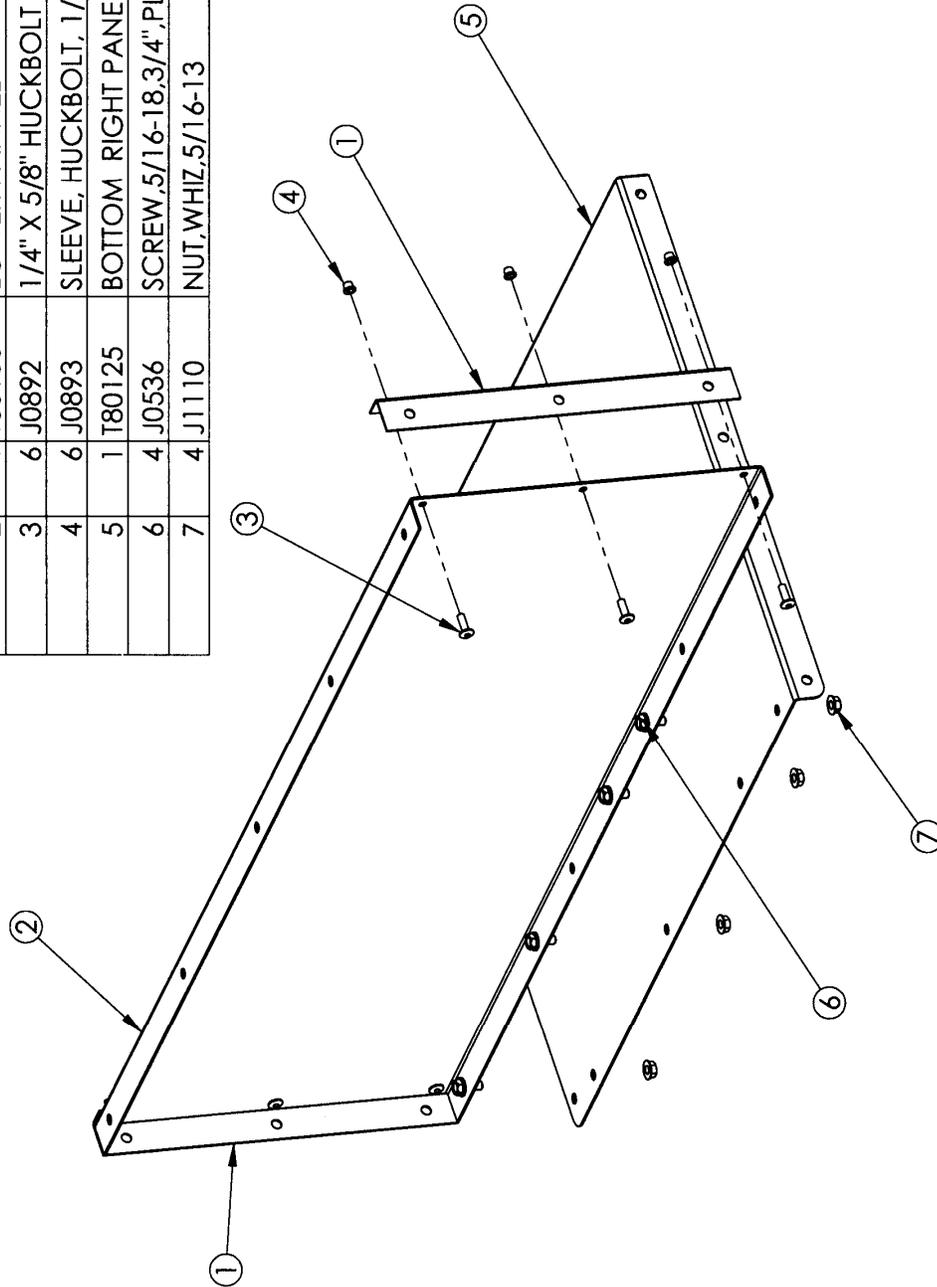
T801052 LOWER PANEL ASSEMBLY, RIGHT

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80107	END FLANGE
2	1	T80106	LOWER PANNEL
3	6	J0892	1/4" X 5/8" HUCKBOLT
4	6	J0893	SLEEVE, HUCKBOLT, 1/4"
5	1	T80124	BOTTOM LEFT PANEL, BLOWER DUCT
6	4	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
7	4	J1110	NUT, WHIZ, 5/16-13

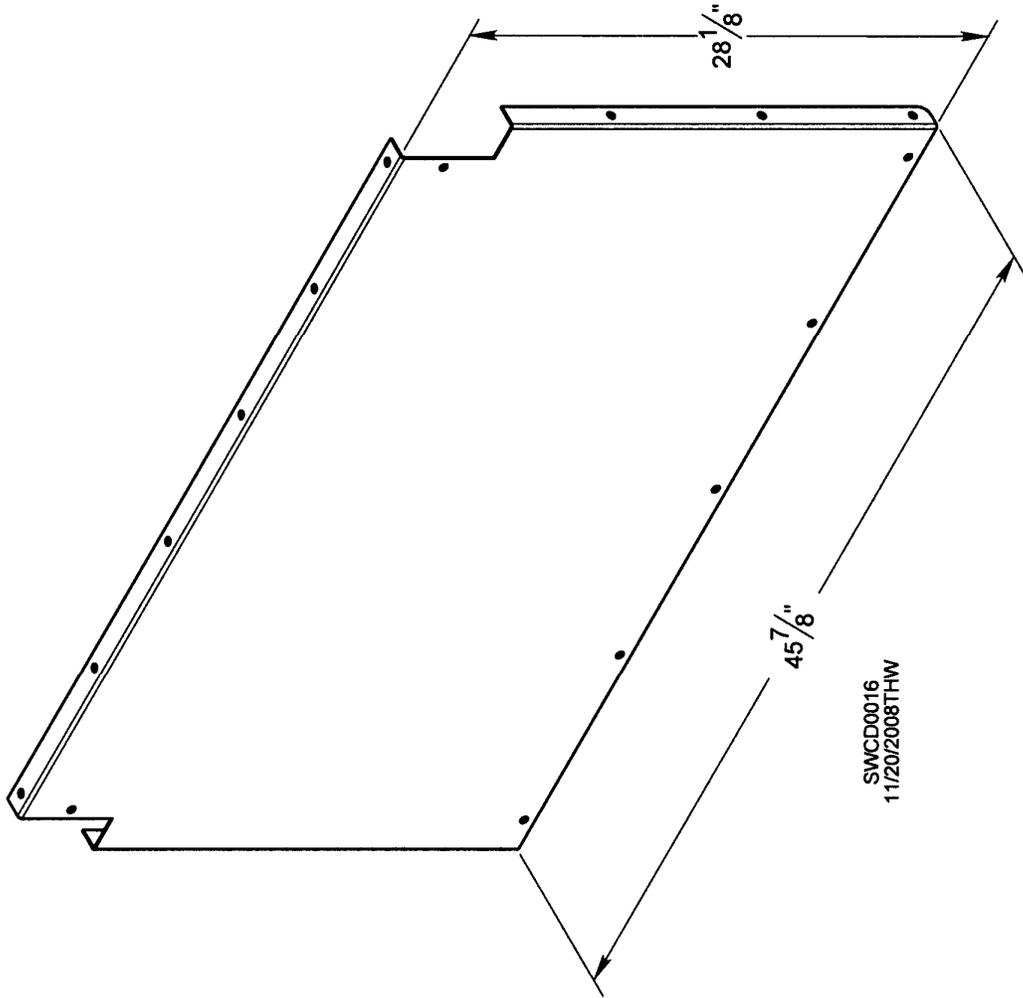


T80105 LOWER PANEL ASSEMBLY, LEFT

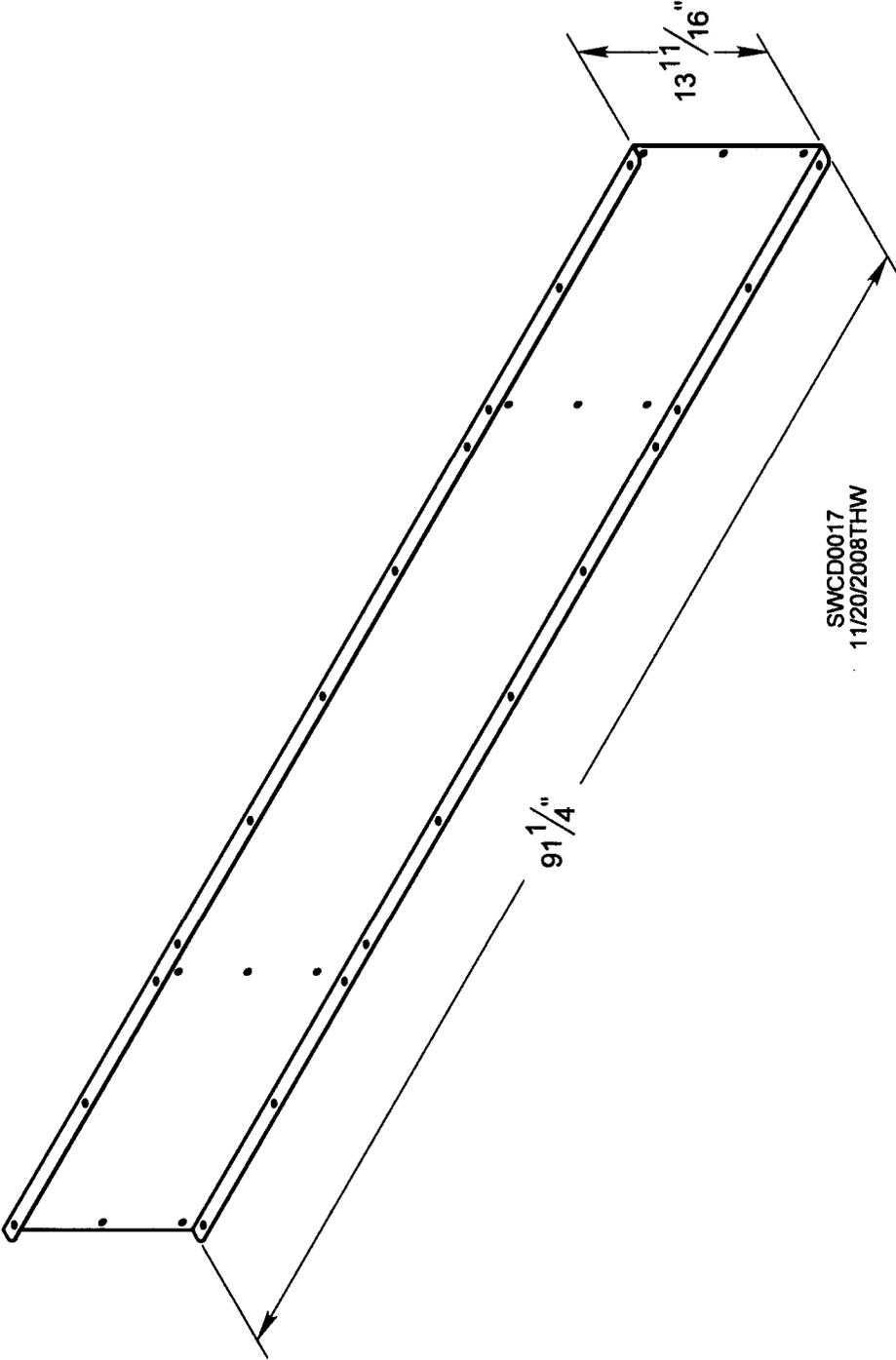
ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80107	END FLANGE
2	1	T80106	LOWER PANNEL
3	6	J0892	1/4" X 5/8" HUCKBOLT
4	6	J0893	SLEEVE, HUCKBOLT, 1/4"
5	1	T80125	BOTTOM RIGHT PANEL, BLOWER DUCT
6	4	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
7	4	J1110	NUT, WHIZ, 5/16-13



T80123 BOTTOM CENTER PANEL, BLOWER DUCT

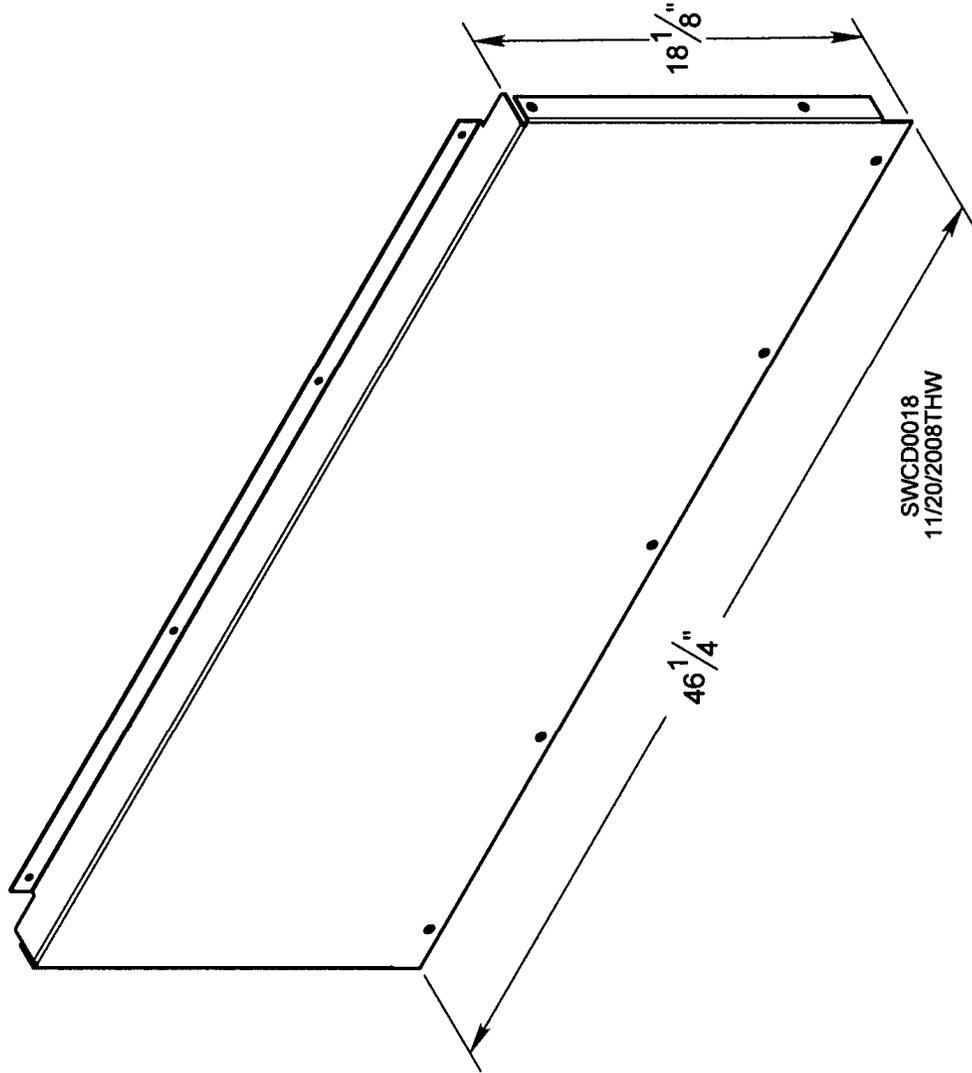


T80115 FRONT PANEL, BLOWER INTAKE DUCT



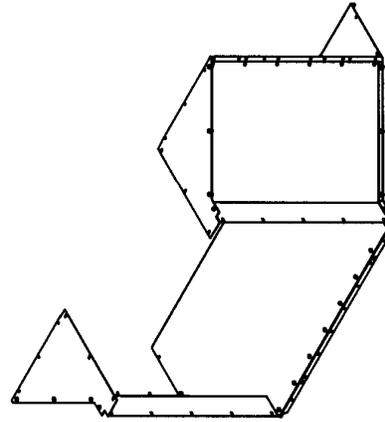
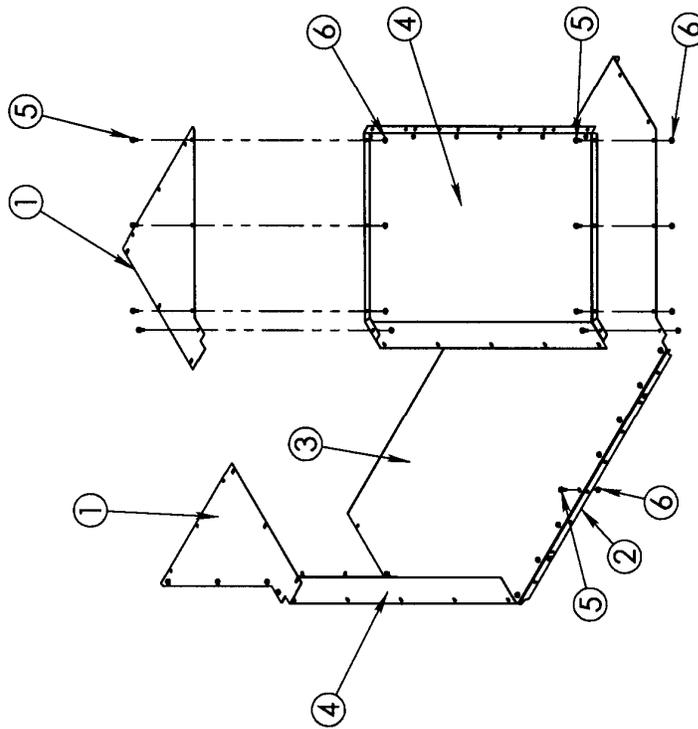
SWCD0017
11/20/2008THW

T80116 UPPER MID PANEL, BLOWER INTAKE DUCT

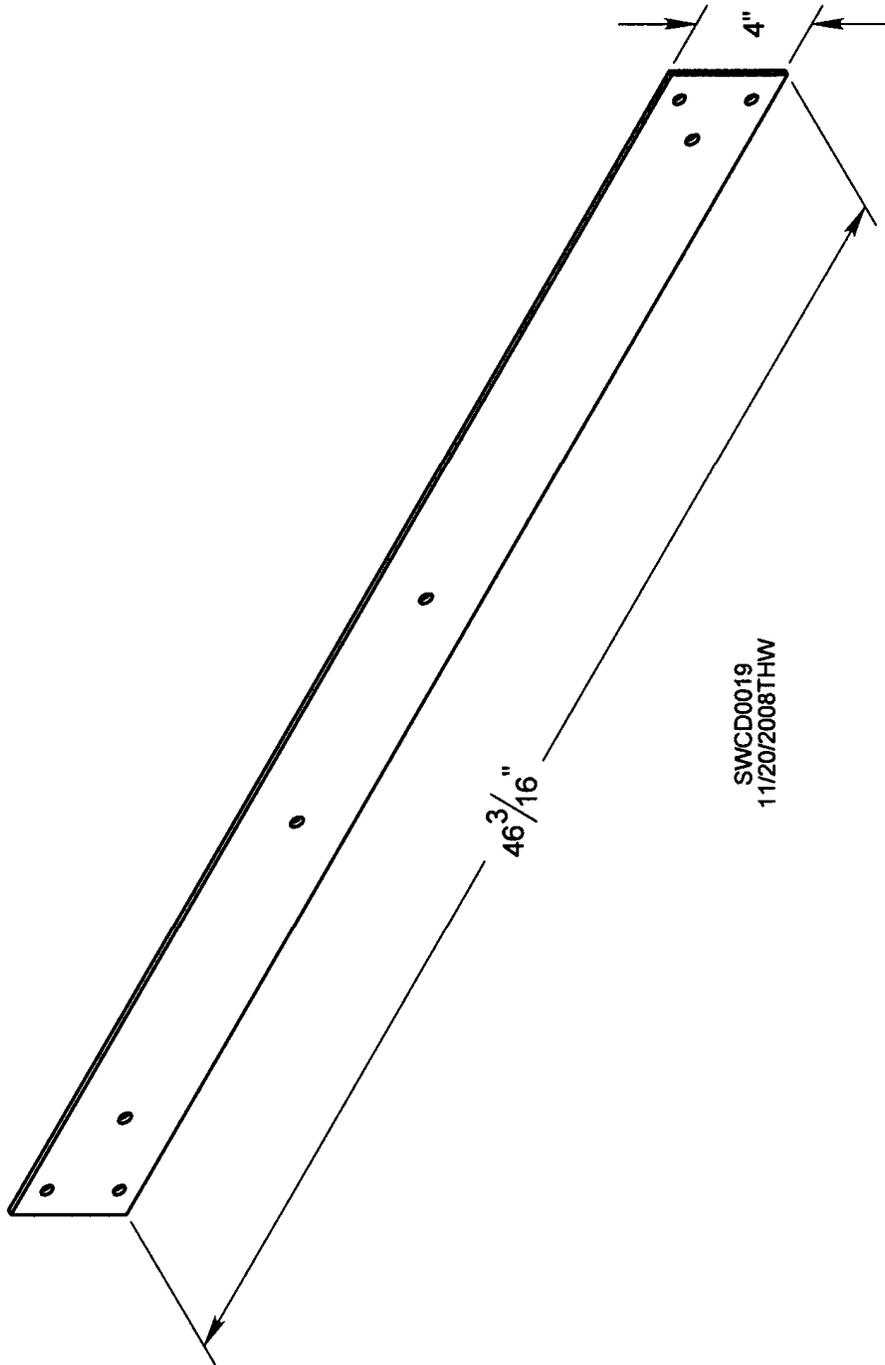


T80164 DRYER FRONT FAN SUPPORT, DUCTWORK, DRYER CONNECTION

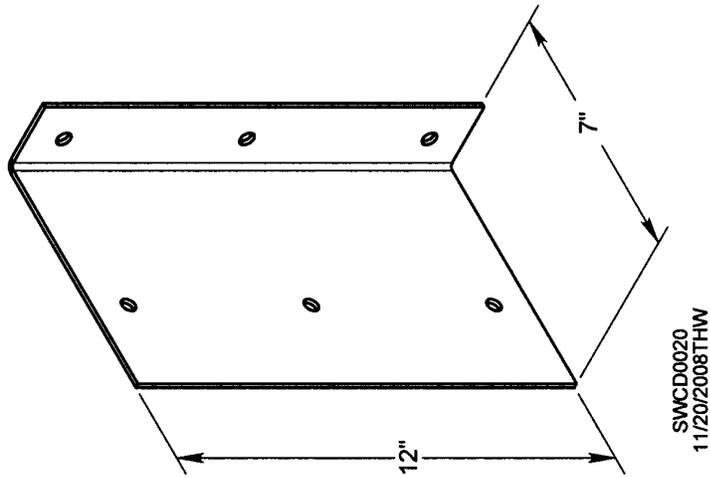
ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80111	TRANSITION TOP PANEL
2	1	T80121	BOTTOM ANGLE, BLOWER TRANS-END PLT
3	1	T80122	BOTTOM PANEL, BLOWER TRANSITION
4	2	T80112	TRANSITION SIDE PANEL
5	24	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
6	24	J1110	NUT, WHIZ, 5/16-13



T80166 MOUNTING PLATE, HEATER CONTROL BOX

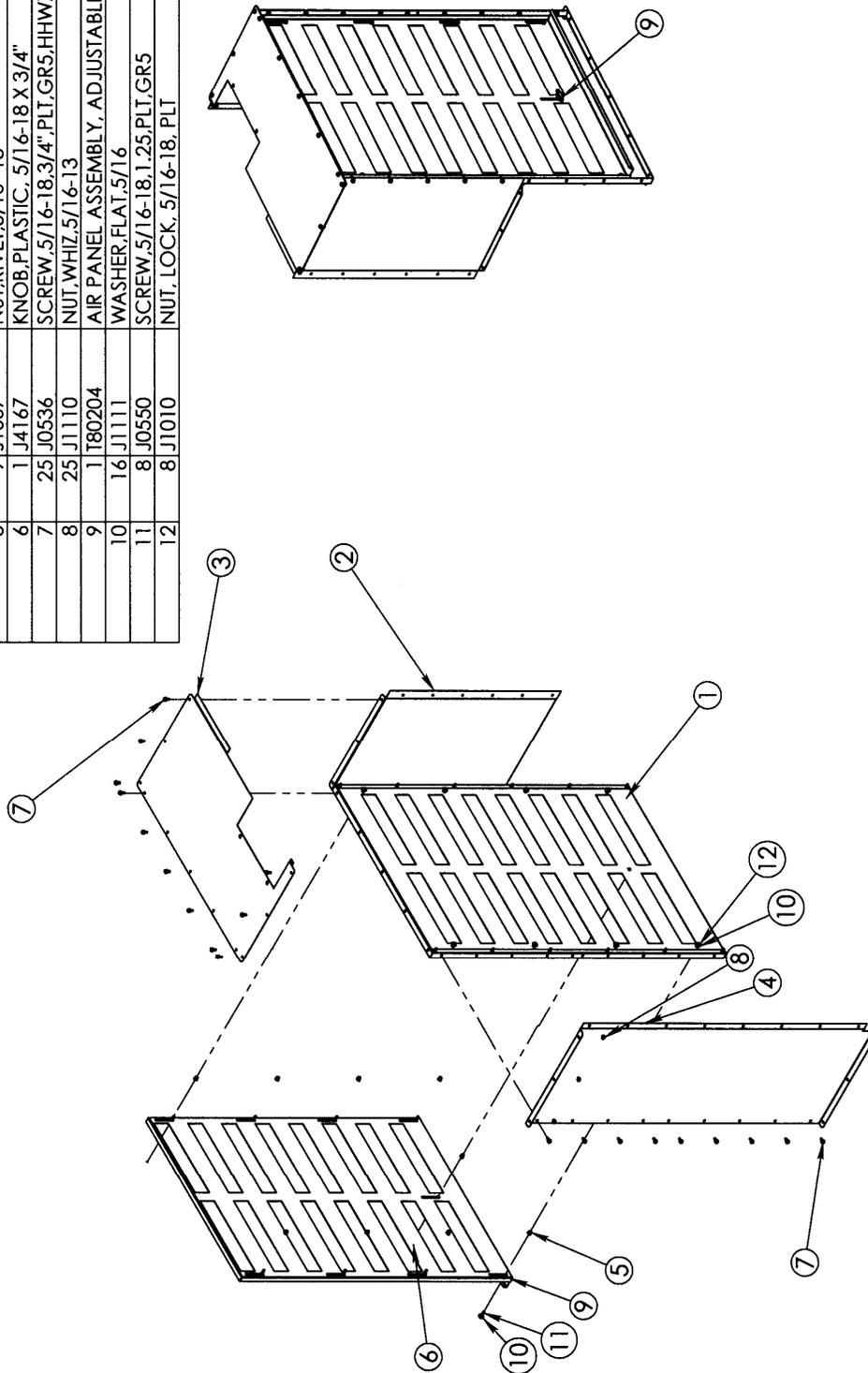


T80200 BRACKET, DRYER DUCTWORK FRONT SUPPORT



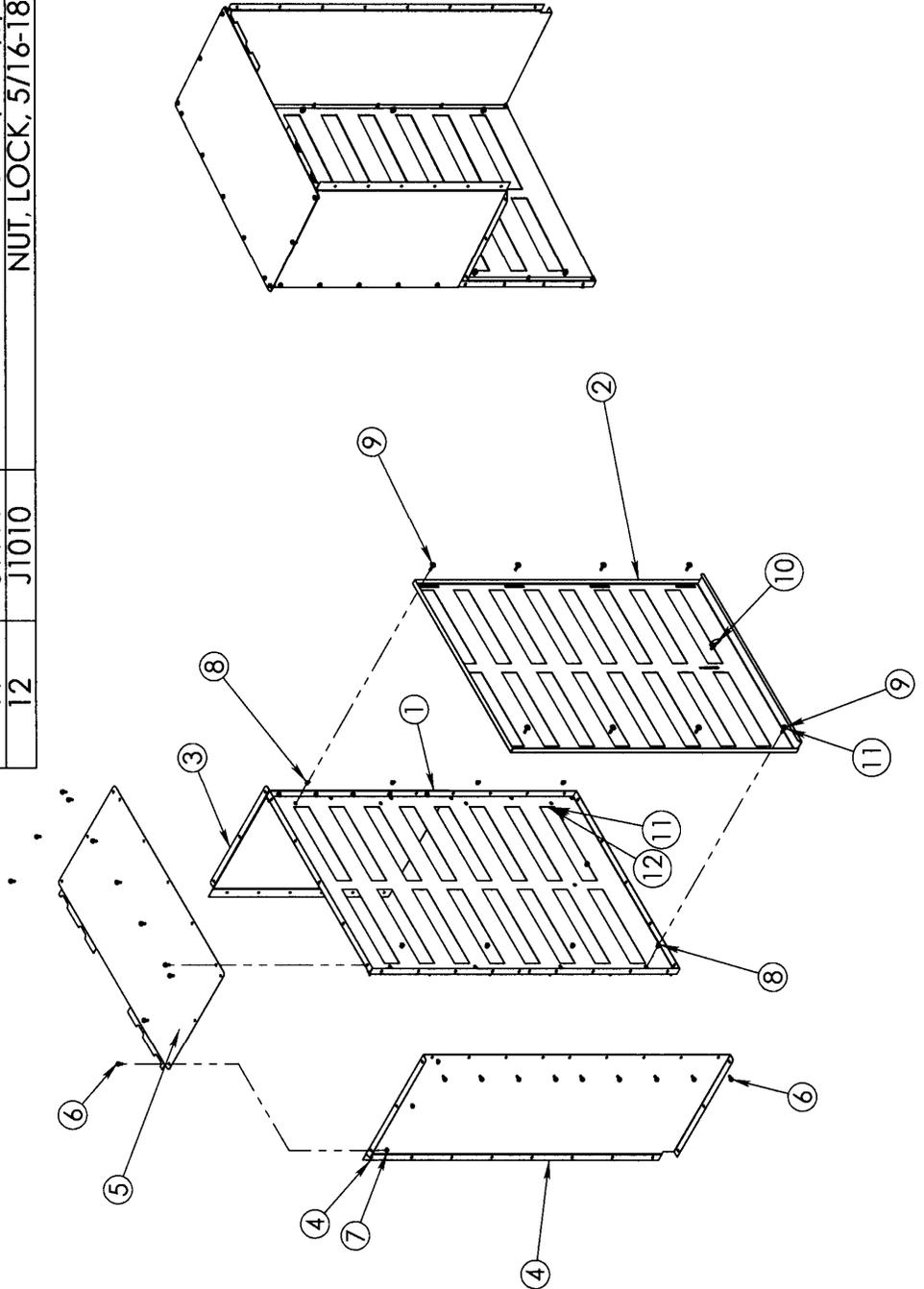
T80163 DRYER FRONT FAN SUPPORT, INTAKE PLENUM, RIGHT

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T80101	AIR PANEL, STATIONARY ASSEM
2	1	T80110	RT SIDE PANEL, BLOWER INTAKE DUCT
3	1	T80117	RT TOP PANEL, BLOWER INTAKE DUCT
4	1	T80109	RT FRONT SIDE PANEL, BLOWER INTAKE DUCT
5	9	J1007	NUT, RIVET, 5/16"-18
6	1	J4167	KNOB, PLASTIC, 5/16-18 X 3/4"
7	25	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
8	25	J1110	NUT, WHIZ, 5/16-13
9	1	T80204	AIR PANEL ASSEMBLY, ADJUSTABLE
10	16	J1111	WASHER, FLAT, 5/16
11	8	J0550	SCREW, 5/16-18, 1.25, PLT, GR5
12	8	J1010	NUT, LOCK, 5/16-18, PLT

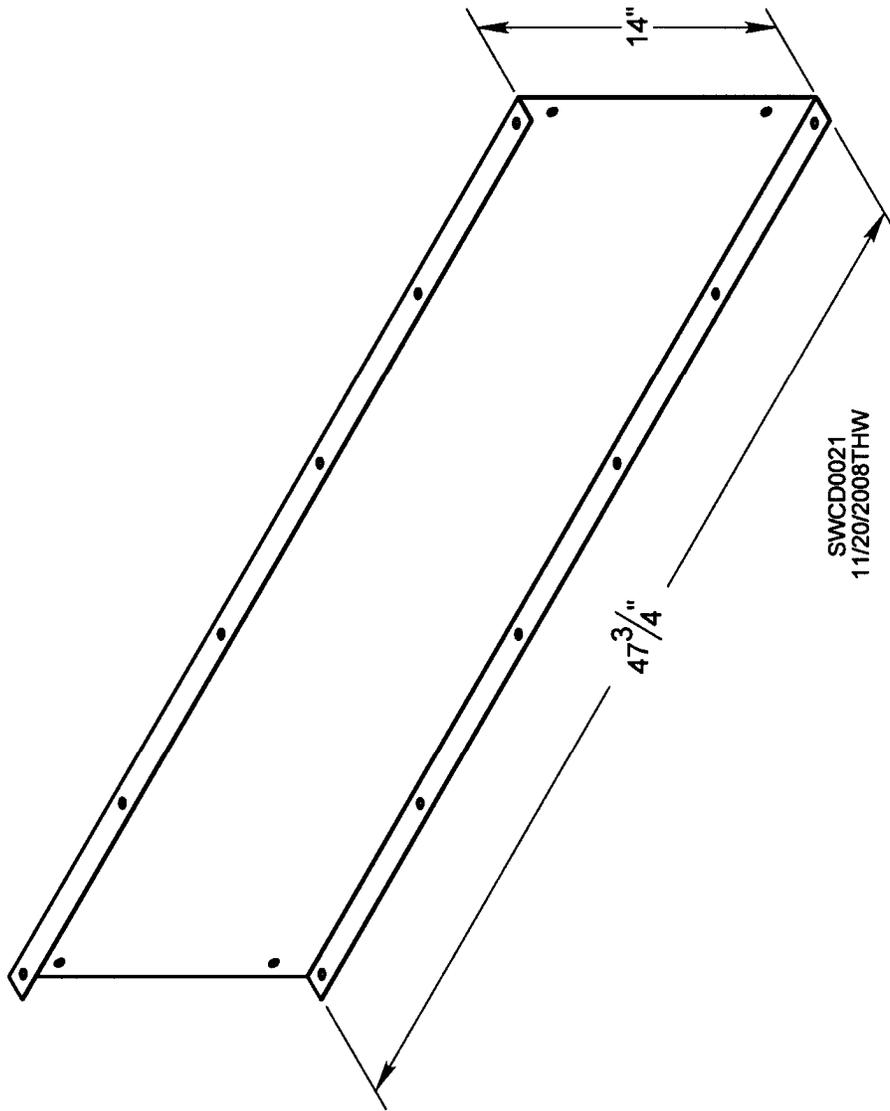


T80162 DRYER FRONT FAN SUPPORT, INTAKE PLENUM, LEFT

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80101	AIR PANEL, STATIONARY ASSEM	1
2	T80204	AIR PANEL ASSEMBLY, ADJUSTABLE	1
3	T80119	LT SIDE PANEL, BLOWER INTAKE DUCT	1
4	T80118	LF FRONT PANEL, BLOWER INTAKE DUCT	1
5	T80120	LT TOP PANEL, BLOWER INTAKE DUCT	1
6	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	25
7	J1110	NUT, WHIZ, 5/16-13	25
8	J1007	NUT, RIVET, 5/16"-18	9
9	J0550	SCREW, 5/16-18, 1.25, PLT, GR5	8
10	J4167	KNOB, PLASTIC, 5/16-18 X 3/4"	1
11	J1111	WASHER, FLAT, 5/16	16
12	J1010	NUT, LOCK, 5/16-18, PLT	8

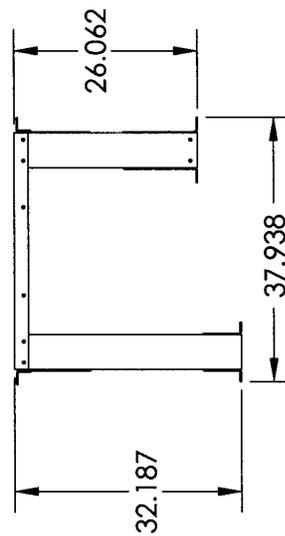
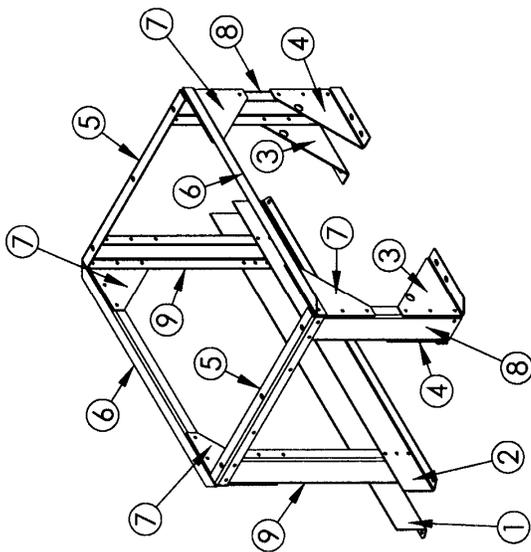
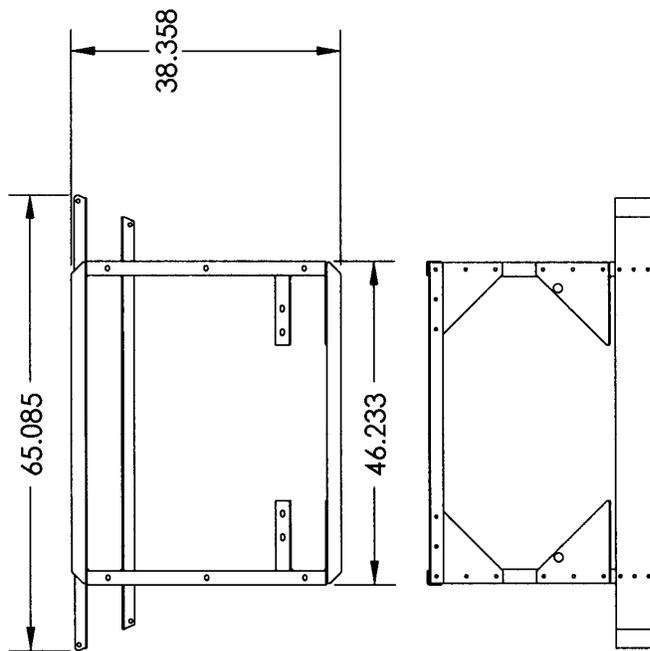


T80219 MOUNTING PLATE, MANUAL CONTROL BOX

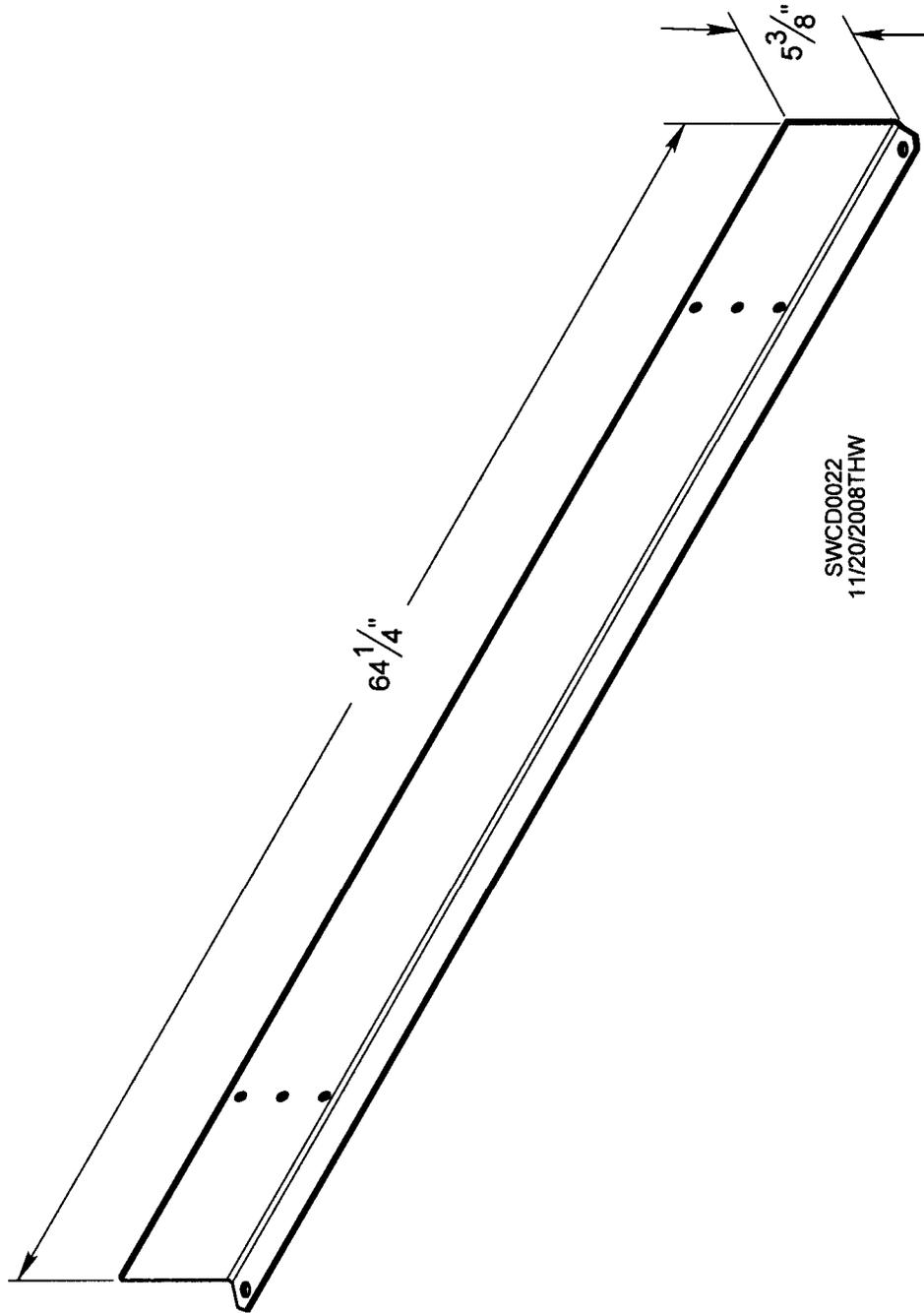


T80167 BLOWER MOUNTING FRAME, TOP UNIT

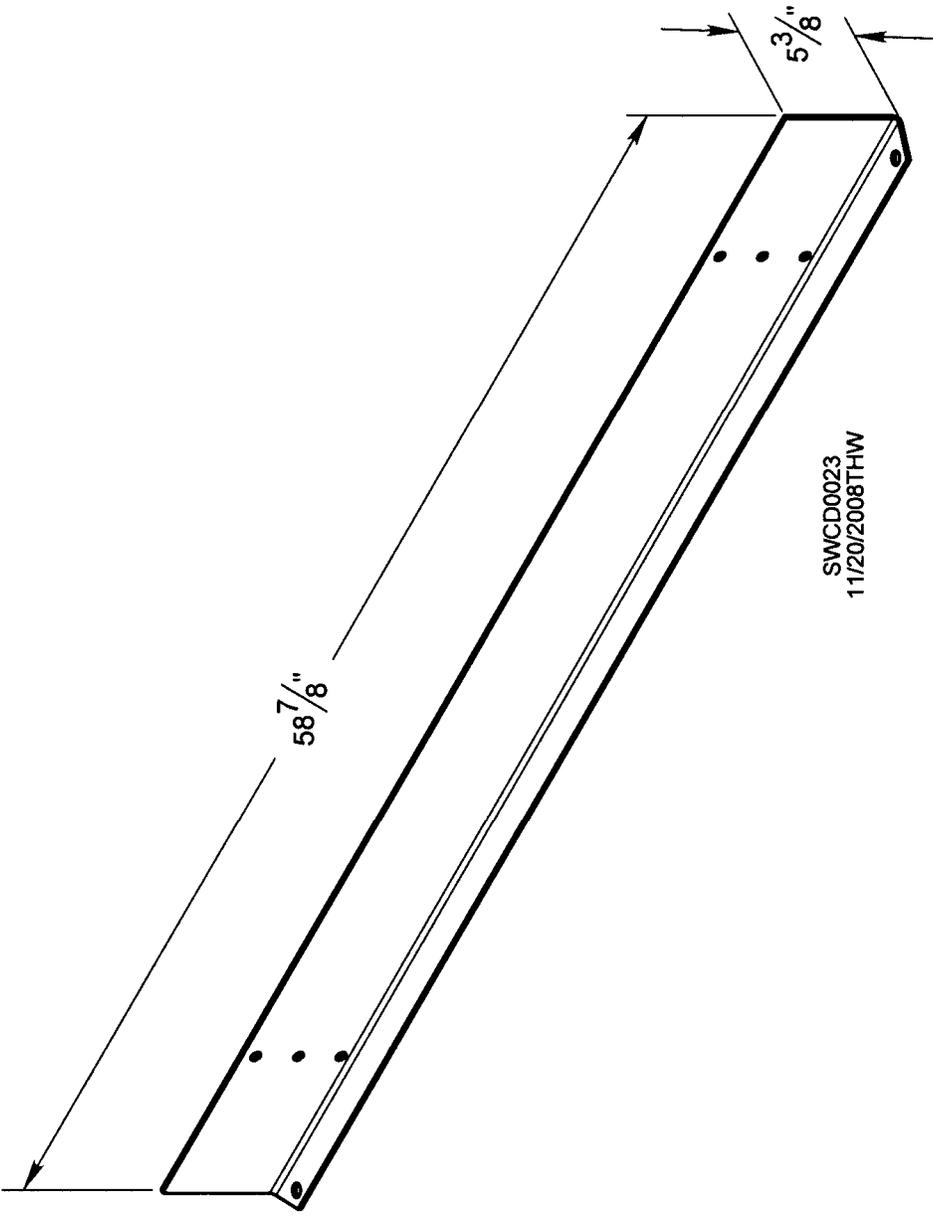
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80172	REAR HORZ SUPPORT B, BLOWER MNT FRAME	1
2	T80170	REAR HORZ SUPPORT A, BLOWER MNT FRAME	1
3	T80155	LF BRACKET, FRONT LEGS, BLOWER MNT FRM	2
4	T80156	RT BRACKET, FRONT LEGS, BLOWER MNT FRM	2
5	T80139	HOZT SIDE, BLOWER MOUNT FRAME	2
6	T80140	HOZT BASE 1, BLOWER MOUNT FRAME	2
7	T80138	GUSSET PLATE, BLOWER MOUNT FRAME	4
8	T80168	FRONT LEG, BLOWER MOUNT FRAME	2
9	T80169	REAR LEG, BLOWER MOUNT FRAME	2



T80172 BLOWER MOUNTING FRAME, TOP UNIT
REAR HORIZONTAL SUPPORT B

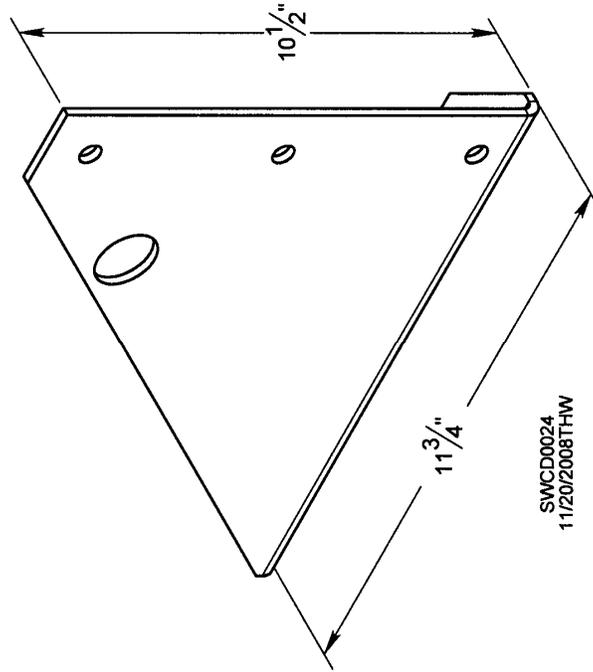


T80170 BLOWER MOUNTING FRAME, TOP UNIT
REAR HORIZONTAL SUPPORT A

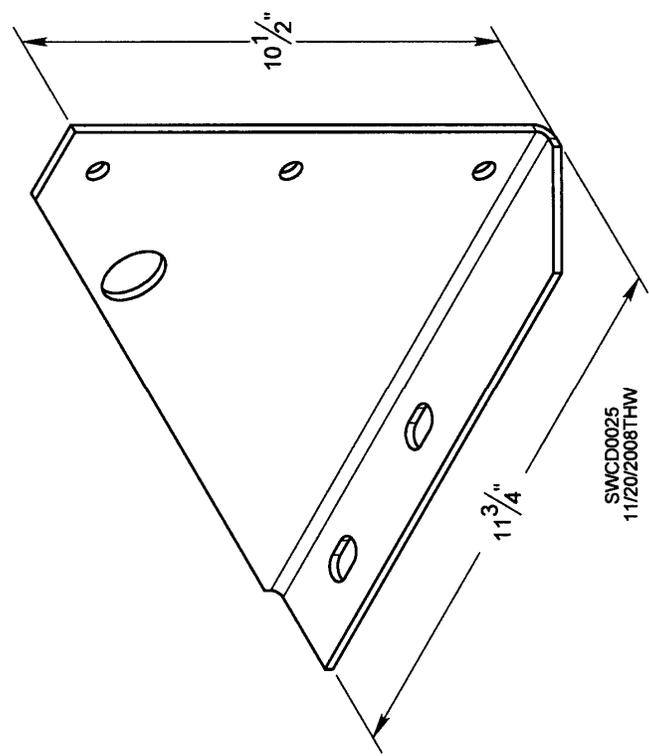


SWCD0023
11/20/2008THW

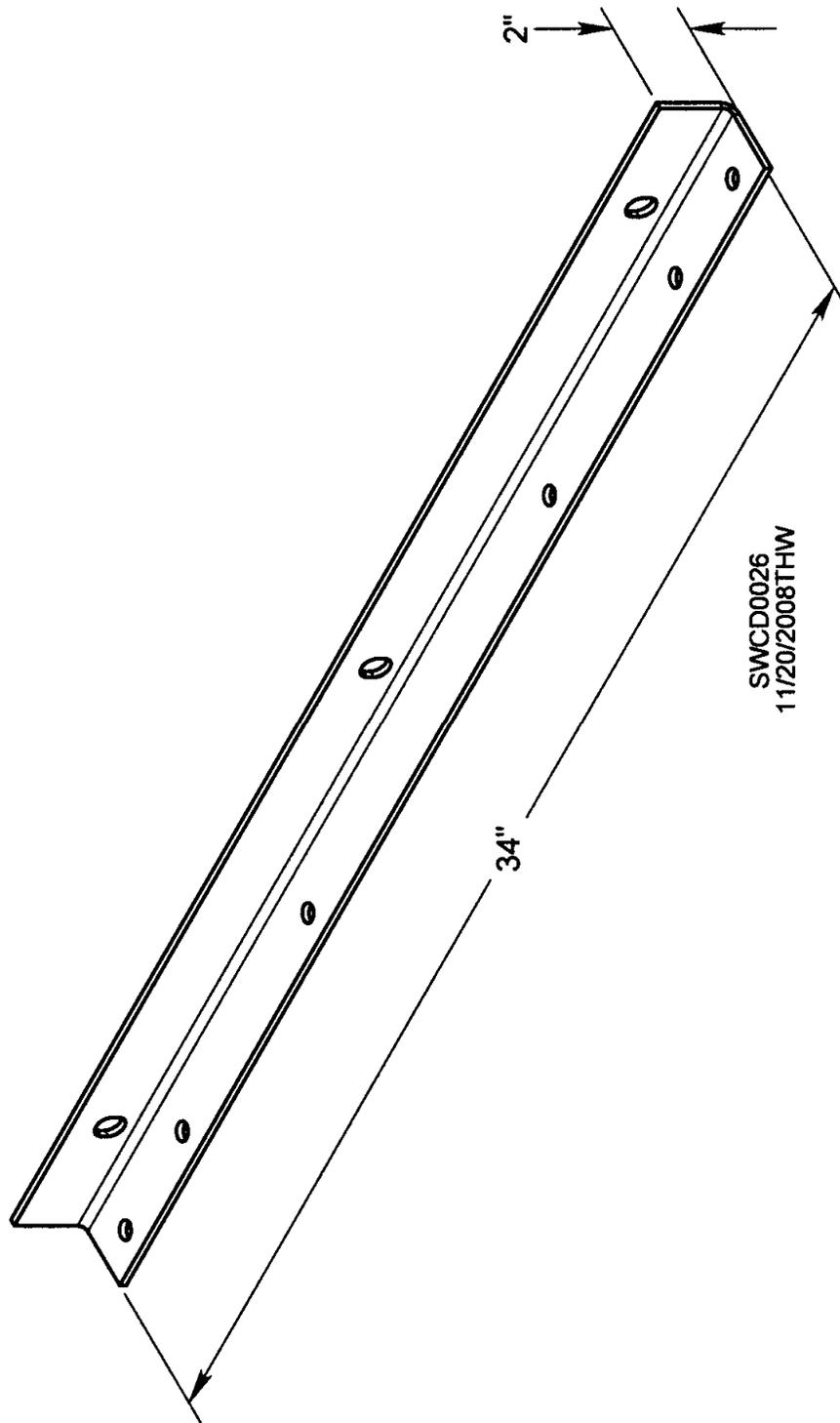
T80155 BLOWER MOUNTING FRAME, LEFT BRACKET, FRONT LEGS



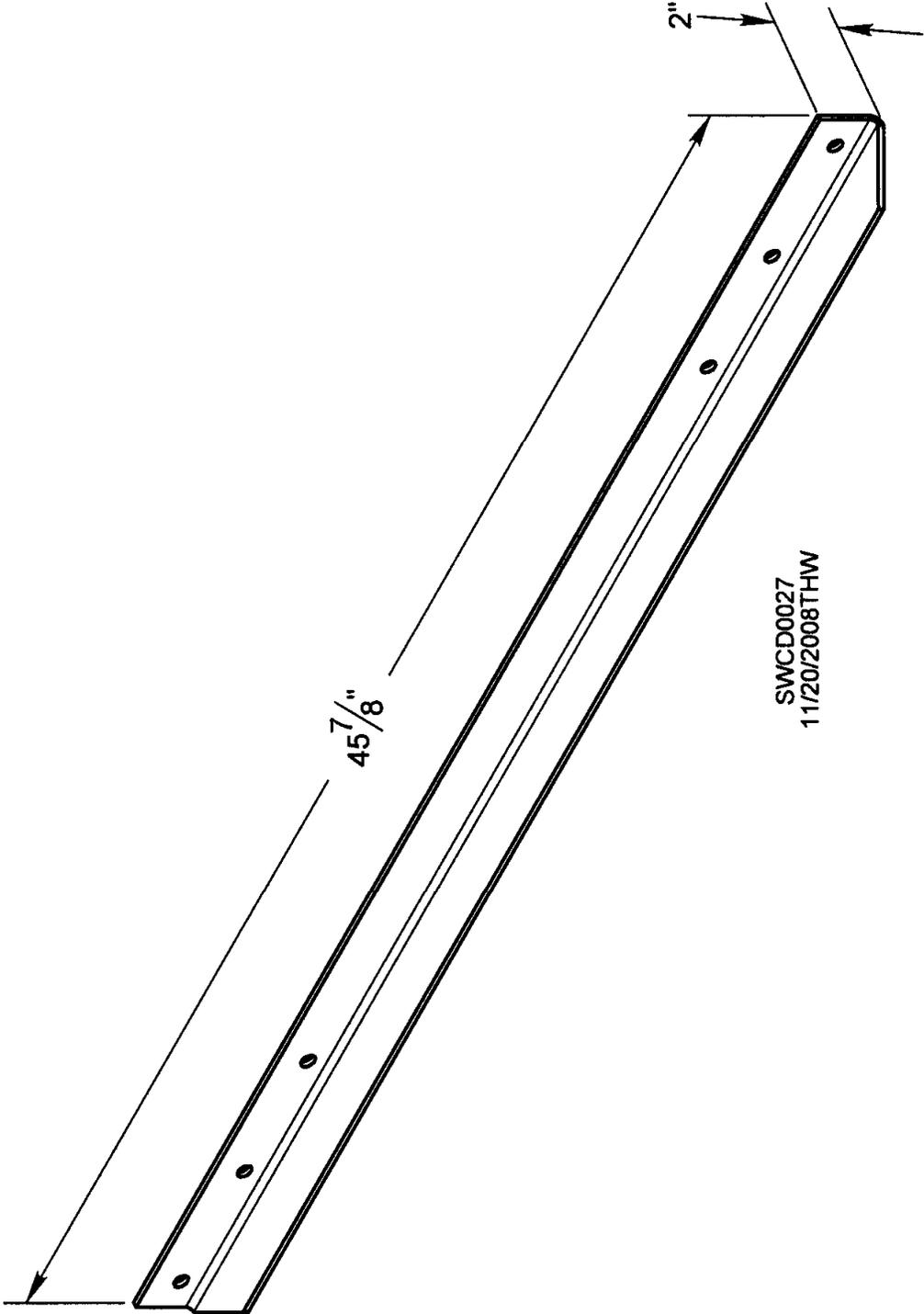
T80156 BLOWER MOUNTING FRAME, RIGHT BRACKET, FRONT LEGS



T80139 BLOWER MOUNTING FRAME, HORIZONTAL SIDE

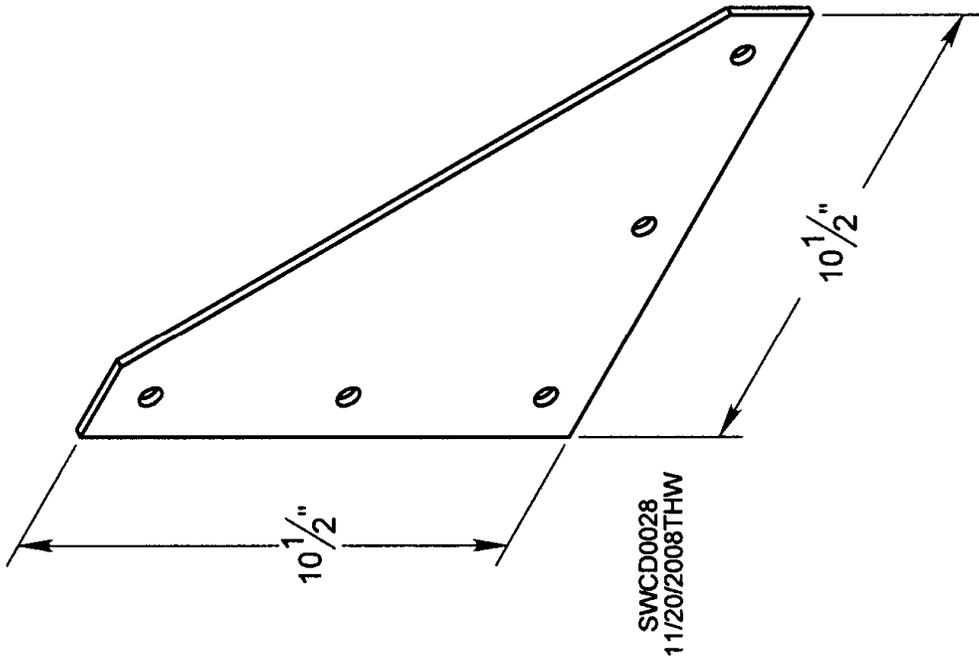


T80140 BLOWER MOUNTING FRAME, HORIZONTAL BASE 1

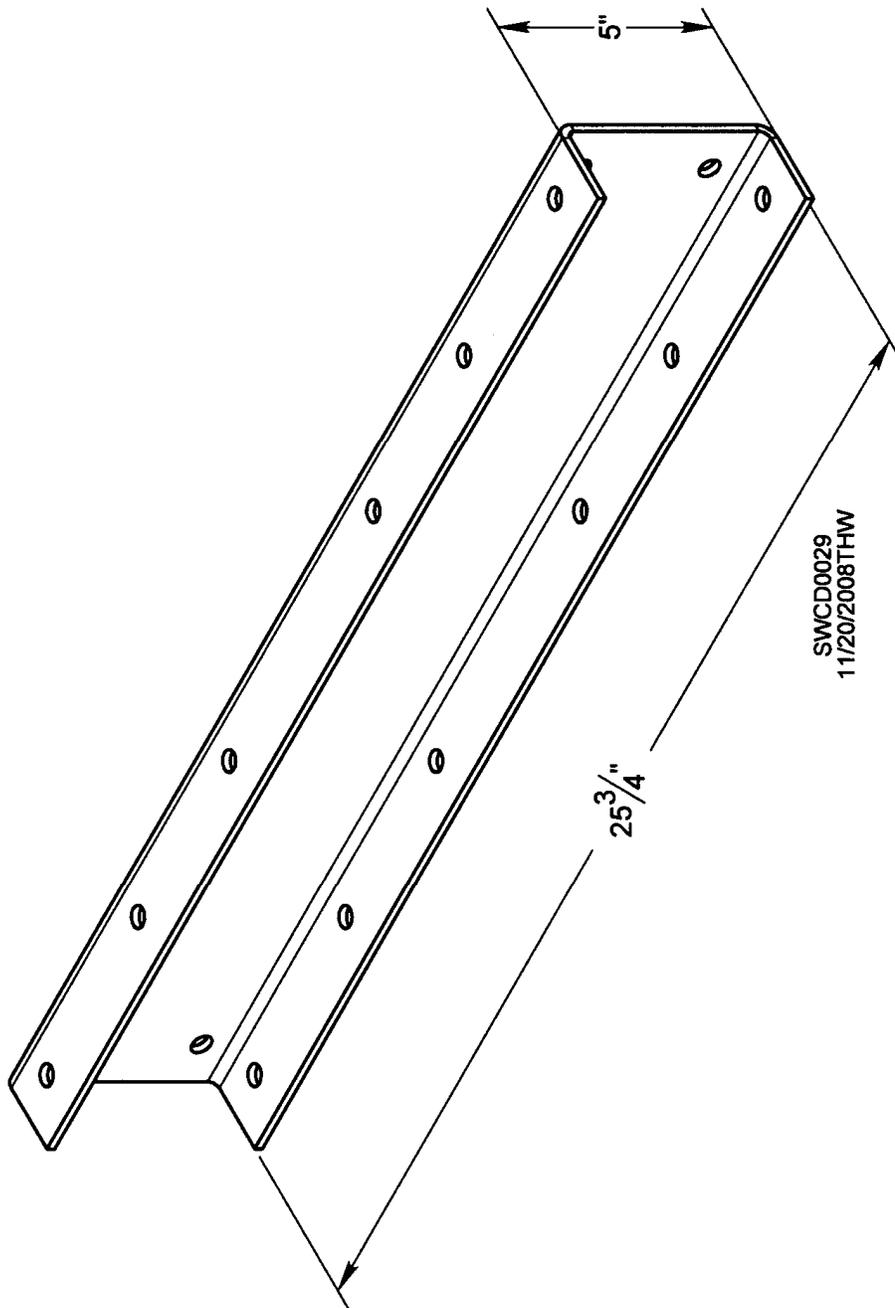


SWCD0027
11/20/2008THW

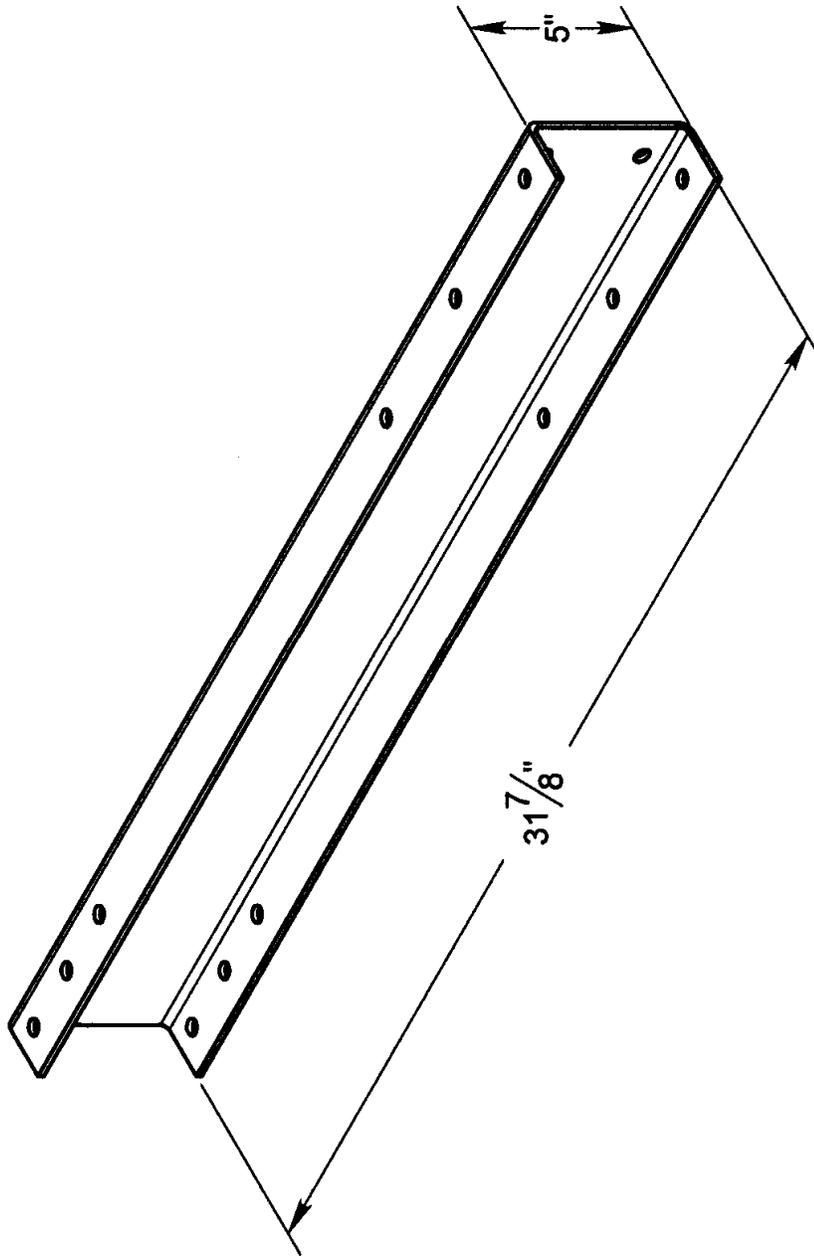
T80138 BLOWER MOUNTING FRAME, GUSSET PLATE



T80168 BLOWER MOUNTING FRAME, FRONT LEG

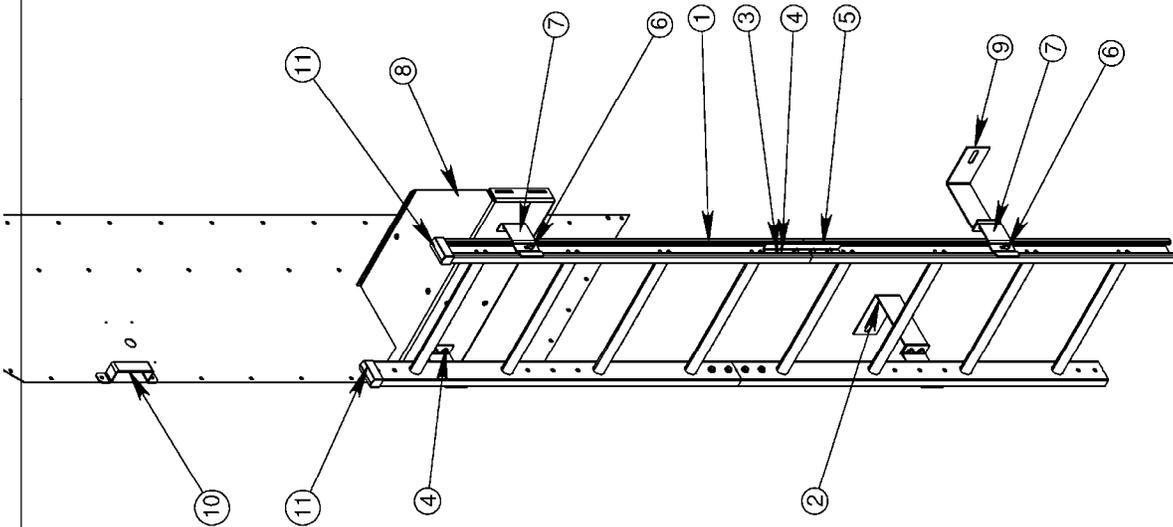


T80169 BLOWER MOUNTING FRAME, REAR LEG



SWCD0030
11/20/2008THW

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	B5084	LADDER, 44"	2
2	T80222	BRACKET, LADDER, FRONT STACK CENT DRYER	1
3	J1110	NUT, WHIZ, 5/16-13	16
4	J0536	SCREW, 5/16-18.3/4", PLT, GR5, HHWZ	16
5	T25545	SPLICE, LADDER	2
6	B5008	CLIP & BOLT, LADDER	4
7	T35515	BRKT, LADDER, REAR PLATFORM	4
8	T28151	PLATFORM ASSY, LADDER SUPT, SUCT COOL DRYER	1
9	T80223	BRACKET, LADDER, FRONT STACK CENT DRYER	1
10	T28152	HANDLE, DRYER FRONT	1
11	J5065	CAP, LADDER, VINYL	2



TOLERANCE UNLESS SPECIFIED
.X = ± .050
.XX = ± .010
.XXX = ± .005
FRAC = ± 1/32
= ± 1°

SUKUP MFG. CO.
Sukup
SUKUP PARKWAY
SHEFFIELD, IA. 50475

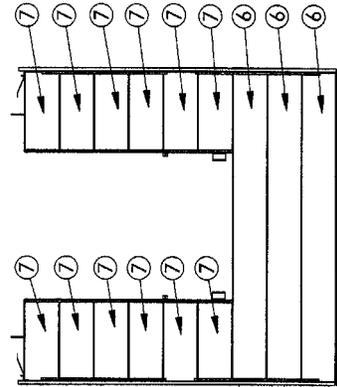
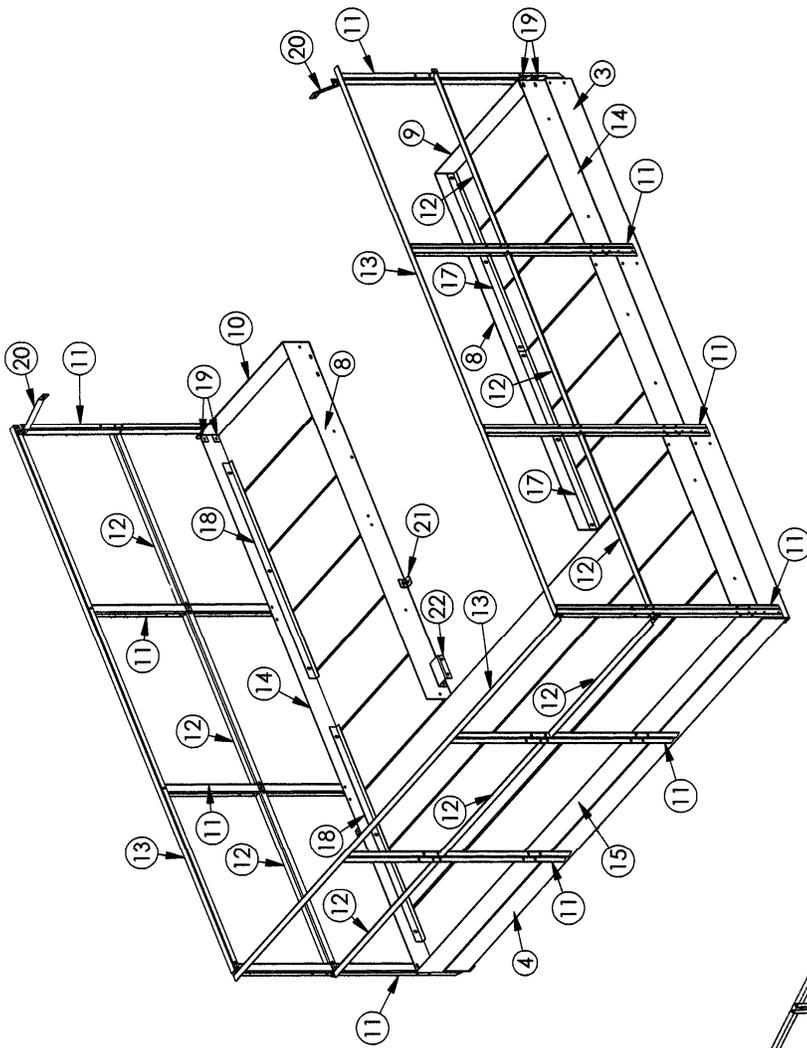
DRAWN BY: DJB	RAW/MAT L/NO.	PART NO. T80224
DATE 8-29-08	MATERIAL	WEIGHT 92.00
USED IN ASSY OF: DRYER, SUCT COOL		
DESCRIPTION LADDER, FRONT SUCT COOL DRYER		

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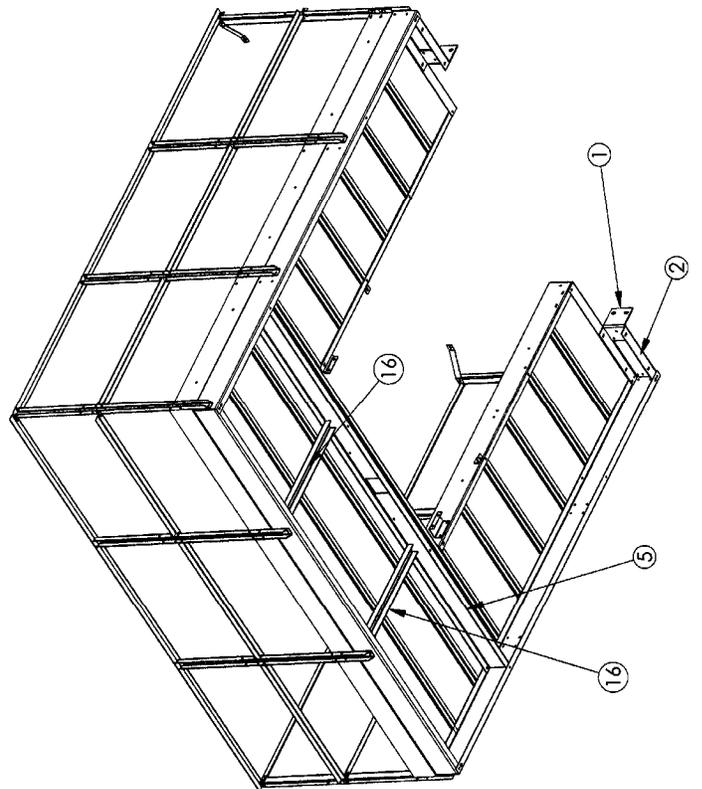
REF	ENG. ORDER #	BY	DATE

R E V I S I O N

CENTRIFUGAL STACK DRYER FRONT DECK

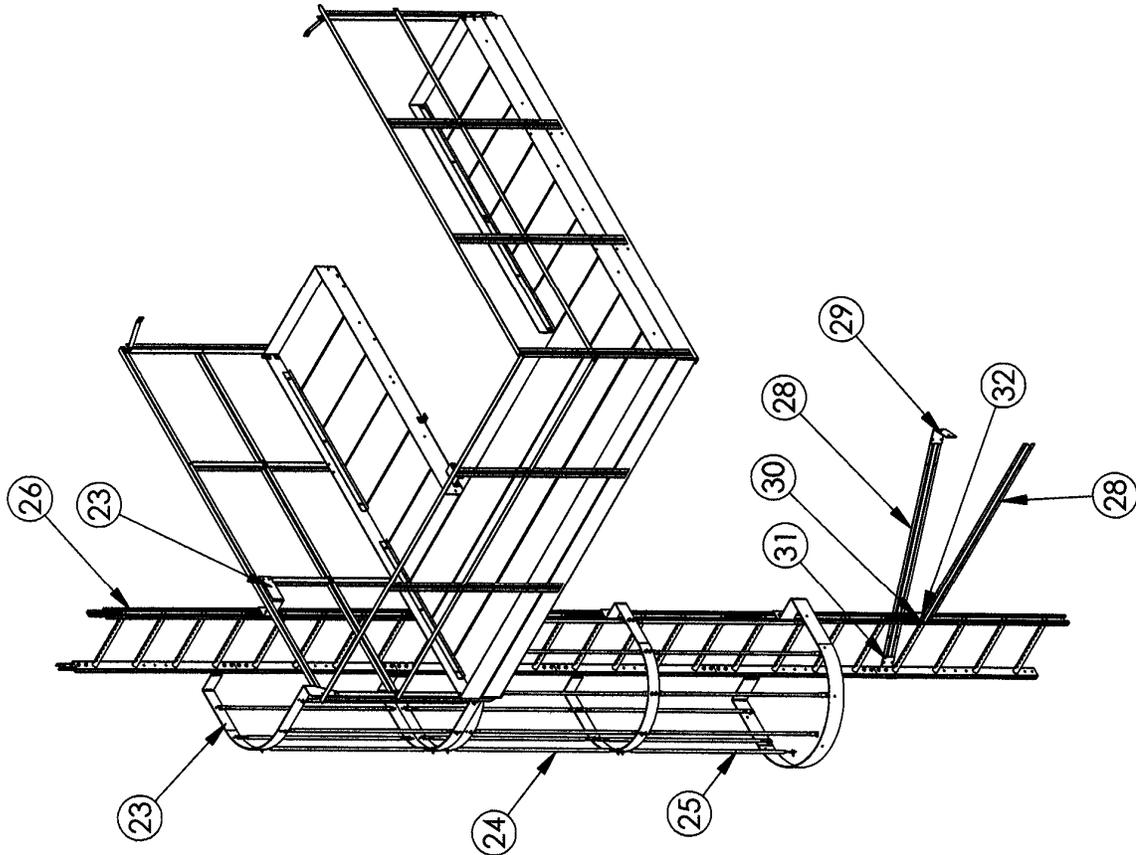


NOTE: T80165 support panel is to be installed between top of bottom of module fan and bottom of top module frame.

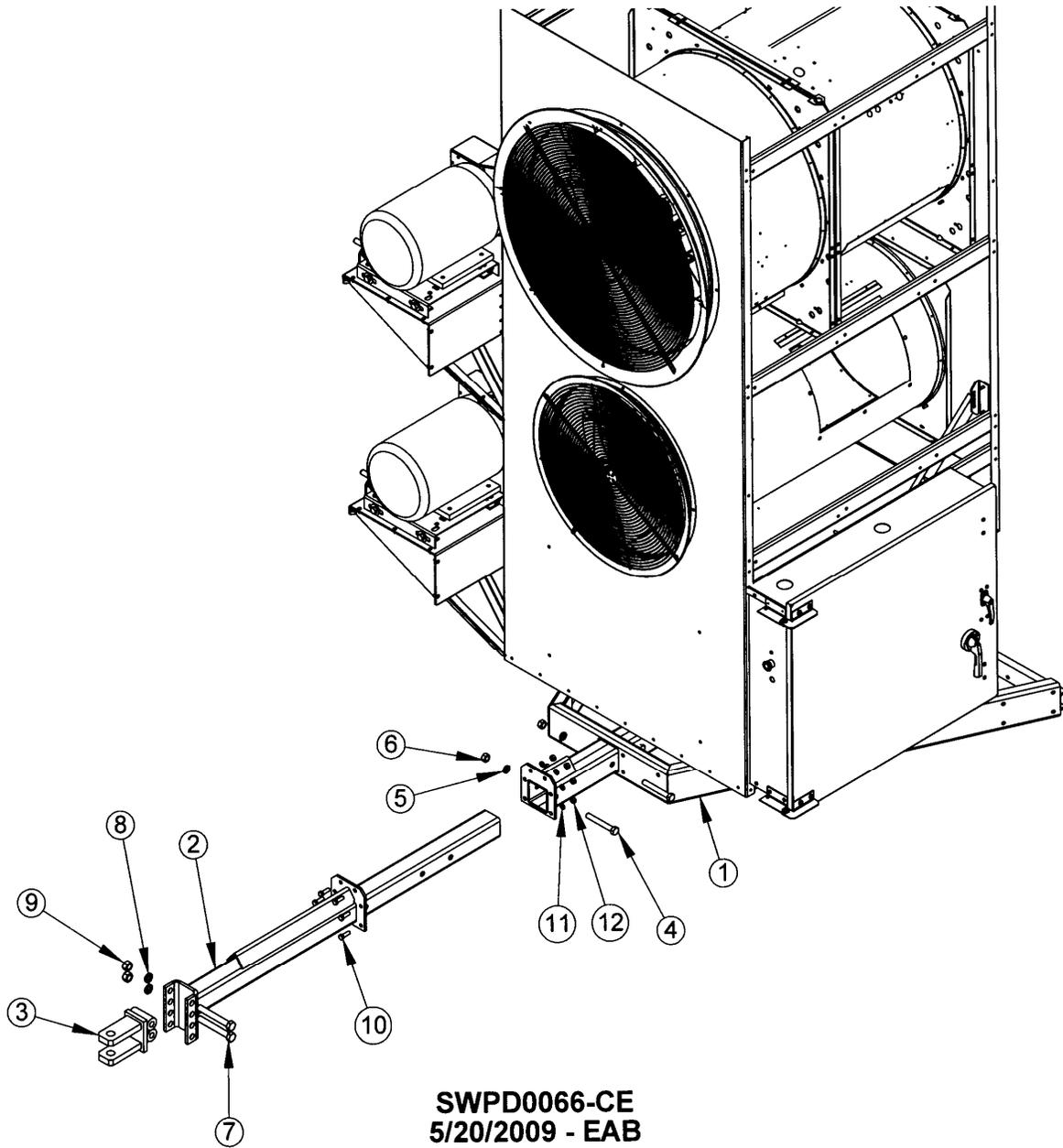


CENTRIFUGAL STACK DRYER FRONT DECK

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	180179	REAR FRAME BRKT, DECK	2
2	180175	OUTER REAR FRAME RAIL, DECK	2
3	180176	OUTER SIDE RAIL, DECK	2
4	T25454	OUTER FRONT RAIL, DECK	1
5	T25455	CENTER RAIL, DECK	1
6	T50122	DECKING, WALKWAY	3
7	T50121	DECKING, WALKWAY	12
8	180178	INNER A-FRAME RAIL, DECK	2
9	T25457	KICK, REAR TOE, LF DECK	1
10	T25458	KICK, REAR TO, RT	1
11	T25465	POST, HAND RAIL	10
12	T25466	HAND RAIL 37", DECK	9
13	T25469	TOP HAND RAIL FRONT, DECK	3
14	180177	SIDE TOE KICK, DECK	2
15	T25461	KICK, TOE FRONT, DECK STACK DRYER	1
16	180180	SUPPORT BRACE, DECK	2
17	T25472	CLAMP STRIP, DECKING	4
18	T25474	CLAMP STRIP, DECKING, 43.5" LG	4
19	T80201	CLIP, DECK CORNER	4
20	180181	RAILING TIE-IN STRAP, DECK	2
21	180183	FRAME L BRACKET, DECK	2
22	180182	MOUNTING BRACKET, DECK	2
23	B50282	CAGE, 4", SAFETY, ACCESS SECTION	1
24	B5028	CAGE, 4", SAFETY	1
25	B5029	CAGE, 4", SAFETY, FLARED	1
26	B5084	LADDER, 44"	6
27	180165	SUPPORT, UPPER FRAME (NOT SHOWN)	1
28	T80207	SUPPORT FRAME, LADDER BASE	2
29	180208	ANGLE, LADDER BRACE MNT	1
30	180209	ANGLE, LADDER BRACE MNT	1
31	180210	ANGLE, LADDER BRACE MNT	1
32	B5008	CLIP & BOLT, LADDER	2
33	T25545	SPLICE, LADDER	12
34	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	48
35	J1110	NUT, WHIZ, 5/16-18	48



DRYER HITCH WITH 24" EXTENSION



SWPD0066-CE
5/20/2009 - EAB

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T16310D	HITCH RECEIVER WELDMT, JACK
2	1	T43711	HITCH INSERT WELD, 24" EXT
3	1	T4372	CLEVIS WELD
4	3	J0822	SCREW, 3/4"-10 X 5" LG.
5	3	J1220	3/4" LOCKWASHER
6	3	J1051	3/4-10 HEX NUT
7	2	J08361	BOLT, 7/8-9 X 6 1/2" LG
8	2	J1222	7/8" LOCKWASHER
9	2	J1059	7/8-9 HEX NUT
10	6	J0730	SCREW, 1/2 -13, 1.50,PLT,GR5,HHCS
11	6	J1215	1/2" LOCKWASHER,PLT,SPLIT
12	6	J1040	NUT, 1/2 - 13,PLT,GD5,HEX

QuadraTouch™

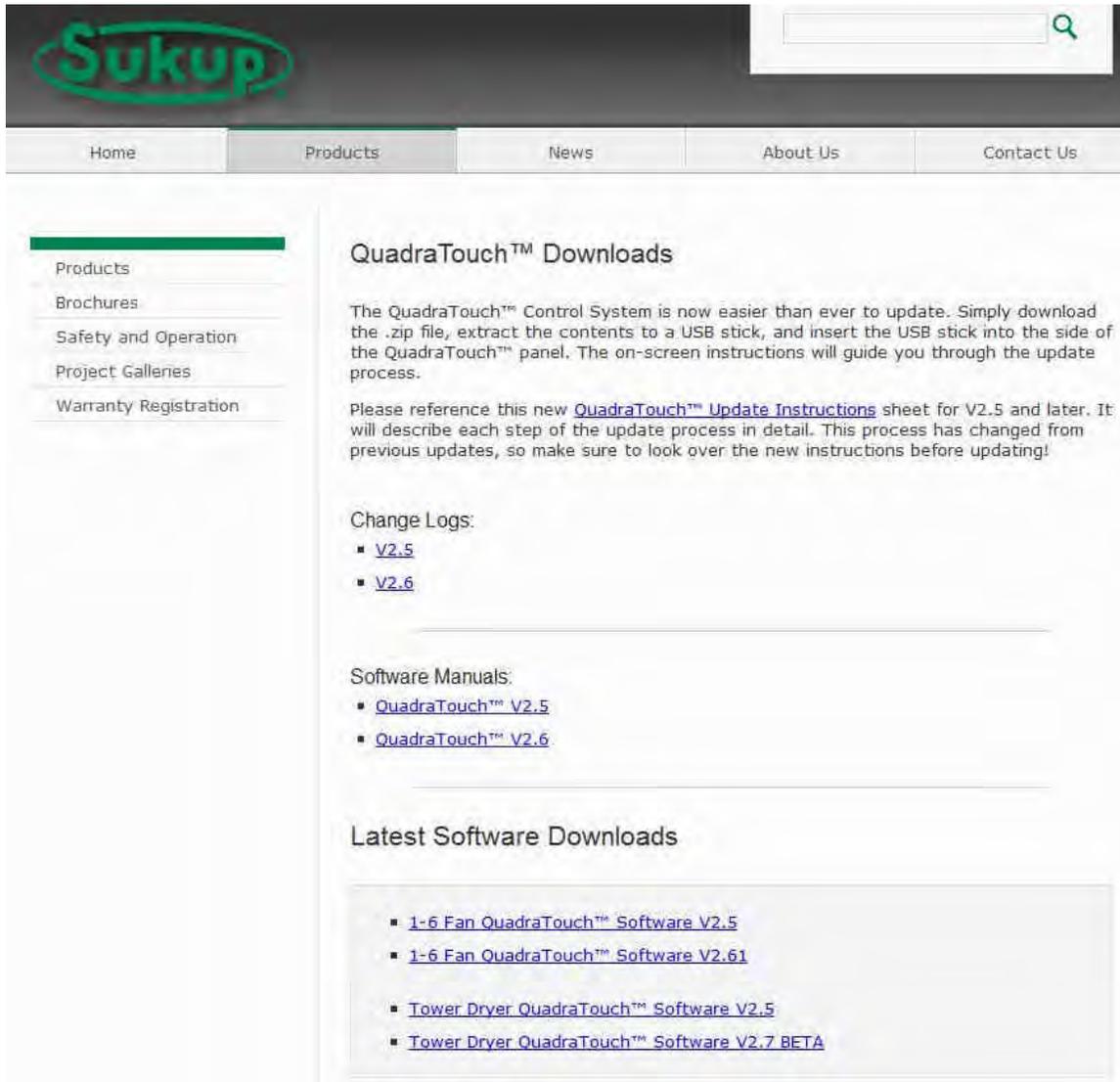


Download & Installation Instructions V2.5 and later

The QuadraTouch™ Control System is now easier than ever to update. Simply go to <http://www.sukup.com/Products/QuadraTouch> and download the newest software for your grain dryer. It's fast, easy, and it comes at no charge for our customers.

Downloading Instructions:

1. Go to www.sukup.com/Products/QuadraTouch



The screenshot shows the Sukup website's navigation and content. The top navigation bar includes Home, Products, News, About Us, and Contact Us. A search bar is located in the top right corner. The left sidebar contains links for Products, Brochures, Safety and Operation, Project Galleries, and Warranty Registration. The main content area is titled "QuadraTouch™ Downloads" and contains the following text:

The QuadraTouch™ Control System is now easier than ever to update. Simply download the .zip file, extract the contents to a USB stick, and insert the USB stick into the side of the QuadraTouch™ panel. The on-screen instructions will guide you through the update process.

Please reference this new [QuadraTouch™ Update Instructions](#) sheet for V2.5 and later. It will describe each step of the update process in detail. This process has changed from previous updates, so make sure to look over the new instructions before updating!

Change Logs:

- [V2.5](#)
- [V2.6](#)

Software Manuals:

- [QuadraTouch™ V2.5](#)
- [QuadraTouch™ V2.6](#)

Latest Software Downloads

- [1-6 Fan QuadraTouch™ Software V2.5](#)
- [1-6 Fan QuadraTouch™ Software V2.61](#)
- [Tower Dryer QuadraTouch™ Software V2.5](#)
- [Tower Dryer QuadraTouch™ Software V2.7 BETA](#)

2. Select the newest Portable/Stack or Tower Dryer program for your dryer.

QuadraTouch™ Downloads

The QuadraTouch™ Control System is now easier than ever to update. Simply download the .zip file, extract the contents to a USB stick, and insert the USB stick into the side of the QuadraTouch™ panel. The on-screen instructions will guide you through the update process.

Please reference this new [QuadraTouch™ Update Instructions](#) sheet for V2.5 and later. It will describe each step of the update process in detail. This process has changed from previous updates, so make sure to look over the new instructions before updating!

Change Log

- [V2.5](#)
- [V2.6](#)

Software M

- [QuadraTo](#)
- [QuadraTo](#)

Latest S

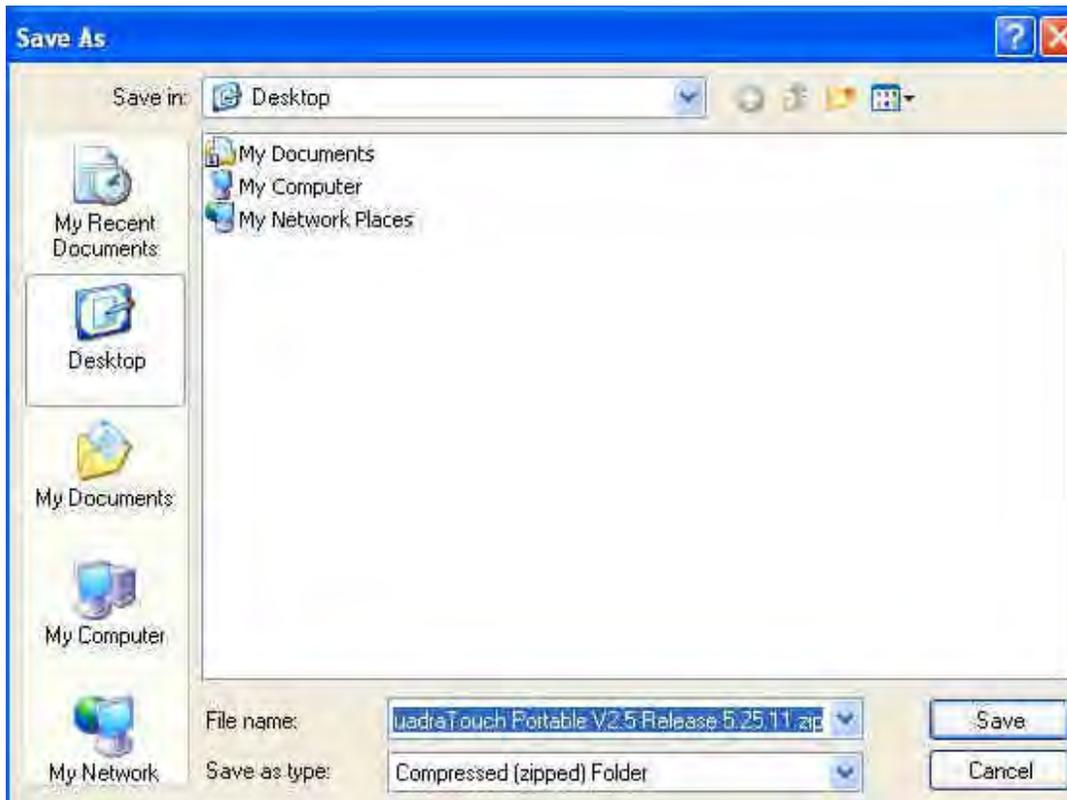


- [1-6 Fan QuadraTouch™ Software V2.5](#)
- [1-6 Fan QuadraTouch™ Software V2.61](#)
- [Tower Dryer QuadraTouch™ Software V2.5](#)
- [Tower Dryer QuadraTouch™ Software V2.7 BETA](#)

A dialog box will appear. Select "Save"

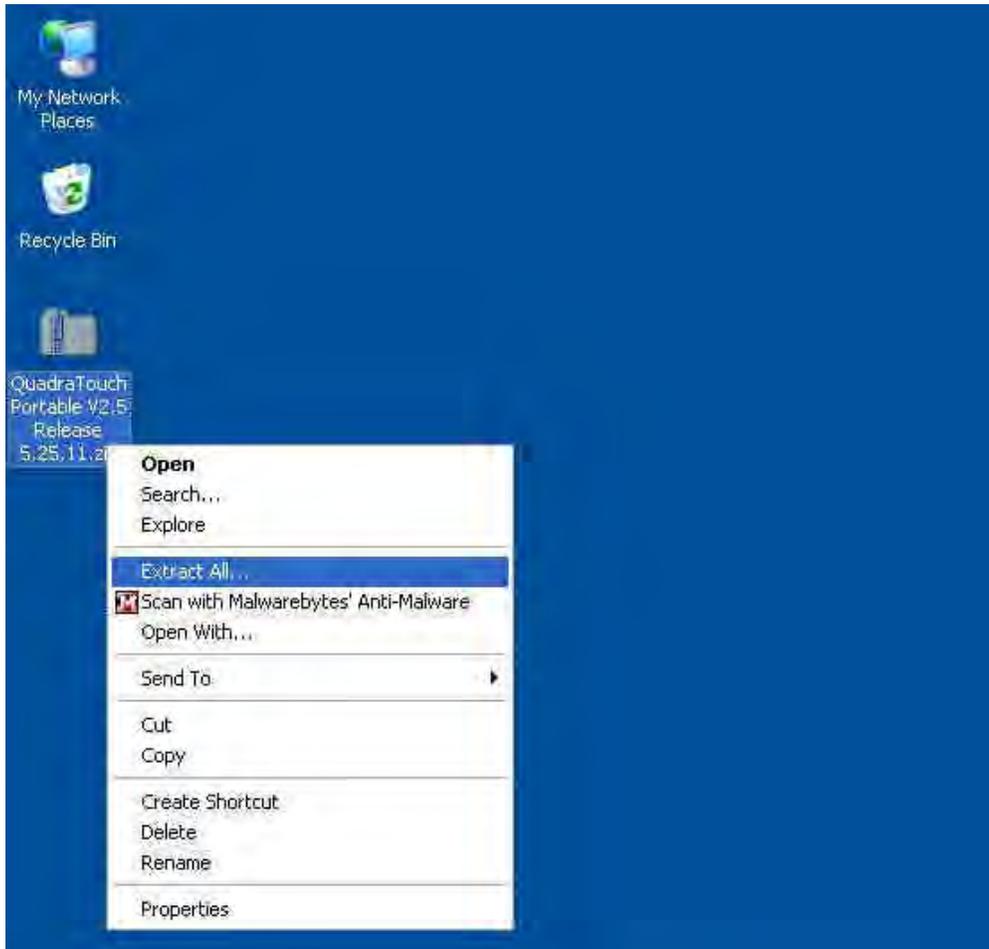
3. Next, another dialog box will appear. This time, it will ask you where you'd like to save the file. Typically "Desktop" is the easiest and preferred selection.

Locate "Desktop" in the Save in: dropdown menu or quick links on the left side of the screen. Then click "Save"



The download is about 16-20mb. It should take less than a minute on a high-speed connection.

4. After the download finishes, it will appear on your desktop (or wherever you choose to save it).

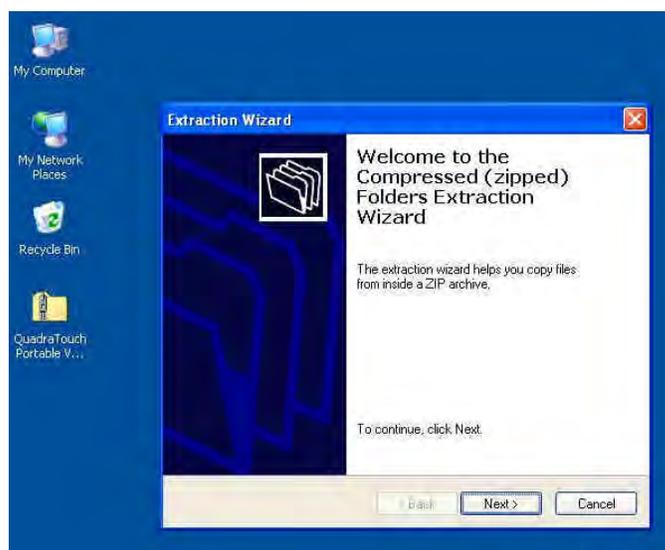


5. "Right Click" on the new program .zip file and select "Extract All"

Windows Vista and 7 users skip to step 8

A dialog wizard will pop up.

Select "Next"



6. The next page will ask you where you'd like to extract the files. It will automatically choose the directory you're currently working out of. In this case, it's the desktop.

Select "Next"



7. You'll notice a folder has been created on the desktop.

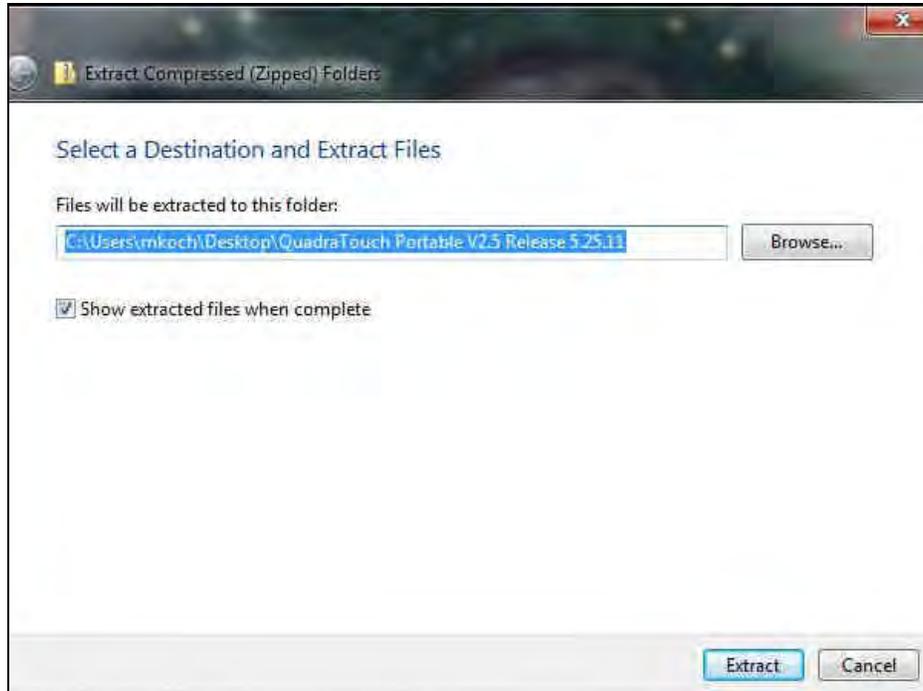
Select the check box for "Show the extracted files"

Select "Finish"

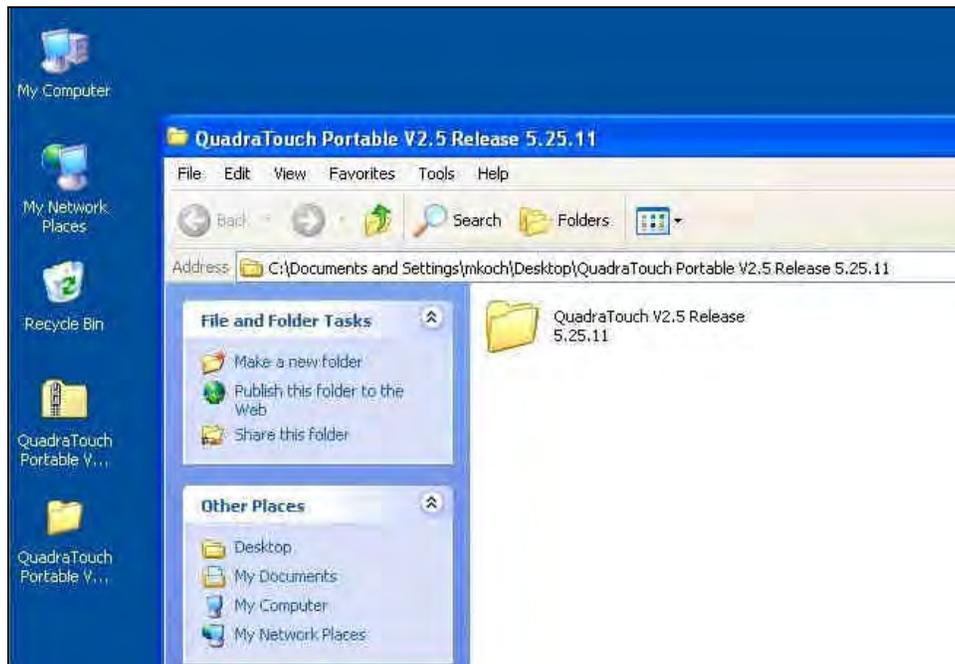
A window will open with the contents of the newly extracted files.



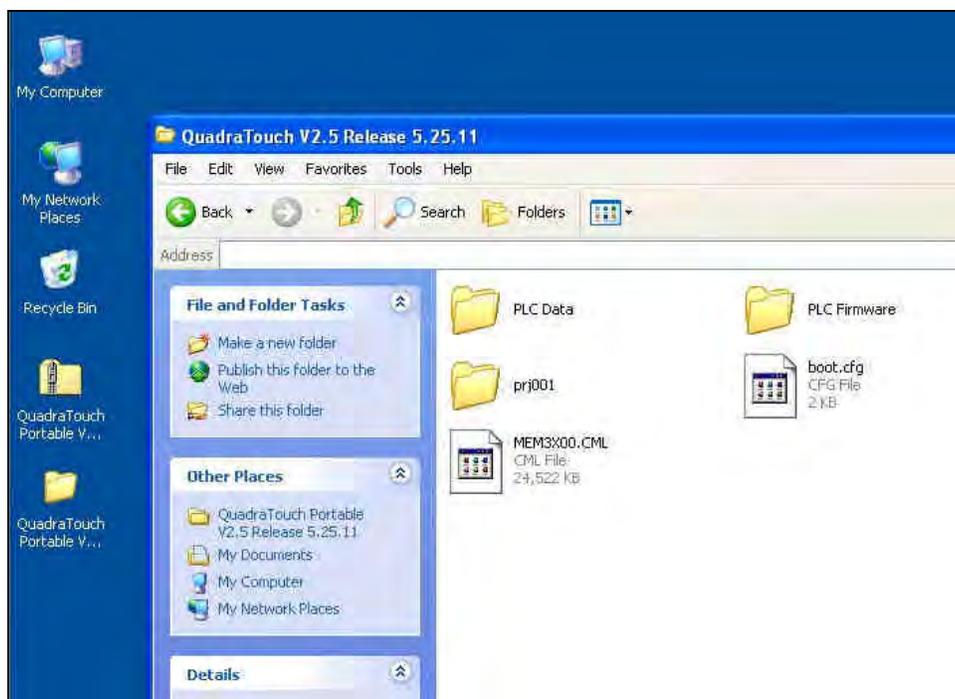
8. Windows Vista and 7 users will see something slightly different, pictured here. Simply choose the “Extract” option.



9. "Double-Click" the folder, and it's contents will be opened in another window.

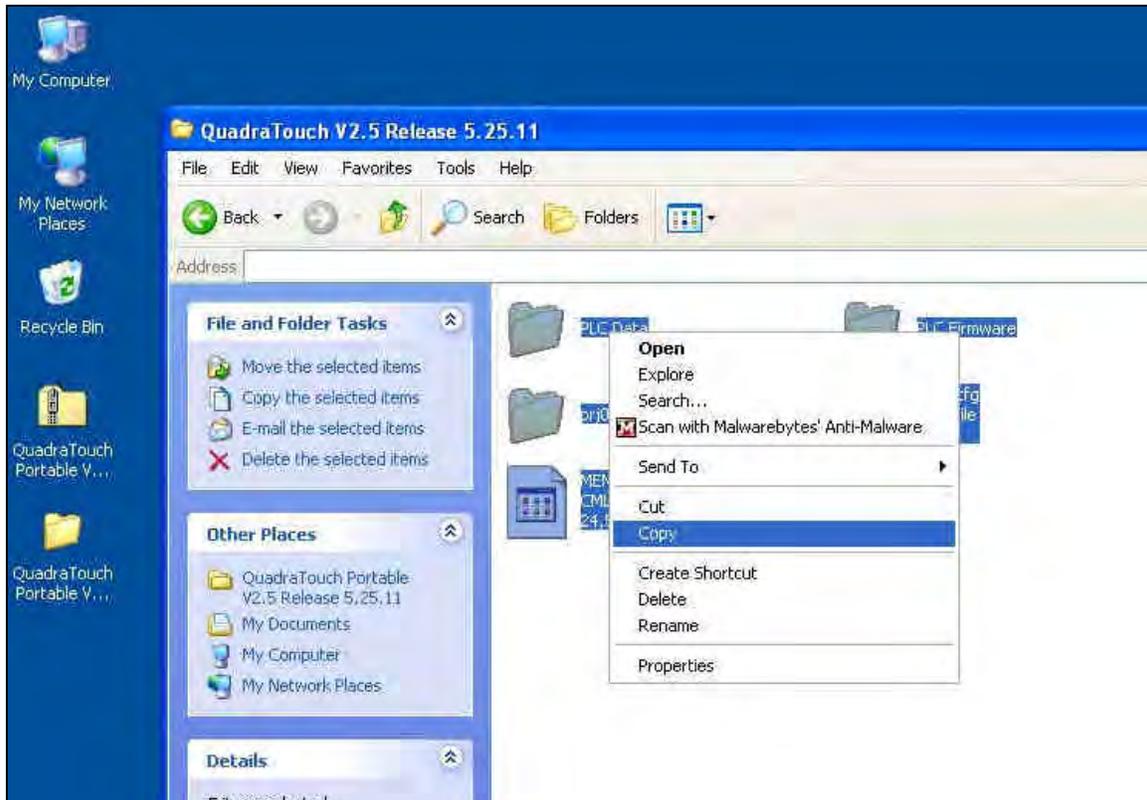


10. You will see this:



11. Highlight the contents of the folder by either holding the left mouse key down and dragging over the files or pressing Ctrl+A on you keyboard.

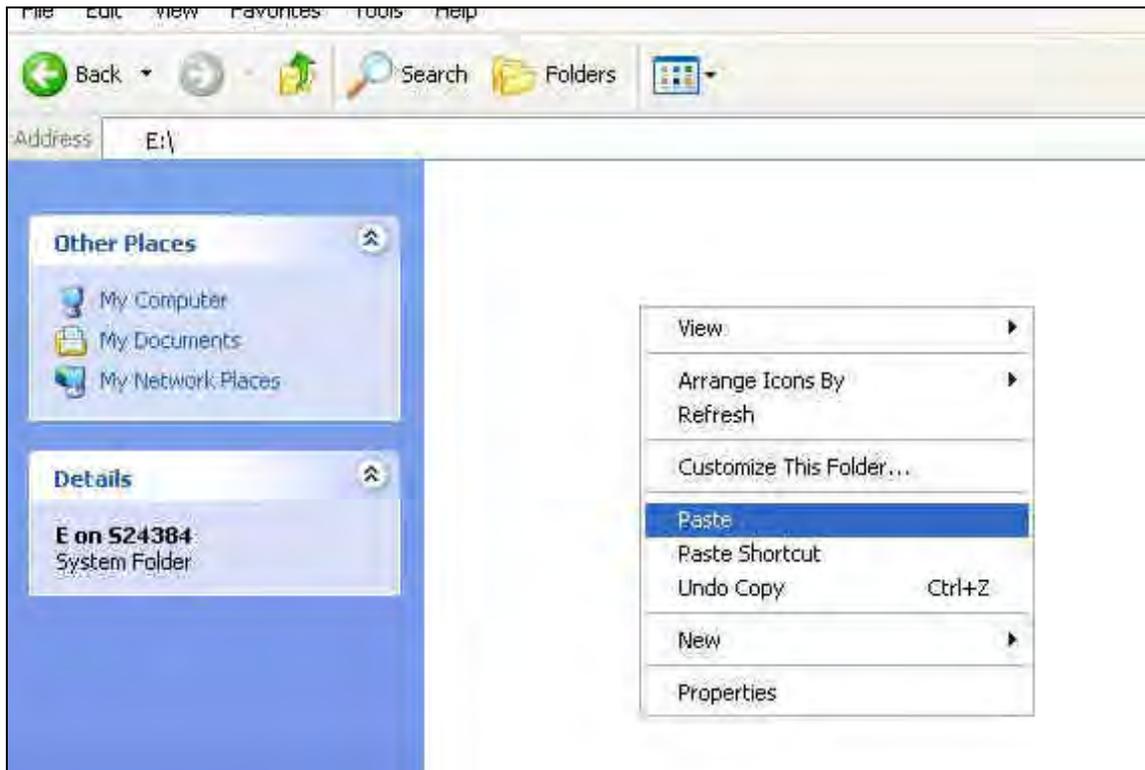
“Right-Click” any one of the selected files and select “Copy”



12. Insert a USB stick into the computer. A dialog window may open automatically, or a quick launch menu may appear. If not, you'll need to manually open the contents of the USB stick by opening the "My Computer" or "Computer" icon and locating the USB stick.

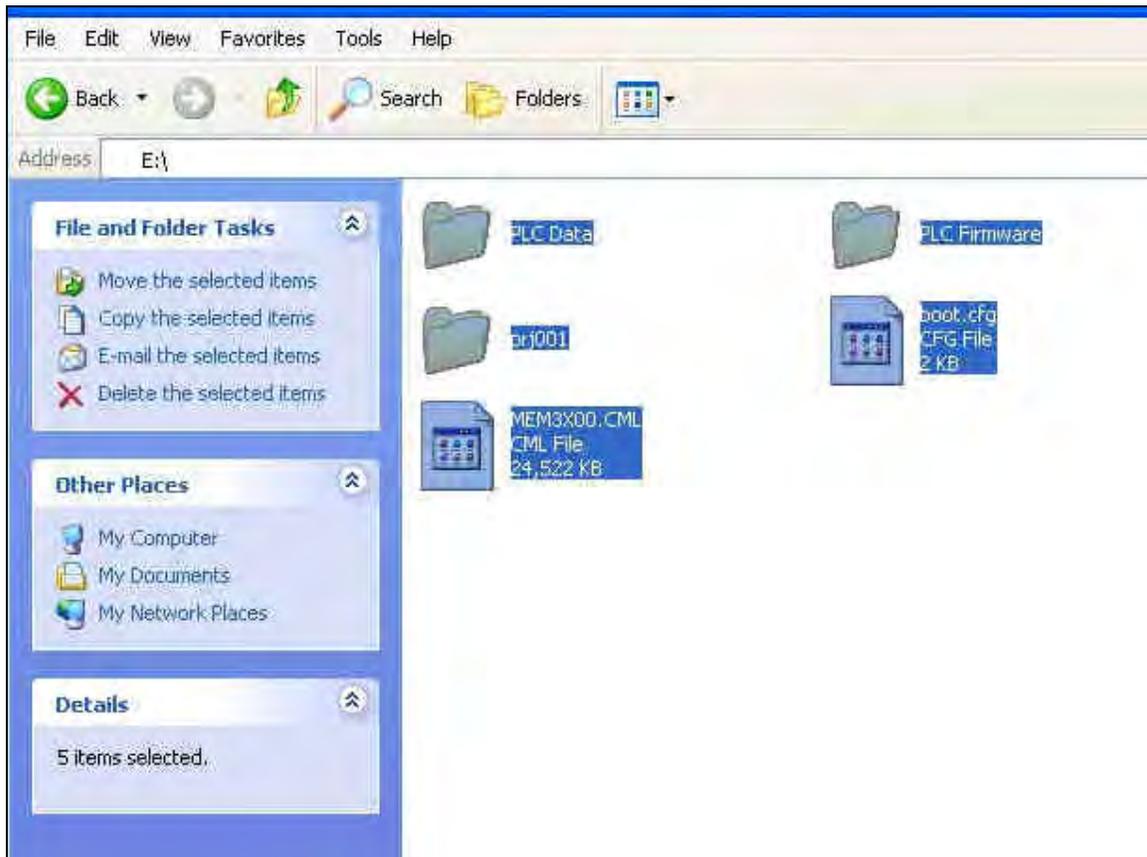
Once the USB stick has been opened, "Right-Click" in the "white, empty folder area and select "Paste"

The files will begin to copy onto your USB stick.



It's important that the files be placed on the root directory of the USB stick and NOT in another Sub-Folder. The touchpanel will not be able to read the contents otherwise. Notice in the "Address" bar, it says: "E:\"

13. If everything has been done according to these instructions, the contents of the file downloaded from the Internet should now be successfully on the USB stick as shown below.



QuadraTouch™ V2.5 HMI Update Instructions

Loading the QuadraTouch™ with new software takes about 5 minutes. Follow the step-by-step instructions listed below.

1. Power Up the QuadraTouch™ controller. Do not power on the dryer. If the dryer has power, turn the main disconnect switch to the “OFF” position.
2. Insert the USB stick (prepared in the previous instructions) into the side of the QuadraTouch™ controller. There are 2 USB ports on the side of the panel. Either one will work.
3. When the gray error bar appears at the bottom of the screen, select the black button (Left-most button of the group of 3 buttons on the right side of the gray error bar)
4. Select CF/USB
5. Select USB_Starting (If there is a problem here, it’s because the files weren’t placed correctly on the USB stick)
6. The panel will automatically reboot.
7. Upon Reboot, select “English” as the language
8. Select the button to the right: Download USB → Display
9. Select “Start”
10. Select “Yes”
11. When the process finishes, hit the back button twice, and then exit. Then select “Yes” you want to restart. (or simply turn power off and back on again)

DO NOT POWER THE UNIT DOWN DURING PROGRAMMING. THIS WILL CAUSE THE UNIT TO FAIL, AND IT WILL NEED TO COME BACK TO SUKUP MANUFACTURING FOR REPAIR.

QuadraTouch™ V2.5 PLC Update Instructions

After updating your HMI program to V2.5 or greater, you will have the option to load the PLC program directly from the HMI without the use of a computer. All necessary files are included with your program download.

To get to this screen (if not automatically prompted) Choose the “Tools” → “System Tools” → “QuadraTouch Update”

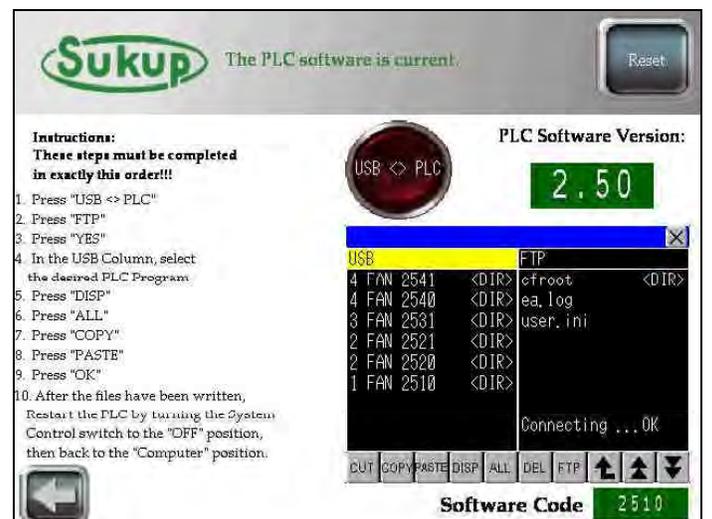
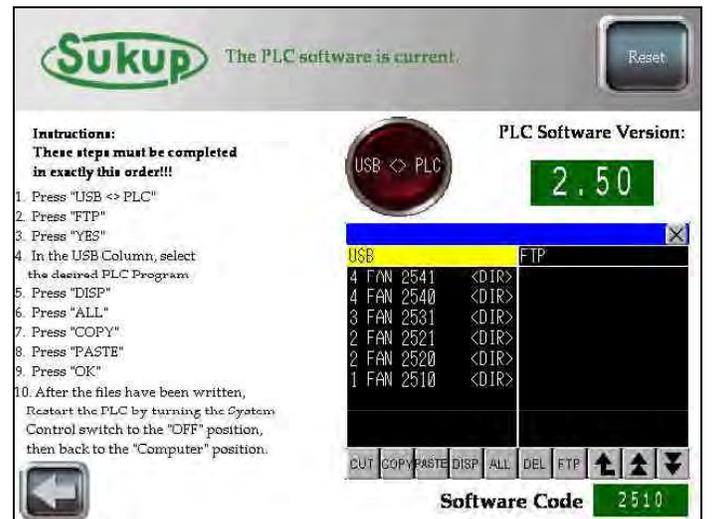
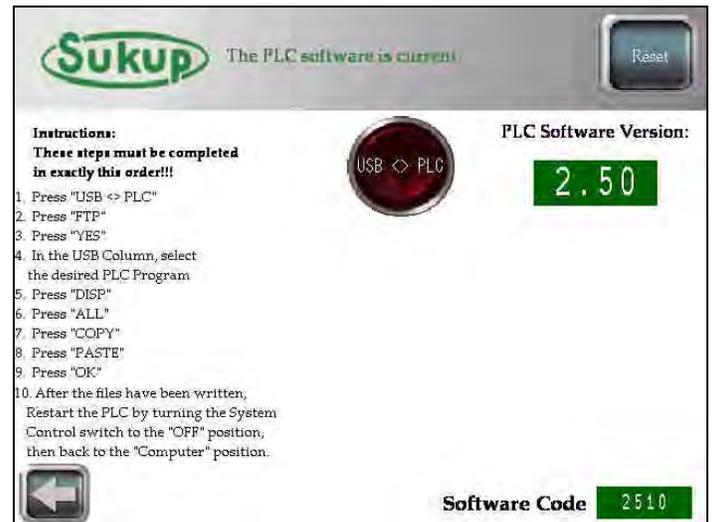
Nicely enough, the directions are right on screen with you, so performing this task should be relatively painless.

First, touch the black, circular “USB\leftrightarrowPLC” button. A rectangular USB/FTP box will appear in the lower-right corner of the screen (shown in the picture to the right).

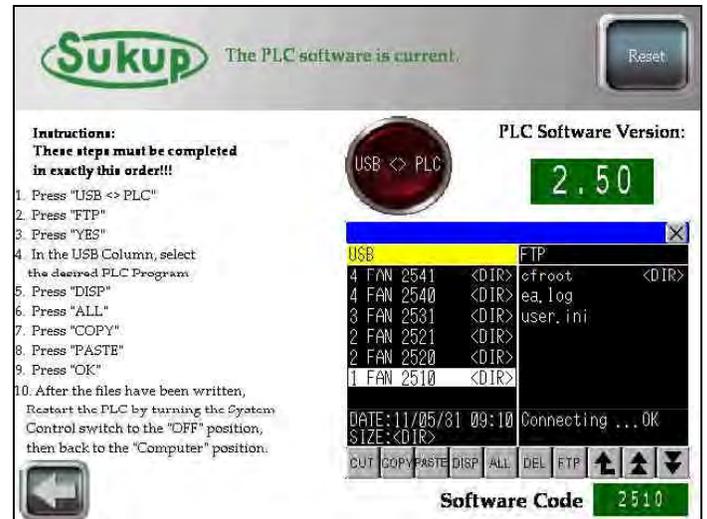
Next, press “FTP”, and a dialog box will pop up. Select “YES”

After selecting “YES”, the FTP column will show the PLC’s contents.

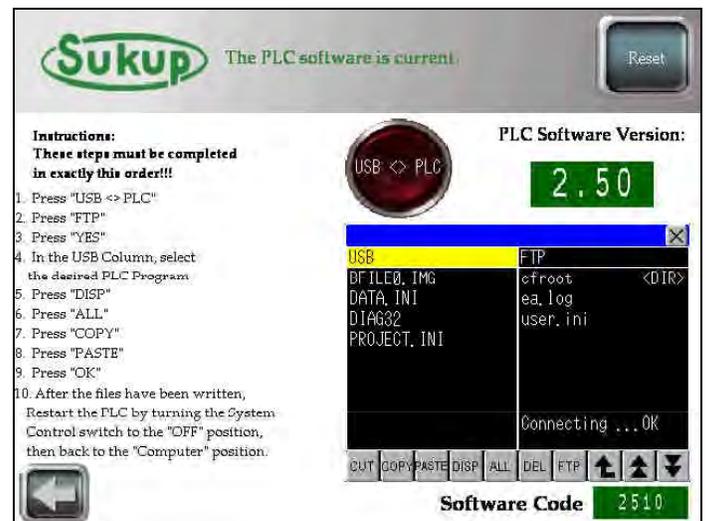
All V2.5 and later software releases will contain all the portable dryer programs. After updating to V2.5, there will also be a software code that appears in the lower-right corner of the screen. The code 2510 means V2.5 software, single-fan program, and no incoming moisture sensor. Similarly, a code of 2521 would mean, V2.5 software, two-fan program, and an incoming moisture sensor.



In the USB column, select the appropriate fan setup. As was just mentioned, after updating to V2.5, you'll have a software code to help you in choosing the right PLC folder. Don't worry though, if something goes wrong, you can always start the process over! Here, we are updating a single fan model. Touch the desired PLC folder in the USB column to highlight the desired folder.



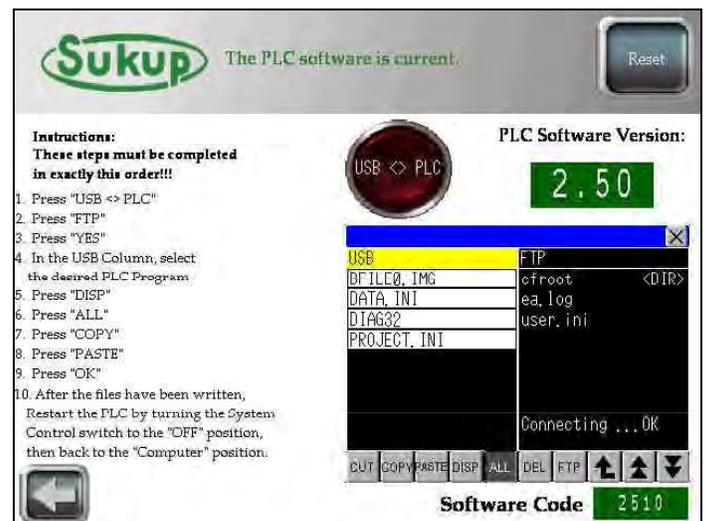
Touch the "DISP" button. The contents of the selected folder will then be displayed in the USB column.



Next, touch the "ALL" button. This will highlight all the files in the USB column.

Select "COPY"

Select "PASTE"



A dialog window will appear. Select "OK"

Finally, the HMI will send the files over to the PLC for programming.

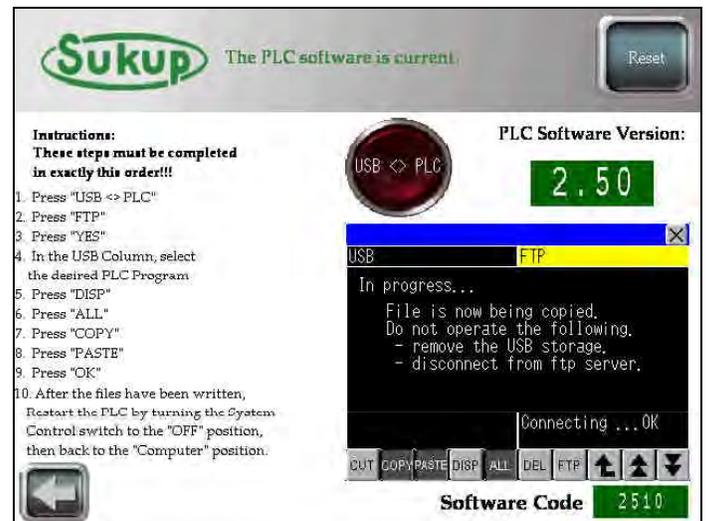
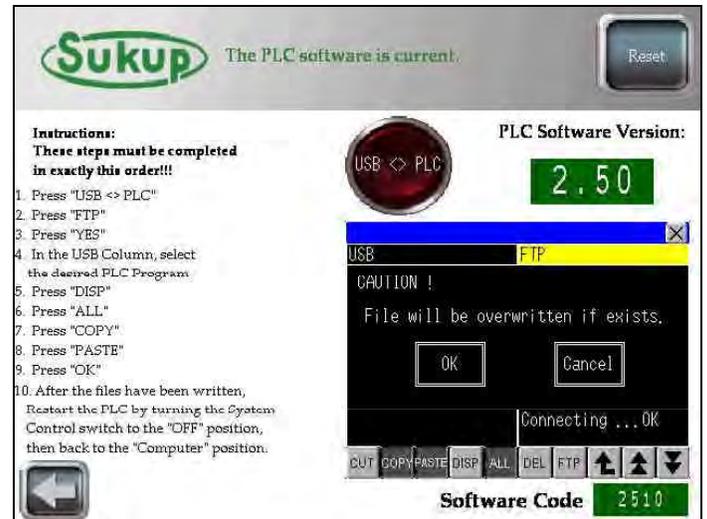
A progress box will open with "In progress" blinking.

Do not power off either device during programming!

When the file transfer is complete, the "In progress" dialog will disappear, and the process is finished. For the new program to take effect, the PLC will need to be restarted. As shown in step 10 of the on-screen instructions, simply turn the system control switch, located on the side of the power box, to the "OFF" position, then back to the "Computer" position.

IMPORTANT!!!

After completing step 10, the PLC will be loaded with the new software. However, if the PLC doesn't reconnect with the touchpanel and show the new version of software, the 7-step procedure will be required on the next page.



***** IMPORTANT INFORMATION *****

**PLC's with HW/FW 04/205, 04/220, and select 04/354
(found on the left side of the PLC, third line of text)**

Model Year '08, '09, early part of '10

After updating the PLC software to V2.50:

The PLC will boot the new program, and the RDY light (shown in the picture to the right with the arrow) will stop blinking and be constantly lit "ON". All other lights on the green slices should also stop blinking.



If the FR light is still blinking (the top-right light on the black power slice) when the RDY light is solid, you will need to perform the following steps:

This procedure is time sensitive. If you think you may have deviated from the instructions, turn the power off, then on again, and start the process over. The whole procedure only takes about 8 seconds to accomplish, so read these instructions BEFORE ATTEMPTING!!!

1. Find the small gray toggle switch on the left side of the PLC (shown in picture to the right). It's currently in the "RUN/PROG" position.
2. Hold the switch in the "MRESET" position. The "FR" light will stop blinking and immediately turn "ON" solid. Continue holding it up until the "FR" light turns "OFF". This usually takes about 3 seconds.
3. When the "FR" light turns "OFF", let the switch fall down into the "STOP" position. The "FR" and "FF" lights will begin to blink together.
4. As soon as the lights begin to blink together, hold the switch up in the "MRESET" position again. The "FR" and "FF" lights will continue to blink together, but the "FF" light will stop blinking in about 3 seconds. When the "FF" light stops blinking with the "FR" light, release the switch. It will fall back down into the "STOP" position.
5. Cycle the PLC power (turn power off, then back on again).
6. After the RDY light has stopped blinking and goes solid "ON", flip the gray toggle switch to the RUN/PROG position and the FR light should stop blinking and turn solid "ON".
7. ALL DONE! The HMI will now prompt you to update the firmware on the PLC. Follow the on screen instructions.



QuadraTouch™ Firmware Update

In order for your PLC to take advantage of the newest features offered in the most recent QuadraTouch™ software release, it's sometimes necessary to update the PLC's firmware in addition to the PLC's program you've just updated.

Make sure the USB programming stick is still inserted into the QuadraTouch™ panel.

The QuadraTouch™ panel will automatically prompt you to complete a firmware update procedure if necessary. If the screen doesn't come up, your system is already up-to-date with the latest firmware.

The firmware update is accomplished in much the same way the PLC program update is performed. The instructions are on-screen, so they are very easy to follow along.

In step 9, you'll be asked to press and hold the "Update FW" button. After pressing that button, the gray error bar will appear on the QuadraTouch panel, and the PLC will perform a system reset, then reboot. During this process, the PLC will be installing its new firmware.

THE RESET/REBOOT SEQUENCE TAKES ABOUT 1 MINUTE. AFTER THE "RDY" LIGHT TURNS "ON" SOLID, THE "FR" LIGHT MAY STILL BE BLINKING— AS IN THE PREVIOUS PAGE'S INSTRUCTIONS.

TO GET THE "FR" LIGHT TO STOP BLINKING –

- 1. PUT THE SMALL GRAY TOGGLE SWITCH IN THE "STOP" POSITION.**
- 2. PUT THE SMALL GRAY TOGGLE SWITCH BACK INTO THE "RUN/PROG" POSITION.**
- 3. THE "FR" LIGHT WILL TURN "ON" SOLID. ALL DONE!**

Appendix G

Software Manual

Manual L141038

V2.65

06/25/2014

Software Manual

V2.65 QuadraTouch™ Dryer Control System



Look for the newest updates on www.sukup.com/Products/QuadraTouch

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“Main Screen”

Located to the right is the main screen. If all the faults are clear, and all of the system inputs are functional, this screen will appear on startup. There are four (4) buttons located on the top of the screen. In addition, the version number and fan setup are listed on the bottom right hand portion of the screen.

(You will see this header with the Sukup logo and any number of buttons throughout the entire program.)

The “Tools” and “Settings” menus will be explained first.



“Tools” Menu

Pressing the “Tools” button will change screens to this one located to the right. (“Bushel Shutdown” and “Bushel Count” will not appear until after the bushel counter has been calibrated under the “Calibrate Sensors” menu)

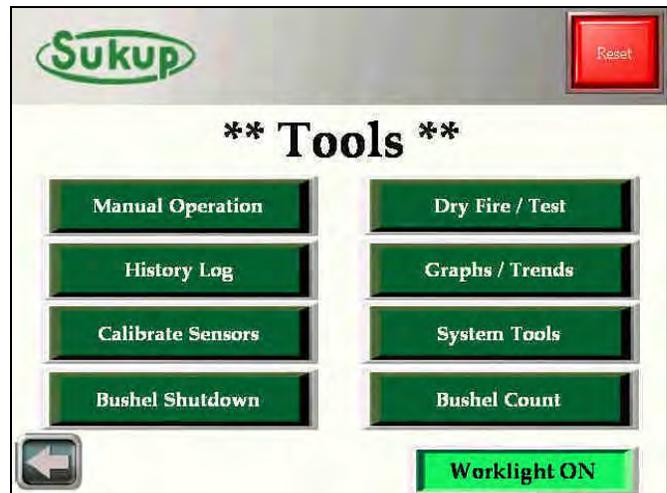
Manual Operation and Dry Fire modes are available in the tools menu.

The History Log keeps track of all fault occurrences and past dryer operations. It shows the date and time when each event happens.

The “Graphs / Trends” button will display a color graph of the discharge moisture, plenum temperature, and meter roll speed.

The “Calibrate Sensors” button will allow you to adjust your moisture sensor and plenum RTD to better reflect exact values.

There is also a nice system tools menu that will be explained in the “System Tools” Section.



Tools → Manual Operation

The first option on the “Tools” menu is the “Manual Operation” button. In manual mode, the user is completely in charge of fan/heater operation as well as load and unload operations. The user is also able to specify a desired meter roll speed. The “Heater” function is interlocked with the “Fan” button. If the fan is not running, the heater will not be able to be turned on.

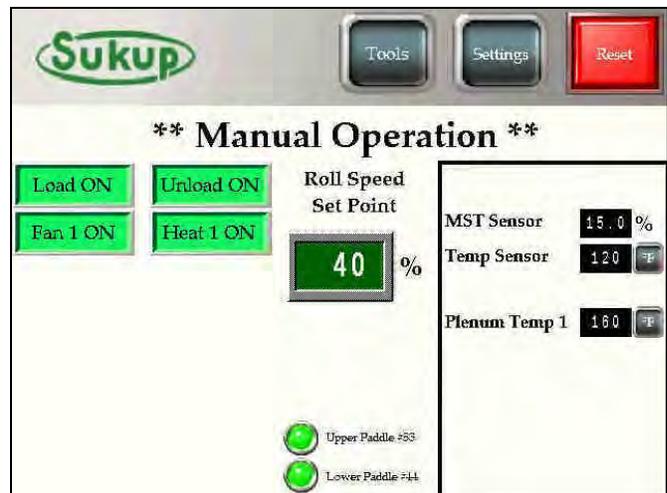
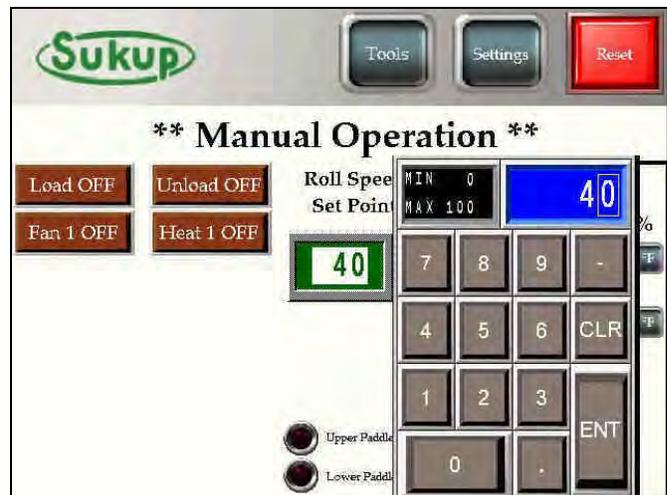
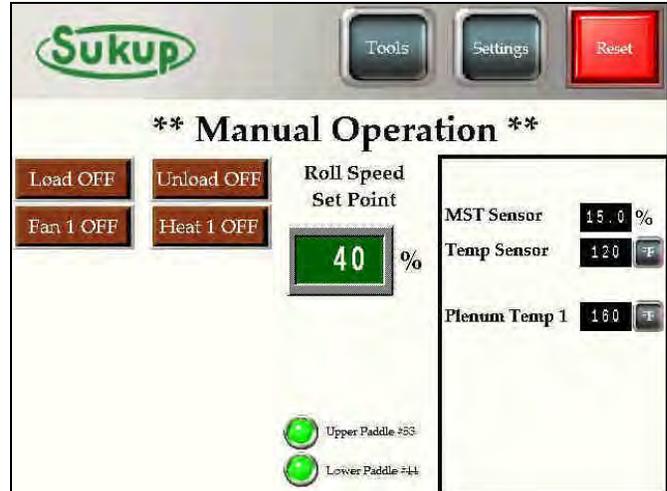
After about 1 minute and 30 seconds, a push-and-hold button will appear on the screen. “Go To Auto Control” will take the user from manual operation to automatic operation seamlessly without the need to shutdown and restart.

Any number display on the touch-panel that appears like the “Roll Speed Set Point” is an adjustable value. Simply touch the number and specify a value using the pop-up keypad.

**Special NOTE:

All buttons that appear burgundy in color (like the load, unload, fan, and heater buttons in the first image) require you to press and hold that button for a full second before the button’s action will be processed. When these buttons are activated, the button will appear in an “On” state denoted by depressed button style and a light, neon-green color (like in the second image).

V2.65 adds paddle switch indicators to the manual screen.



Tools → “Dry Fire” Mode

In addition to “Manual Operation”, “Dry Fire” can also be accessed from the “Tools Menu”.

This mode is used to test the dryer’s fan(s) and heater(s). It’s a good idea to dry fire the dryer before each drying season to ensure quality operation.

The user will start by selecting “HEAT” or “COOL” operation, and then press the “OK” button that appears.



The screen will display a 10- minute running timer while showing the operation type and plenum temperature(s). The signals for Fan On, Air Switch, Differential Air Switch, Heat On, and Flame Detection will appear next to each plenum. This can be a very helpful diagnostic tool.



Lastly, “Dry Fire” will conclude after the timer has expired, and the fans and heaters will automatically turn off.



Tools → History Log

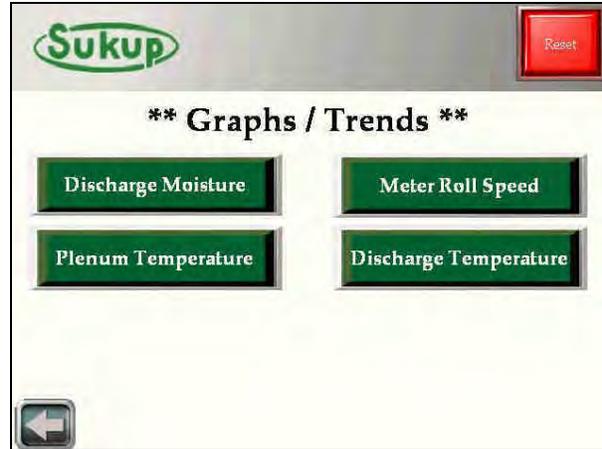
The “History Log” displays events like faults or mode operations. It always shows the latest event on top.

To navigate through the history log, touch the “Enable Scroll” button, and the first entry will become highlighted. Select the “Scroll Up” / “Scroll Down” buttons to move the highlighted entry up or down.



Tools → Graphs / Trends

The “Graphs / Trends” button gives you the ability to visualize the progress/performance of the dryer. The user can have a visual representation of moisture, plenum temperature, roll speed, and discharge temperature. Each of these graphs are stored independently on the Panel’s Compact Flash card. These features are explain in the “CSV Data Transfer” section.

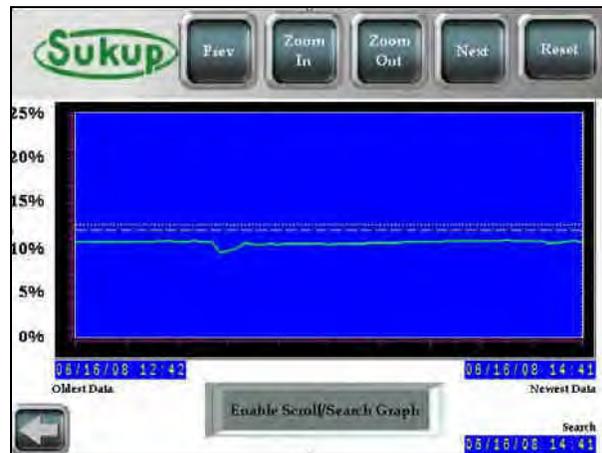


The graph is searchable/scrollable after selecting the “Enable Scroll/Search Graph” button located at the bottom-center of the screen. After pressing that button, crosshairs will appear on the screen, and the buttons located in the header will be functional.

Each graph will display the time and date of the oldest and newest data on the left and right of the x-axis.

The buttons on the header (except Reset) will be inactive until the “Enable Scroll/Search Graph” button is pressed.

The graph is also searchable by time/date by pressing the blue area under “Search” on the bottom-right of the screen.



Tools → Calibrate Sensors

By selecting the “Calibrate Sensors” button, the user can put offsets on the analog inputs of the system. These include the moisture sensor, bushel counter, and input moisture sensor (if applicable).

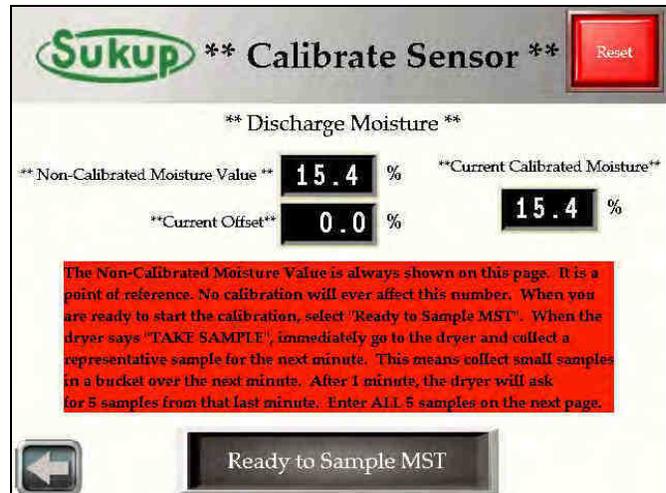
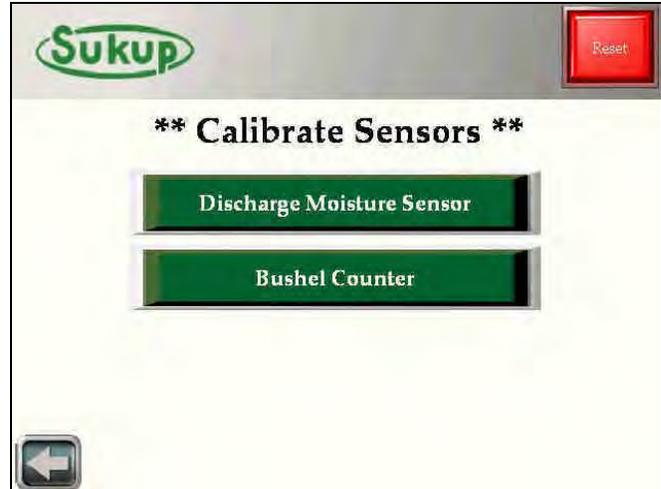
NOTE: Read the “Red” box on the top of each page very carefully.

Tools → Calibrate Sensors → Discharge Moisture Sensor

For V2.65, the calibration procedure has changed. All calibration instructions are posted on screen. The first box on this page is the “Non-Calibrated Moisture Value” located in the top-center of the screen. This value is the actual moisture coming from the sensor. No calibration procedure will ever affect this value. The “Current Offset” value is located directly below this. The offset value is your system’s current stored calibration. Adding “Non-Calibrated Moisture Value” and “Current Offset” will give you the “Current Calibrated Moisture” value located on the right side of the screen.

When the button on the bottom of the screen “Ready to Sample MST” is pressed, the “Please Wait...” text will flash for **10 seconds** before it turns green and tells you to “Take Sample Now.”

During the “Please Wait...” 10 second period, you should be heading out to the discharge chute of the dryer for sampling. Take a bucket with you and collect small samples of grain in the bucket for the next 60 seconds.



Tools → Calibrate Sensors → Discharge Moisture Sensor

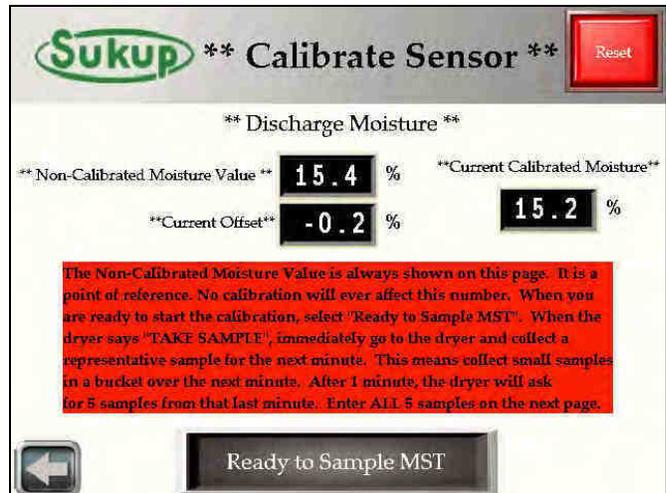
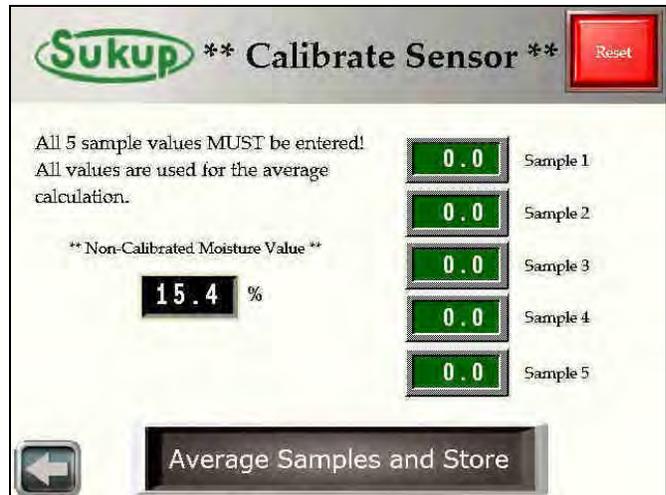
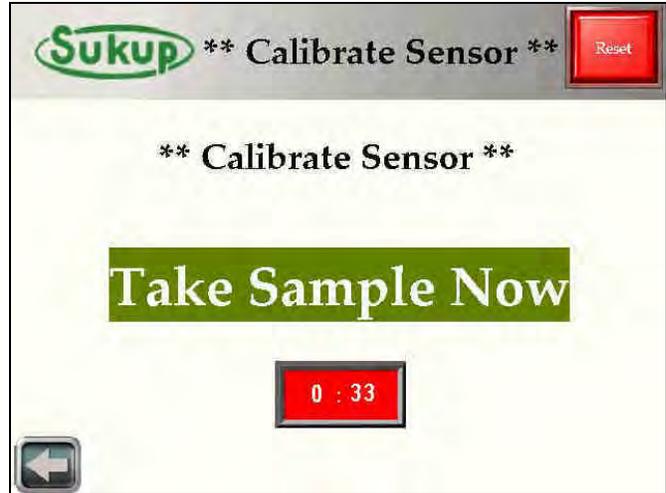
After the 10 sec “Please Wait...” delay timer has expired, the QuadraTouch™ display will tell you to “Take Sample Now.”

While you are at the dryer during the “Take Sample Now” period, the dryer will also be recording the moisture average over the next minute. After 1 minute, you’ll have the opportunity to compare your values in the sample bucket to the dryer’s 1-minute moisture average.

After you’ve collected a representative sample of grain for 1 minute, it’s time to test the grain sample.

The screen to the right comes up immediately after the “Take Sample Now” timer has expired. The “Non-Calibrated Moisture Value” is locked in so it can be compared to your bucket samples. For better accuracy and control, the QuadraTouch™ system asks for 5 samples from your bucket. It will average all 5 samples and compute the offset for you. All 5 samples must be entered otherwise a zero value will be used in the averaging.

Lastly, press “Average Samples and Store” on the bottom of the page, and you’ll see that the 5 samples are averaged together, and subtracted from the “Non-Calibrated Moisture Value” and stored in the “Current Offset” box. To the right, you’ll see an offset of (-.2%) is used. This results in a calibrated moisture of 15.2%.



Tools → Calibrate Sensors BUSHEL COUNTER

The bushel counter is configurable in two ways – automatic and manual. Read the instructions in red on the top of the screen.

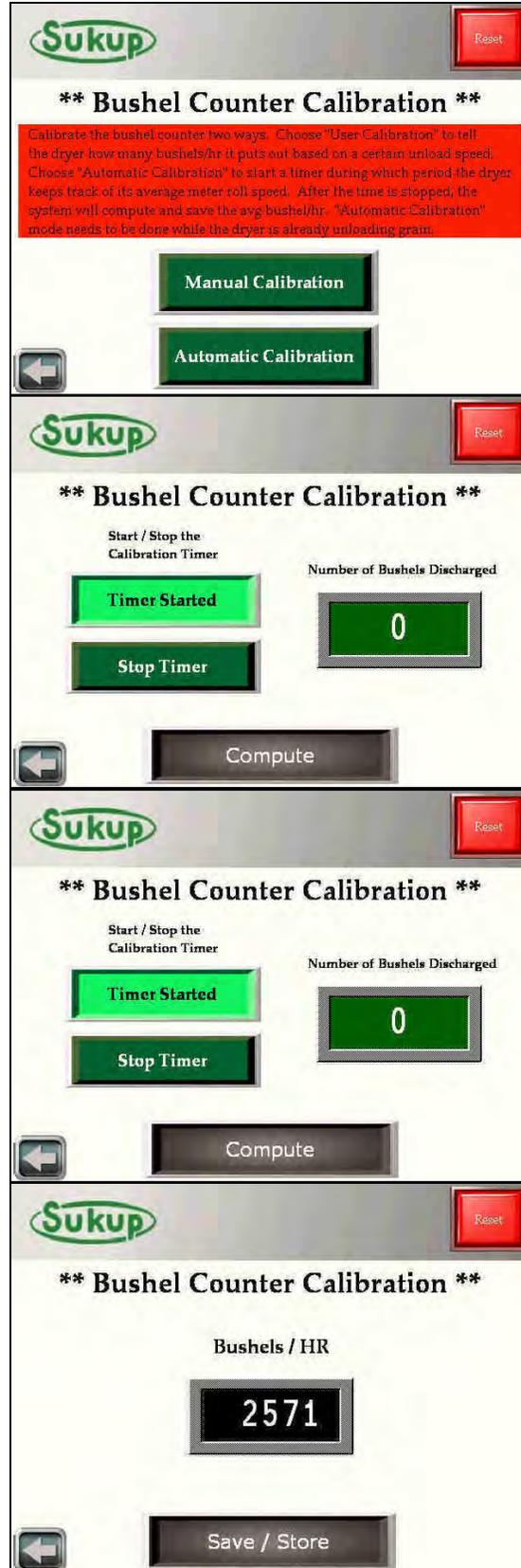
The automatic calibration is shown here. For the calibration to work, the user will need to know how much grain (in bushels) has been discharged from the dryer. A grain cart equipped with a scale works well.

To do the automatic calibration correctly, the dryer **MUST BE UNLOADING GRAIN**.

Simply start the timer, then after a period of time, stop the timer and enter the number of bushels discharged. The dryer will keep track of the unload speed during the unload process then compute a bushel/hr rating.

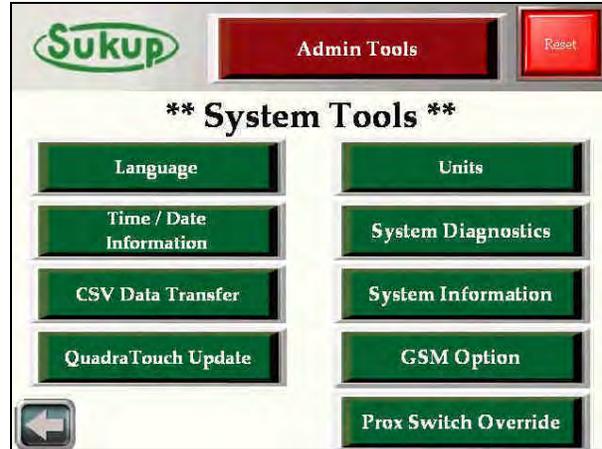
The user must then select “Save/Store” to store that value. The dryer will then begin to keep track of the amount of grain being discharged from the dryer.

After calibration is completed, the options for “Bushel Shutdown” and “Bushel Counter” will appear in the “Tools” menu.



Tools → System Tools

The “System Tools” menu allows the user to visualize and adjust the main system settings as well as offer some great diagnostic tools.



Tools → System Tools → Language

Select a system language. V2.65 will have future languages in different program selections.



Tools → System Tools → Time/Date

Change Date and Time using the arrow keys.



Tools - System Tools – CSV Data Transfer

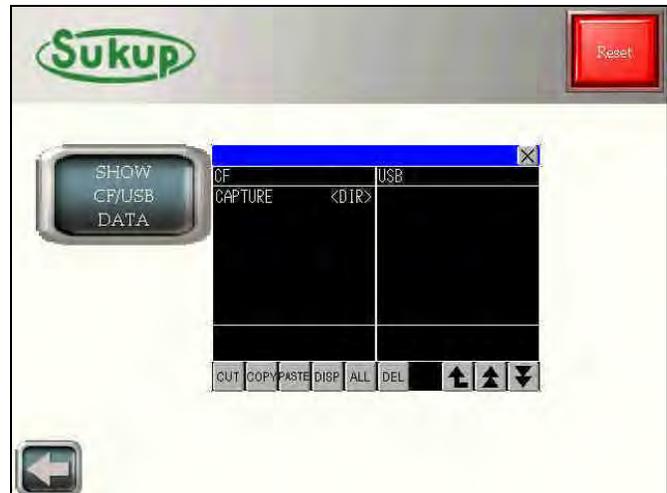
Selecting the “SHOW CF/USB DATA” displays the black directory window. This window shows all the folders and files available on the Compact Flash Card and USB storage devices plugged into the panel.

In this image (right), the panel has a Compact Flash card inserted in the back of the panel, and the CF card has one folder called “Capture”. The USB device is either not inserted or empty. To transfer files between the two cards, simply touch the file or folder you want, and then select the “Cut”, “Copy”, “Paste”, “Disp”, “All”, or “Del”. These buttons are relatively self-explanatory.

Each Touch-Panel comes with a factory-supplied Compact Flash card. All data that is collected in the drying process will be stored to this card. A person would use this feature to copy data from the card for backup purposes and/or to graph the data on a computer.

***It wouldn't be necessary to use this feature if the user already has a CF card reader for their computer. They could just remove the CF card from the back of the touch-panel and insert it into their card reader.

If not, the data must be transferred over to a USB flash drive, using this function.

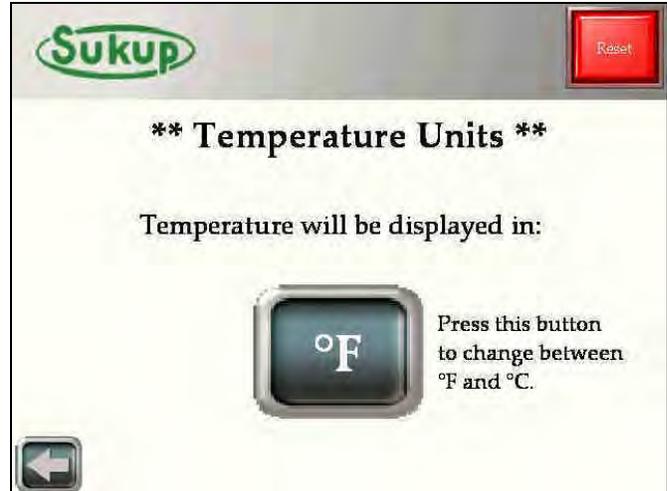


Tools → System Tools → Units

Change between Fahrenheit and Celsius.

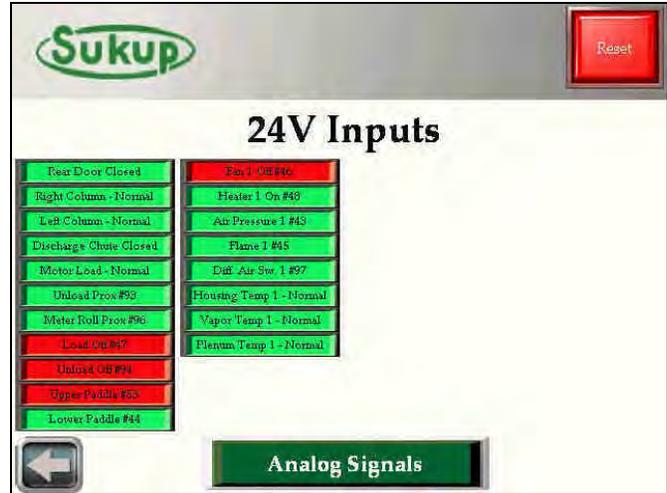
This page allows the user to press the button and the units will change from °F to °C or vice-versa.

On other screens where this same image is displayed (but smaller, generally always next to a temperature value), the user is also able to press and hold that button, and the units will change as well.



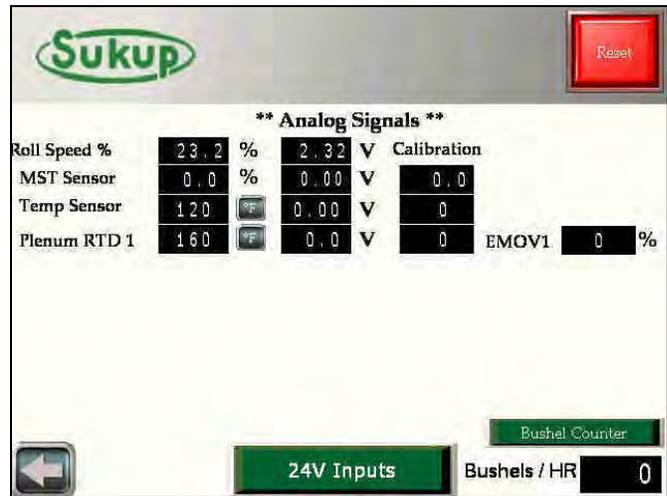
Tools → System Tools → System Diagnostics

The “System Diagnostics” feature is very nice to have. Locate to the right is a picture of the system’s 24VDC input. It is an up-to-the-second, visual representation of the PLC’s discrete inputs and outputs. When the input is triggered or 24VDC is present, the “lamp” will appear green in color. When not energized, it will appear red.



By selecting the “Analog Signals” button, the user will be able to see the voltages and interpreted values of all the analog inputs and outputs. These are especially helpful when troubleshooting problems.

SPECIAL NOTE!!!!:
Pressing and holding the SUKUP logo on the top left of every screen will get to this analog signals page.



Tools → System Tools → System Information

In the system information page, the PLC and HMI software versions are displayed. Check <http://www.sukup.com/Products/QuadraTouch> to make sure your dryer has the latest software updates.



Tools → System Tools → GSM Option

If equipped with the T24999 GSM kit, the dryer will automatically contact the programmed number on this page in the event of a fault condition. Press and Hold "International Dialing" if the number you want to notify is outside the +1 country code.

See the L24999 GSM modem operating instructions at the end of this section for more information.



If dialing outside of North America, you may need to change the band setting of the GSM modem. Touch the "Help" button to show band setting options.



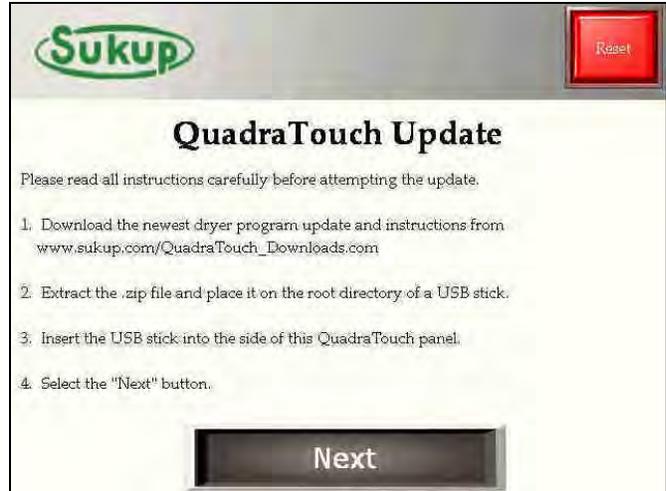
Tools → System Tools → Prox Switch Override

Sometimes it may become necessary to ignore the system's 2 proximity switches. These switches are intended to verify auger rotation, and this override should only be used in extreme cases. If the switch is malfunctioning, a replacement switch should be ordered immediately! Should you choose to continue dryer operation in the event of a missing or failed switch, this override can be used to bypass the proximity switch failure fault. The override will last for 24 hours, and then the override will be cancelled automatically.



Tools → System Tools → QuadraTouch Update

Please refer to the QuadraTouch™ Update instructions sheet for more information.

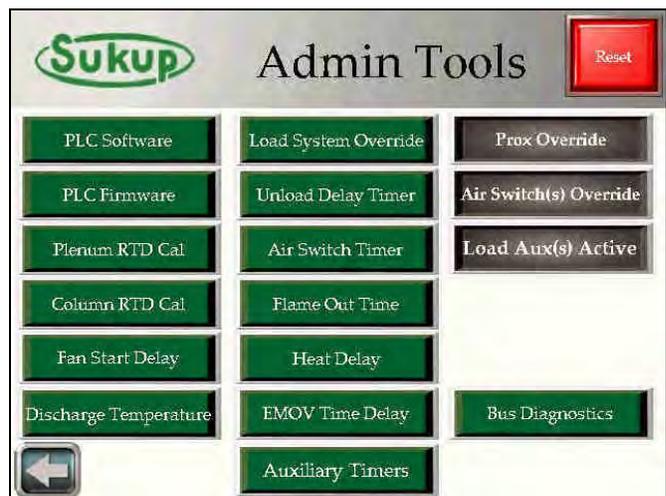


Tools → System Tools → Admin Tools

The Admin Tools menu allows you to customize your dryer in order to better suit your operating conditions. **HOWEVER: Some options will allow you to seriously change the way the dryer operates. In some cases, serious and permanent damage may occur if the settings are used improperly.**

SUKUP MANUFACTURING DOES NOT RECOMMEND BYPASSING SAFETY CIRCUITS AND SENSORS FOR ANY PERIOD OF TIME. ONLY USE THESE SETTINGS IF ABSOLUTELY NECESSARY.

To the right is the admin tools section. You will always see the “RED” warning screen when trying to access this menu.



**Tools → System Tools →
Admin Tools → Load System
Override**

The load system override function allows you to turn on the load motor and either auxiliary motor in any order regardless of the paddle switch position.

Serious and/or Permanent Damage can occur if the load system is used improperly.



**Tools → System Tools →
Admin Tools → Unload Delay Timer**

The Unload Delay Timer can be used to stop the unload auger from running during automatic operation. This value is user selectable from 1-5 minutes.



**Tools → System Tools →
Admin Tools → Air Switch Fault
Timer**

In **RARE** cases, the air switch timer may not close before calling for heat. This function gives you the ability to extend the air switch closing time for up to 20 seconds. This may be applicable in Soft Start Applications. However, it's highly recommended to use the **HEAT DELAY** function if possible.



**Tools → System Tools →
Admin Tools → Flame Out Time**

In **RARE** cases, it may be necessary to extend the flame detection timer. This timer may be extended up to 90 seconds.



**Tools → System Tools →
Admin Tools → Heat Delay**

In Soft Start Applications (or any application for that matter) where it takes an extra couple of seconds for the fan to build enough pressure to close the air switch, the Heat Delay function is very useful. You can tell the dryer to wait a certain period of time between when the fan starts and when power is applied to the heater relay. This reduces the chance of a start-up flame-out fault.



**Tools → System Tools →
Admin Tools → EMOV Delay**

If the Electronic Mod Valve (EMOV) butterfly valve stem ever needs to be adjusted, this is a great way to do it. This function allows you to lock the EMOV stem in its low-fire position for up to 4 minutes. At factory settings, the EMOV will open to 25%, which should read 5lbs of pressure on the pipe train. Fire the burner in dry fire mode with this setting to adjust the stem position of the butterfly valve to 5lbs of pressure. After the Timer delay, the valve will start actuating like normal.



**Tools → System Tools →
Admin Tools → Aux Timers**

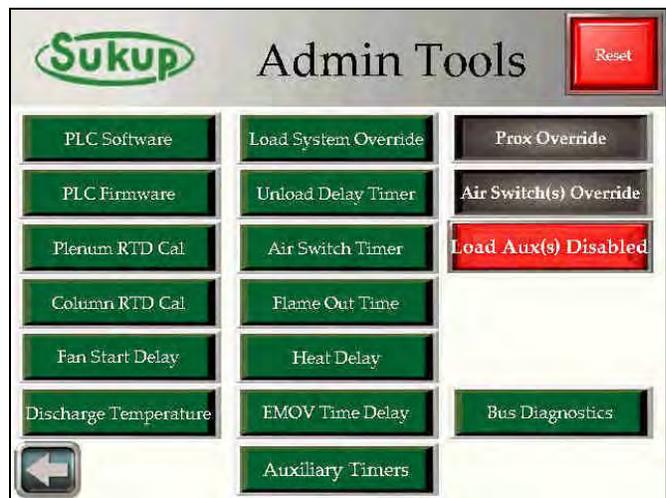
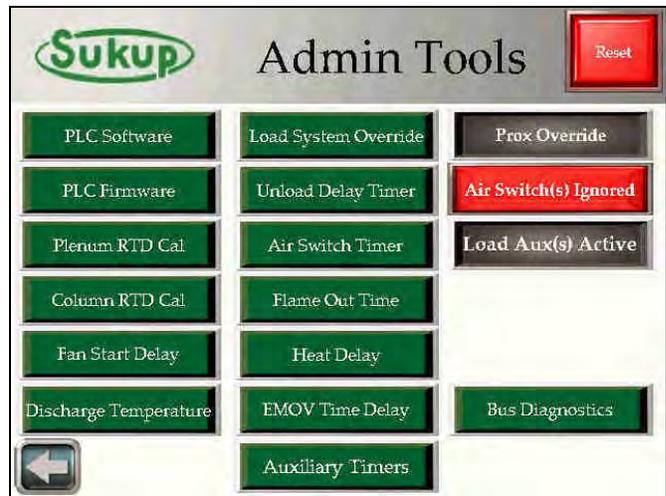
Because everyone’s dryer setup is different, it may be necessary or helpful to change the factory delay settings on the auxiliary load devices. This will allow a longer or shorter delay between when the load auger, auxiliary 1, and auxiliary 2 start.



**Tools → System Tools →
Admin Tools → Overrides**

In **RARE** cases, it may be necessary to use the override functions. These overrides, shown in red on the right-hand part of the screen, should only be used for short periods of time until the dryer can be serviced. These overrides allow the program to disregard the proximity switches and air switches for a period of 24 hours.

The program also gives you the option to turn BYPASS the Auxiliary Load devices. This can be a nice feature when you are transferring grain through the dryer and bypassing the wet bin.



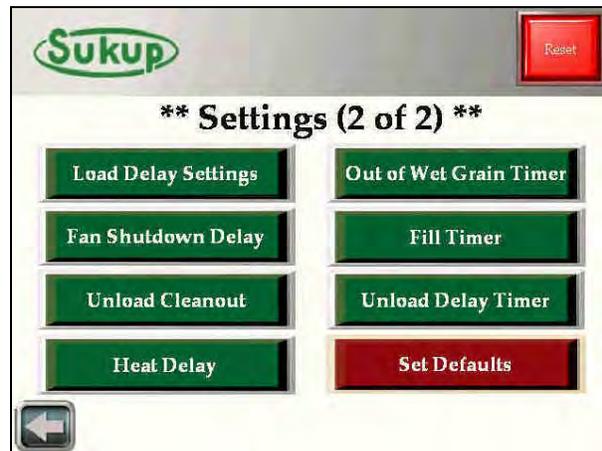
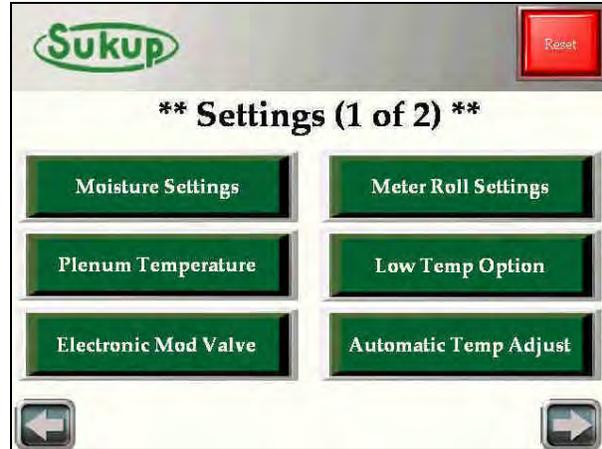
“Settings” Menu

The “Settings” menu allows the operator to specify optimal settings for grain drying.

The “Settings” menu is broken up into two pages. The first page includes settings that have to do with drying operation such as moisture and plenum temperature set points. The second page includes mainly delay timer settings. There is also a button to reset factory defaults.

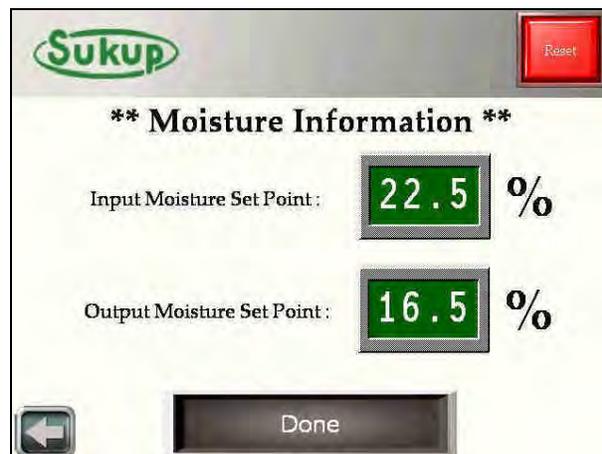
**As before, the burgundy and light, neon-green buttons have press and hold features.

Each button opens a new screen where the user will specify their desired values. Each setting is factory set before it leaves Sukup Manufacturing Company.



Settings (1 of 2) → Moisture Settings

Specify the input and desired output set points.



Settings (1 of 2) → Meter Roll Settings

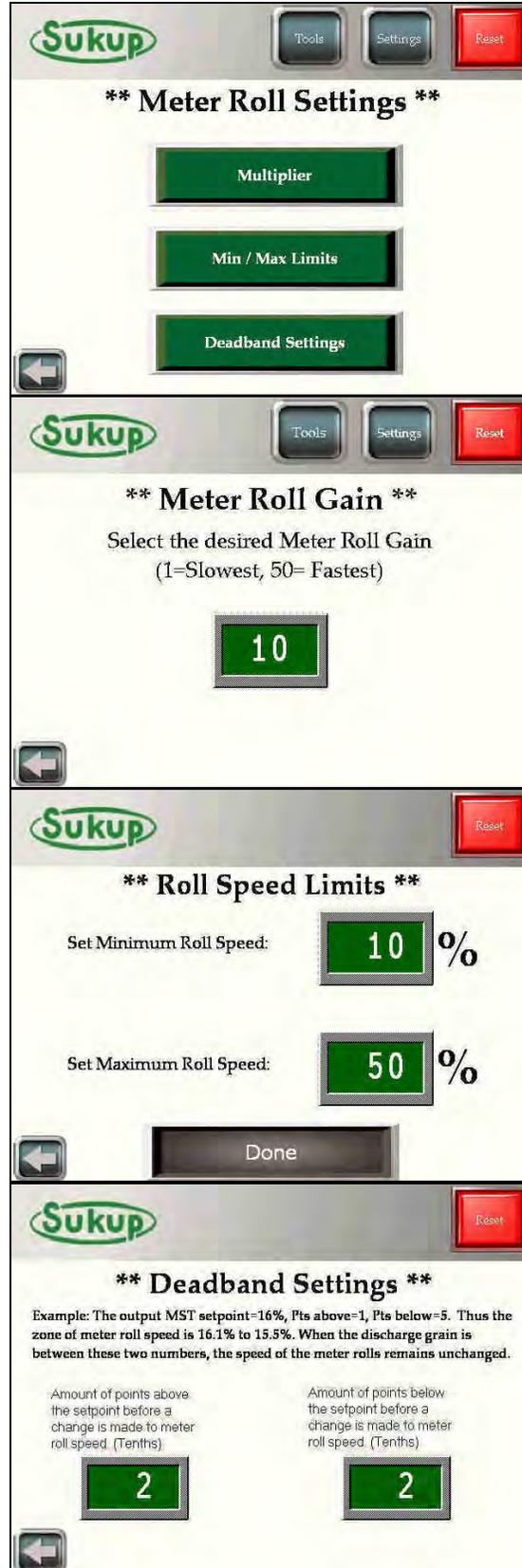
A user may specify the high and low limits of the meter roll speed. It is also possible to adjust how fast the meter rolls react to changing output moisture using the “Meter Roll Gain” feature. Use the Deadband zone to freeze meter roll speed around the discharge moisture setpoint.

The default setting for the “Meter Roll Gain” is 10. The scale goes from 1 to 50 where “10” is normal reacting and “50” is very fast reacting.

A setting higher than 30 will rarely ever need to be used.

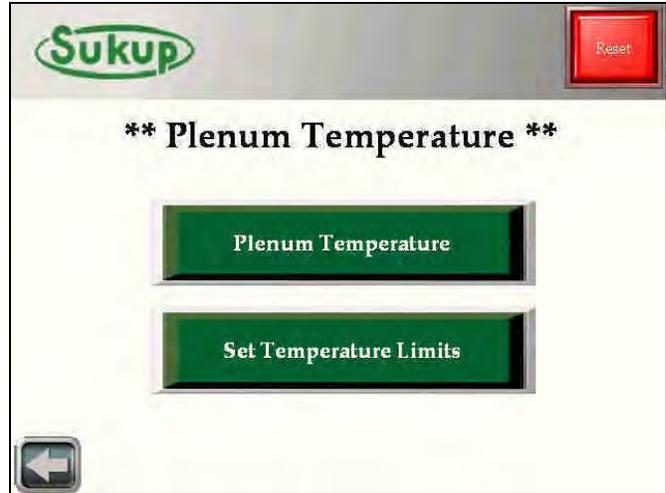
The minimum and maximum metering roll speeds can be set with this screen.

The deadband zone is a great feature to help the dryer from swinging around a set point. The deadband settings can be changed according to user preference. With a default setting of 2 tenths above and 2 tenths below, the meter roll speed will stay at a constant speed while the discharge moisture remains between 2 tenths above and 2 tenths below the set point.



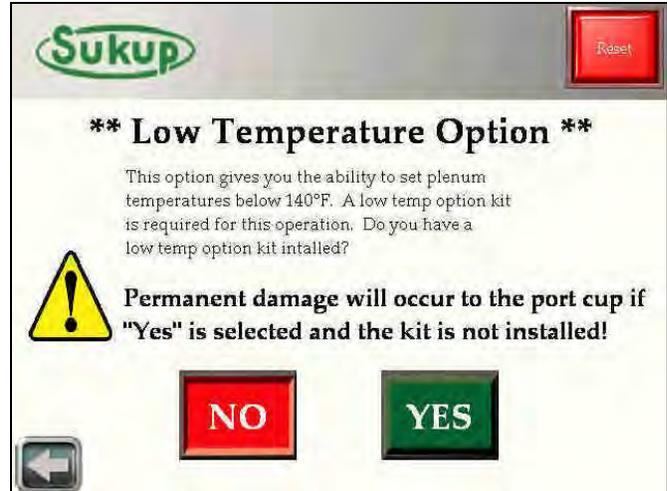
Settings (1 of 2) → Plenum Temperature

A user can also specify the **RANGE** in which the plenum temperature may be set. Use the “Set Temperature Limits” button to control the temperature range, and use the “Set Plenum Temperature” button to set a specific temperature.



Settings (1 of 2) → Low Temp Option

The “Low Temp Option” page has a good description on it, but its key feature is to decrease the plenum temperature low limit down to 120°F.



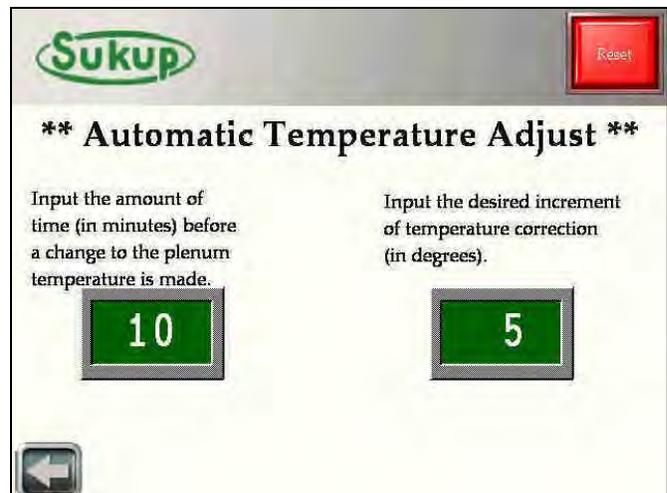
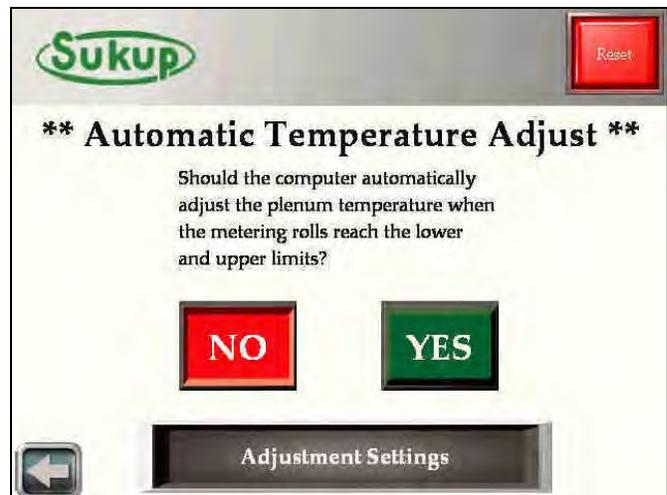
Settings (1 of 2) → Automatic Temp Adjust

The “Automatic Temperature Adjust” feature allows the computer to automatically change the plenum temperature up and down based upon metering roll speed. (Factory Default is OFF)

The user is able to set the specific amount of time in minutes before a change is made as well as the increment of change itself. Both of these changes can be made after pressing the “Yes” button or the “Adjustment Settings” button.

This function will increase the plenum temperature up or down if the meter rolls are running at their minimum or maximum speeds respectively.

When the metering rolls are no longer running on their minimum or maximum speed, the plenum temperature will return to its original setpoint in the increments in which it was increased or decreased. These increments or decrements will occur in the reverse order using the same time and temperature corrections.



NOTE: V2.65 Disables Auto-temp adjust when meter rolls are on their minimum limit.

Settings (1 of 2) → Electronic Mod Valve

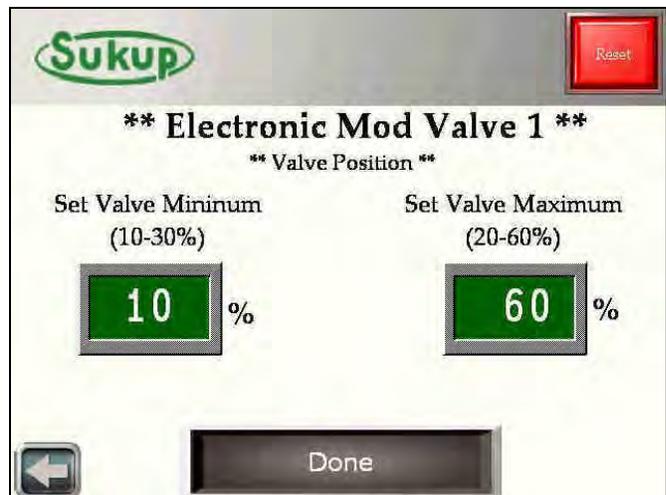
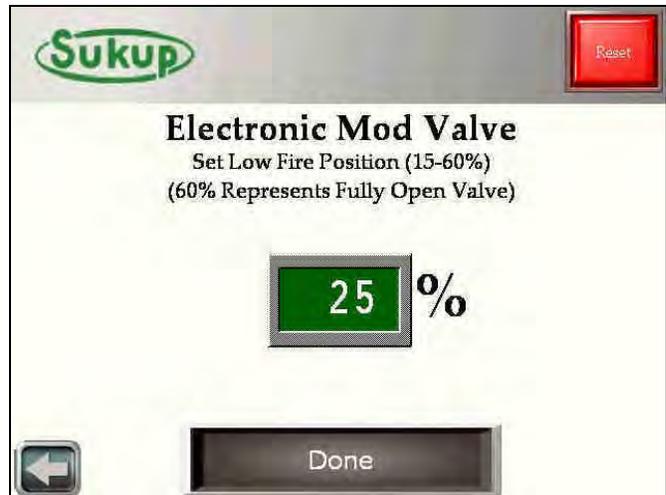
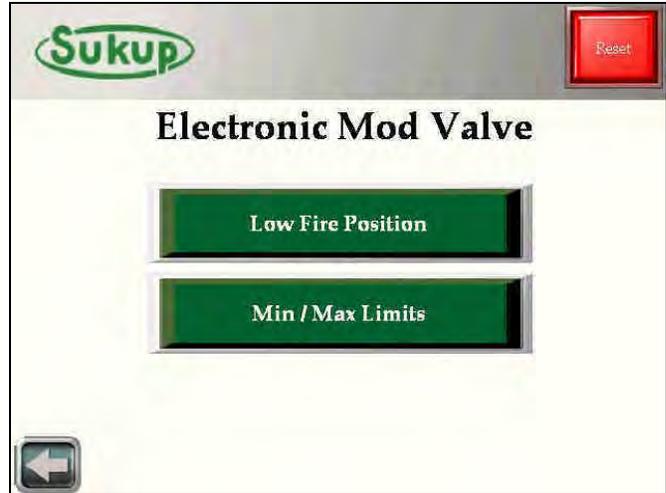
This menu gives the user the option to specify a low fire position (the position the valve is opened to for ignition) as well as setting the minimum and maximum valve opening position.

The control loop used to control plenum temperature is very accurate. Users will seldom need to make changes in this area. The default setting for low fire position is 25% max valve opening.

Sukup Manufacturing Company finds that at 25% opening, the pressure gauge should read 5lbs. of pressure (+ or - 1/2 lb.). To check if this setting is correct, select “Valve Settings” and decrease the max valve opening setting down to 25% and increase the min valve opening to 25%.

***Special NOTE:

The actuating time of the butterfly valve is very fast which gives better control of plenum temperature. If for some reason the valve is opening too fast, and the temperature is rising to quickly, reduce the valve maximum setting from 60% down to 40% and re-evaluate.



Settings (2 of 2) → Delay Settings

The Load Delay Settings menu will give the user the option of waiting a set period of time (0-240 seconds) in addition to the 5 & 10-second timers before the auxiliary load motors start. This is especially helpful when the loading system is oversized for the dryer it's attached to. Having a constant on/off situation is tough on motors. Putting a delay in allows time for the dryer to unload a little bit more than usual and allows the auxiliary load motors to stay on for longer periods of time. The default setting is 0 seconds.



The Fan Delay timer allows the fan to run for up to 10 minutes after the dryer is shut down.

However, the fan will not always run upon a fault condition. If the fault that stopped the dryer is unrelated to heat/over-temp alarms, the fan will be allowed to run.



The Unload Cleanout Timer allows the unload auger to run for up to 60 seconds after the dryer has been shut down.

Just like the Fan Delay, the unload auger will not run during an unloading related fault.



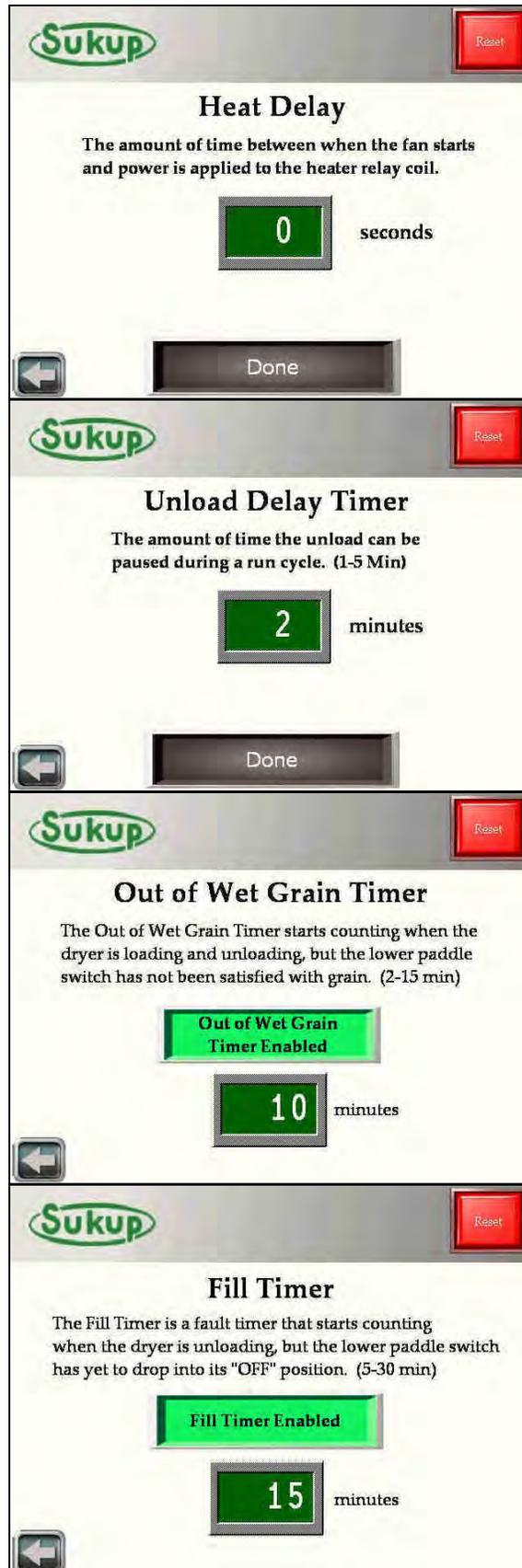
Settings (2 of 2) → Delay Settings

The Heat Delay setting is the delay time between when the fan relay closes and when power is applied to the heat relay. This setting is helpful when supply power to the dryer is unstable or inadequate.

The Unload Delay Timer allows the unload auger to be paused for up to 5 minutes during a run cycle. This may be helpful when changing a distributor on your air system or managing your auxiliary take-away system during operation.

The Out-of-Wet Grain timer is user settable from 2-15 minutes. Its default value is 10 minutes. While unloading, if the dryer hasn't been filled (meaning the lower paddle switch hasn't been satisfied) for the timer duration, it will shut down with an out-of-wet grain fault.

Similarly, the Fill timer is also user adjustable from 5-30 minutes. Its default value is 15 minutes. During the unloading process, the dryer has between 5 and 30 minutes to call for grain. If the paddle switch hasn't been released during that time period, it will shut down with a fill timer fault.



BASIC OPERATION

From the “Main Screen” touch the “Start” button.

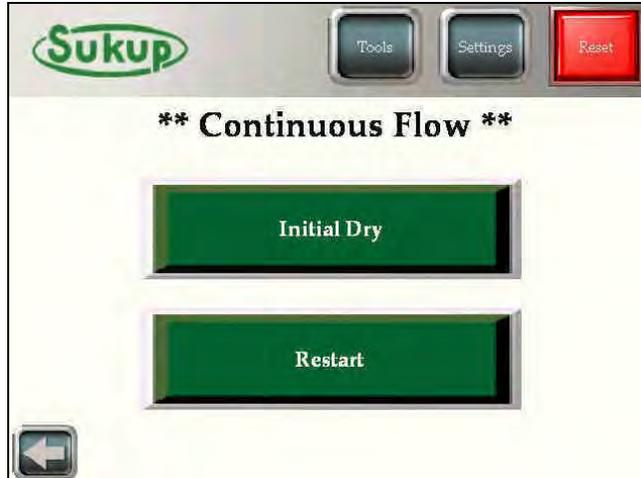
The “Choose Operation” menu will come up.

There are 4 automatic modes in which the dryer can operate. Each operation sequence will be shown below.

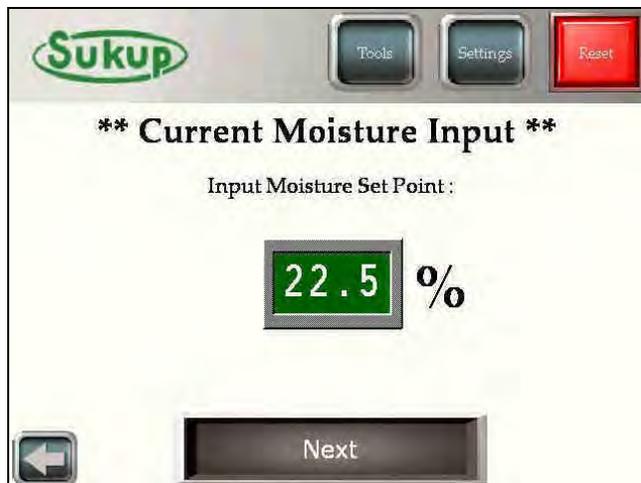


Continuous Flow Mode → Initial Dry

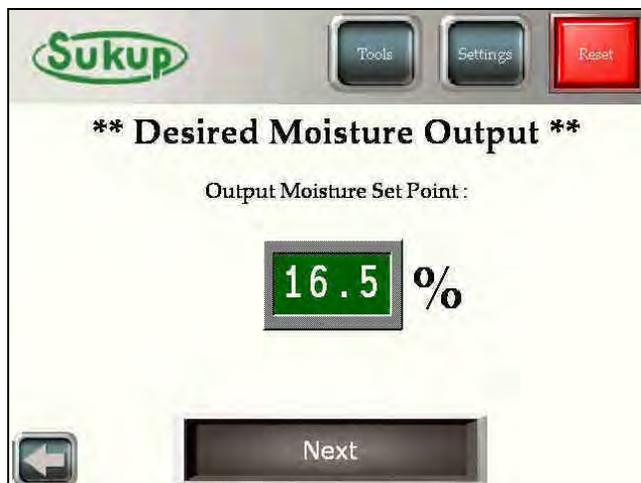
After selecting “Continuous Flow” from the “Select Operation” menu, choose the “Initial Dry” option.



The next screen to appear is the “Current Moisture Input” screen. Using the pop-up key pad, enter the moisture content of the incoming grain.



After the input moisture has been entered, specify the desired output moisture.



Lastly, set your desired minimum and maximum roll speeds.

Special NOTE:

This system uses a Variable Frequency Drive to control the speed of the metering rolls. Set points are exact, and there is no need to calibrate this device.



When “Next” is pressed, the “Loading Sequence” begins.

Loading Sequence

The dryer will check its paddle switches to determine if the columns are full of grain. After a short delay (When the main button flashes “Please Wait...”), the dryer will give the option of “Start Loading” or “Load Complete! Continue”



Firing Sequence

After loading has finished, the dryer will now start its fans and heaters. The fan(s) and heater(s) will start from the top down.

Example: A two-fan dryer will start its upper fan first.

After each device is started, a check mark will appear when operation has been confirmed. When all heaters are started, a 90 second, plenum stabilization timer will begin.

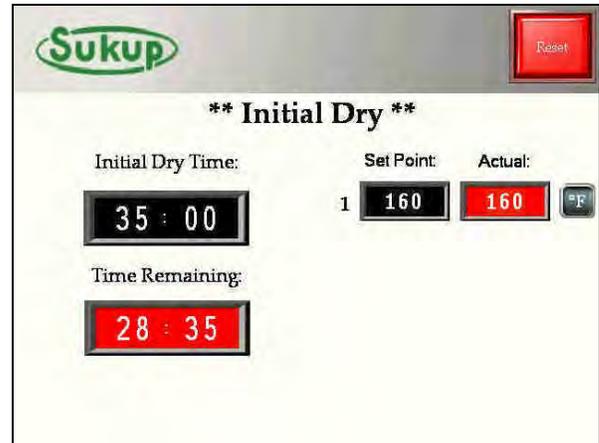


INITIAL DRY

After the fans and heaters have been started, the “Initial Dry” timer will begin.

Initial Dry Time is determined by 6 min/pt (+) or (-) 1 min/pt per 20°F difference from 160°F

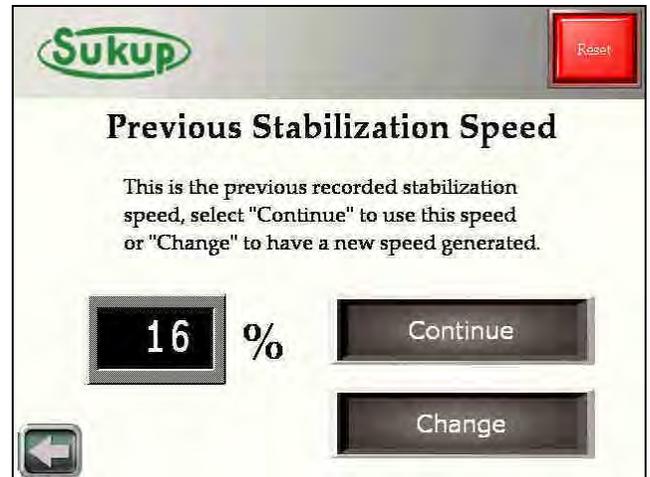
Example: Input MST =22%, Desired MST = 16% → 6 pt removal. 6 min/pt at 6 pts @160°F = 36 min.



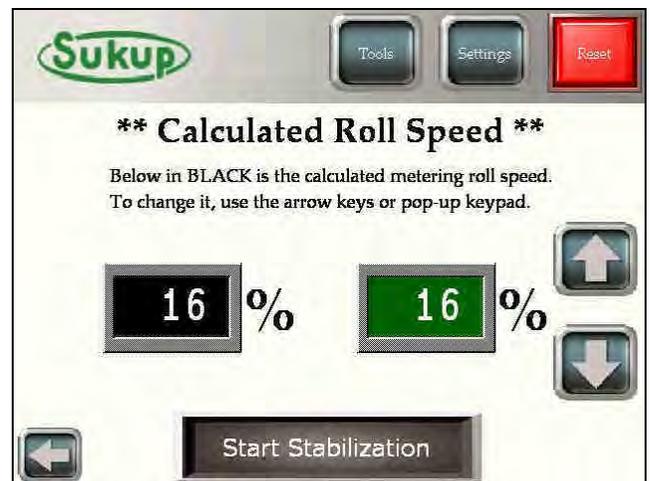
After the “Initial Dry” timer has expired, the operator will have the opportunity to specify a stabilization temperature and the computer will determine and unload rate based upon that temperature.



If the dryer has been run previously, the user will be prompted to resume a previous stabilization period or calculate a new one.



The computer will determine a “Calculated Roll Speed” based upon the temperature desired for “Stabilization” mode. This calculated number is displayed in BLACK on the left. This value is automatically loaded into the GREEN box on the right. This value is adjustable. If the calculated speed is outside the user’s predetermined minimum and maximum meter roll speeds, and error message will pop up and give you the option to change the plenum temperature.



STABILIZATION

After the user has selected “Start Stabilization”, the computer will determine a dry time based on the roll speed and the amount of moisture to be taken out of the grain.

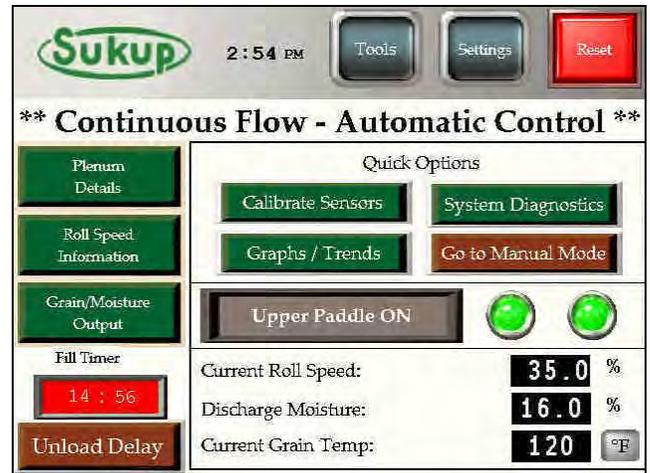
Ten seconds after the “Stabilization” mode has started, the unload process will begin.



Continuous Flow

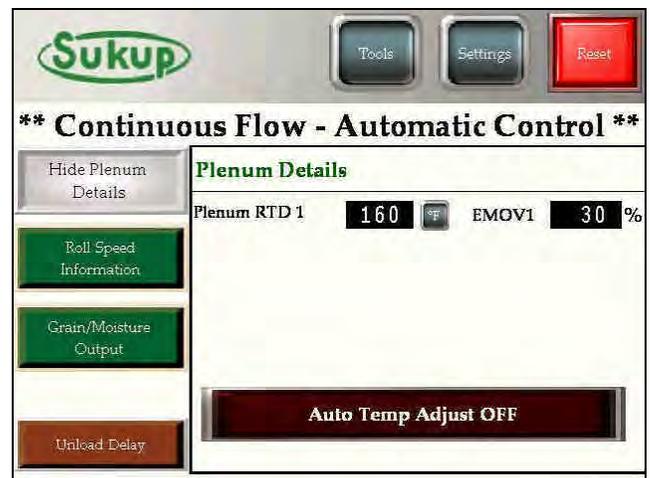
After the “Stabilization” timer ends, the “Continuous Flow” mode begins. During this mode, the dryer constantly monitors the outgoing moisture and makes corrections to roll speed and plenum temperature (optional). The buttons along the left side of the screen allow the user to keep track of all relevant drying information.

The paddle switches are also visually represented by the two lamps next to the Load Auger status.



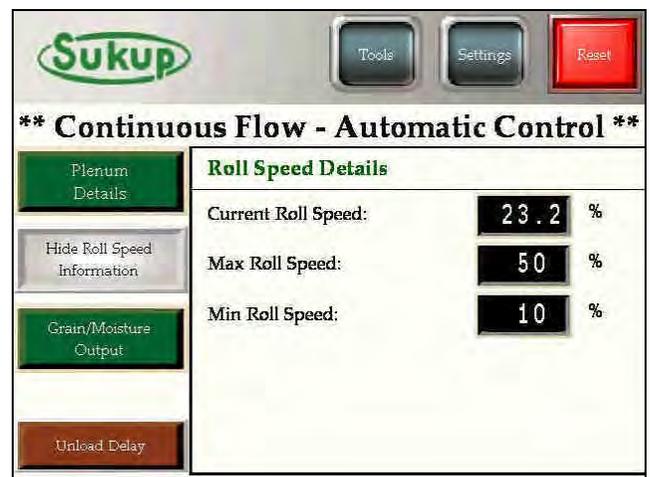
V2.65 adds the Fill Timer and Out of Wet Grain fault timers when applicable.

Pop-up menu for “Plenum Details”
This will show plenum temperature(s) and corresponding electronic mod valve position(s).

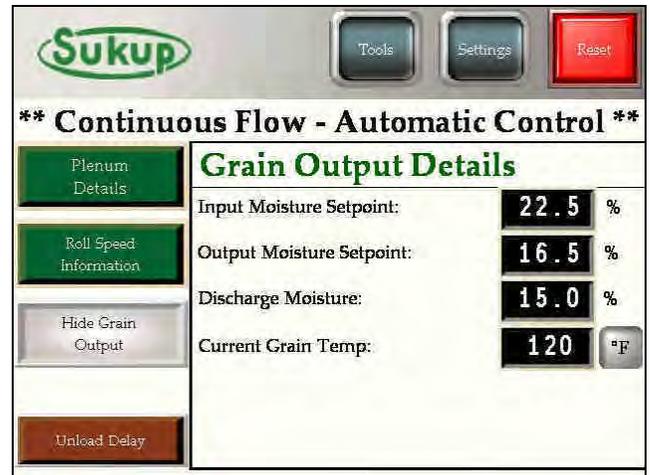


Pop-up menu for “Roll Speed Information”
This will show all the corresponding unload speeds and their limits.

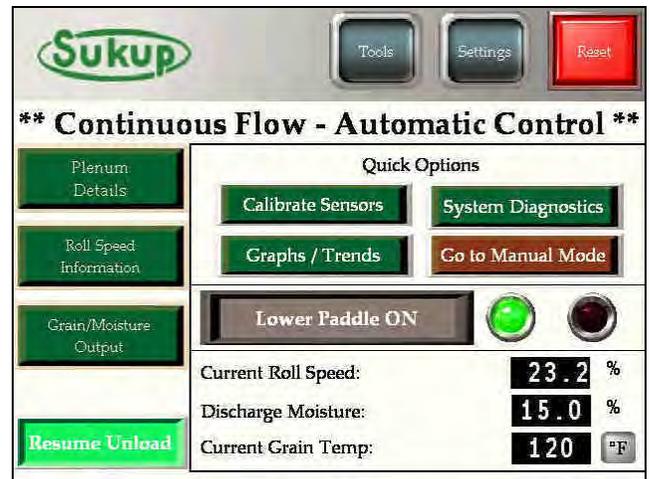
After the bushel counter has been calibrated, it will show up on this menu as well.



Pop-up menu for “Grain/Moisture Output”
 This menu will show all the set points and actual moisture levels of the grain.

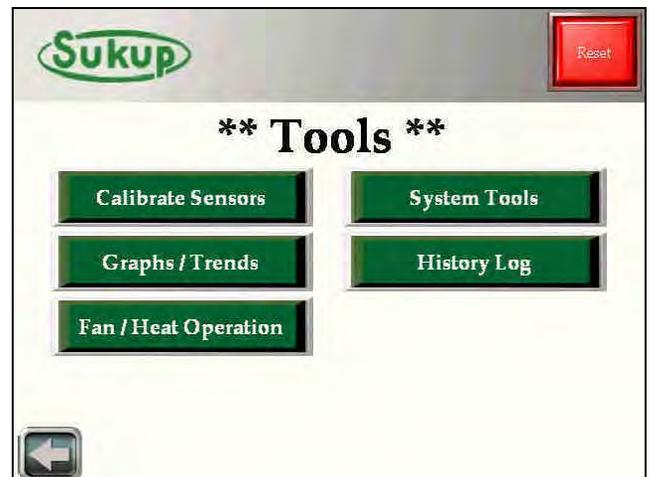


During operation, it sometimes becomes necessary to stop the unloading process for a brief period to clean the sensor or switch storage bins. Using the press-and-hold “2 Minute Unload Delay”, the dryer will stop its unloading system for 2 minutes. The system will not re-engage the unload system unless the button is pressed and held again. The dryer will shut itself down with a fault condition if the unload system is not re-engaged by the user within 2 minutes.



During normal, automatic operations, a limited “Tools” menu will be available for use.

The Fan/Heat Operation option will come up during automatic modes. This will allow you to turn fan(s) and heater(s) on and off during continuous flow.



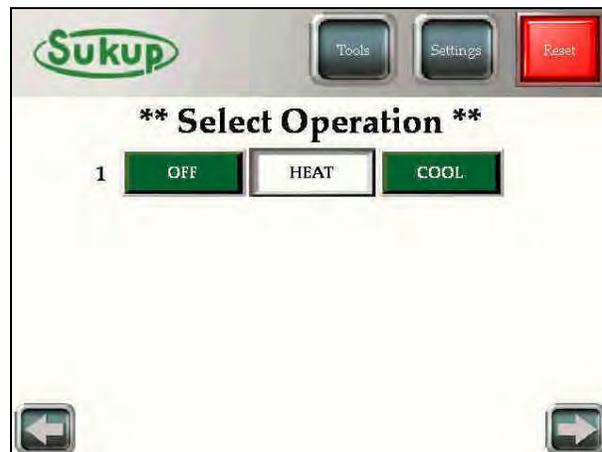
Continuous Flow → Restart Menu

If the dryer has already completed its “Initial Dry” and/or the user is restarting the dryer after a shutdown, the “Restart” option is a great way to pick up where the dryer left off. If the dryer shut down due to a fault condition, the time and date will be stored and displayed on the screen.

Choose either “Restart With Stabilization” or “Restart Without Stabilization”

Choose your Fan/Heat Operation.
The “Heat” option will engage the fan and heater. The “Cool” option will engage only the fan.

“Restart w/ Stabilization” will put the dryer through its “Stabilization” process of calculating dry time based on temperature, incoming moisture, and meter roll speed. “Restart w/o Stabilization” will take you directly into “Continuous Flow” computer controlled mode.

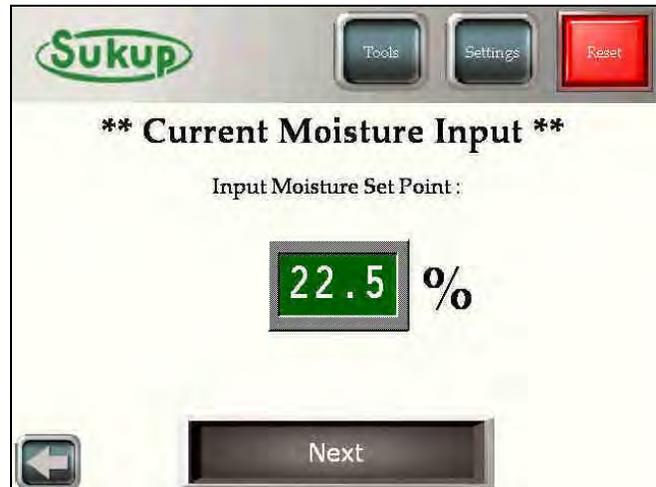


“Autobatch” Mode

In the event of extreme high moisture grain, it may be necessary to run the dryer in “Autobatch” mode. This mode allows the user to dry grain in batches with the option of computer-controlled adjustments.

The system will prompt the user for some set points to make dry-time and unload time calculations.

The user will enter input and output moisture as well as the maximum unloading capacity.



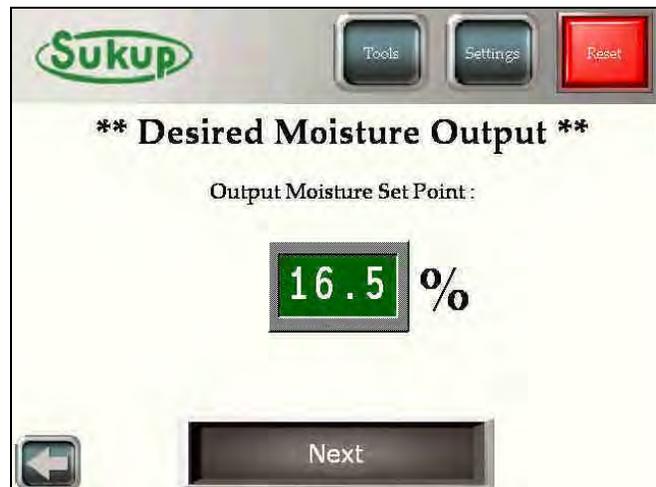
Sukup Tools Settings Reset

**** Current Moisture Input ****

Input Moisture Set Point :

22.5 %

← Next



Sukup Tools Settings Reset

**** Desired Moisture Output ****

Output Moisture Set Point :

16.5 %

← Next



Sukup Tools Settings Reset

**** Maximum Roll Speed ****

Maximum Roll Speed Set Point:

50 %

← Next

After the user has selected the desired set points, it's time to select a fan/heat operation.

“Full Heat Operation” runs the fan(s) and heater(s) during the “Dry Cycle”, and the “Cool Cycle” is omitted.

“Heat/Cool Operation” runs the fan(s) and heater(s) during the “Dry Cycle” and shuts off the heater(s) for the “Cool Cycle”



If the user is resuming a previous batch, the “Resume” button will start the batch immediately using the past temperature and timer set points.

The batch number is incremented each time a load is discharged.

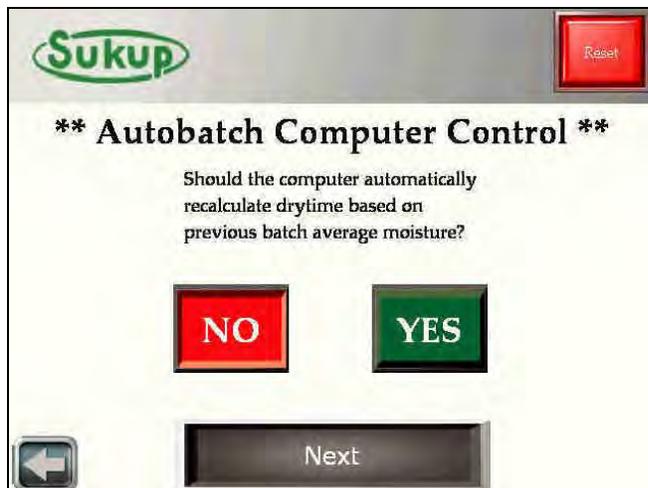
If a new batch is desired, the “New Batch” button is offered, and the user will be able to set drying temperature and dry cycle timers.



After pressing “New Batch” the user will select a drying temperature.



After selecting a drying temperature, the system will offer to automatically adjust the batch dry time based on outgoing moisture after the batch has been dried.



Next the user will decide on the method of grain discharge. In most cases, time discharge will be the only option.

If the dryer has a Column RTD option installed in it, there will be two (2) more discharge options on this page (Temp Based and Time and Temp Based Control)



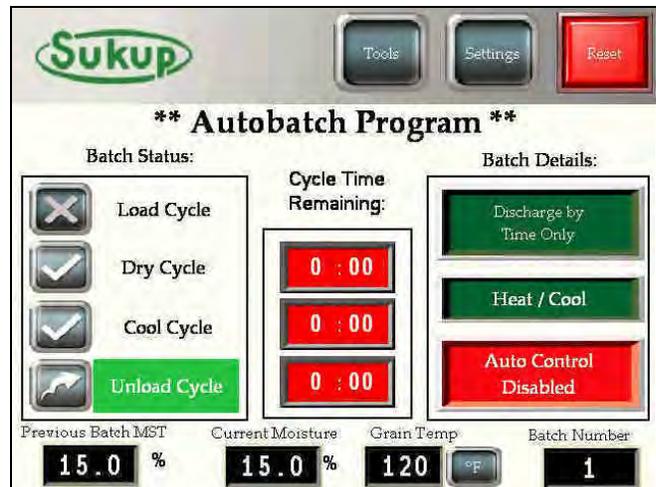
After selecting "Time Based Control" the computer will calculate a recommended dry time based upon the user's set points. That number is placed in the BLACK box. It is automatically loaded into the GREEN box, which is user selectable.



Similar to the batch dry time, the batch unload time is also calculated and placed into the BLACK box.



After all set points and timers have been decided, the "Autobatch" program can begin. Each step of the process (under "Batch Status") is highlighted in GREEN. The middle of the screen displays the time remaining in each highlighted section, and the "Batch Details" section shows the batch information.



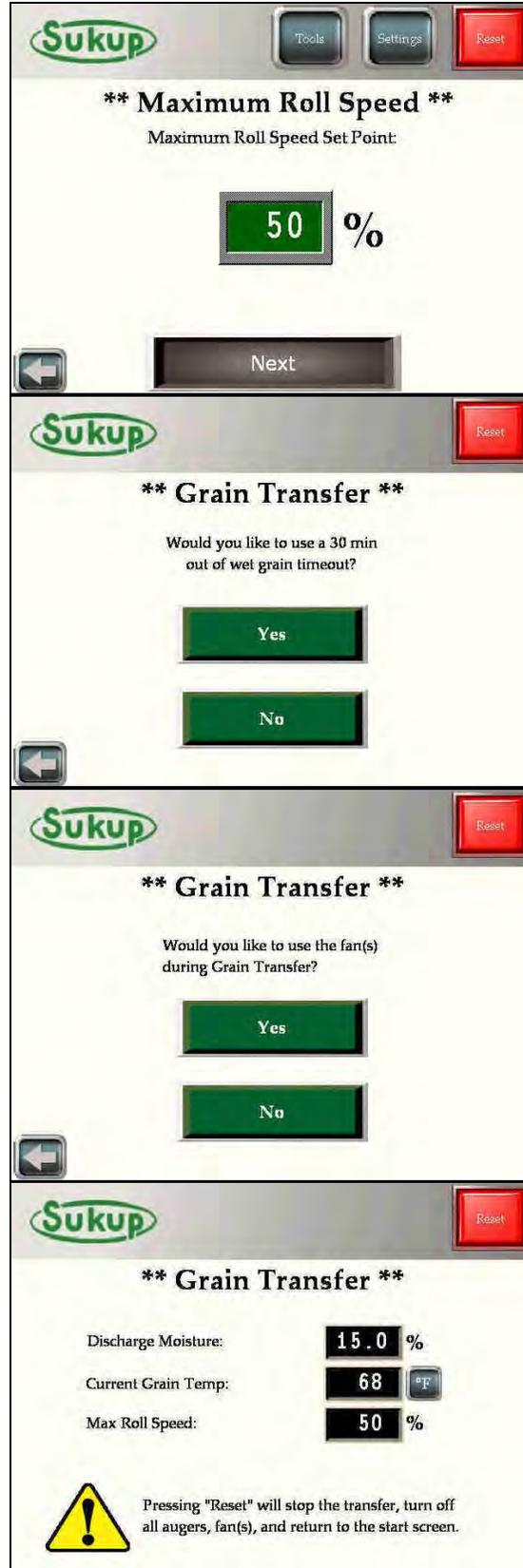
“Grain Transfer” Mode

The first step after selecting “Grain Transfer” is to specify a Maximum Roll Speed. This tells the dryer’s control system how fast the unload system is capable of taking grain away from the dryer. During “Grain Transfer” the dryer’s unload system will always run at the maximum roll speed.

After a speed is selected, the user will have the opportunity to use an Out-of-wet-Grain timer. This timer will start after both paddle switches are in their respective “off” positions. If the lower switch hasn’t been made in 30 minutes, the dryer will automatically stop with a 30 minute Out of Wet Grain fault timeout.

New in 2.6, Grain Transfer gives you the option to use the fans during transfer operation.

This screen will show up for the entire “Grain Transfer” process. It shows the discharge moisture, grain temp, and your unloading speed.



“Final Dry” Mode

After selecting “Final Dry” from the “Start” menu, the user will specify the current moisture of the remaining grain in the dryer. This mode allows the remaining grain to dried and unloaded without the dryer being completely full.

After the moisture content has been entered, the system calculates a recommended dry-time for the user. Pressing “Start Final Dry” will start the fan(s) and heater(s), and the ignition sequence will begin.

Because the batch remaining is already partially dried, a calculation of 3 min/pt @ 140°F is used.

After the 90 sec. plenum stabilization timer expires, this screen will appear.

After the “Dry Time Remaining” timer has expired the fans and heaters will turn off. The unload auger will run for the length of the “Unload Time Remaining” timer. This value is calculated off the system’s maximum roll speed.

When “Final Dry” mode finishes, this screen will appear. The screen also tells the user to use the manual operation feature to unload any grain still remaining in the dryer.



Fault Screens and Error Messages

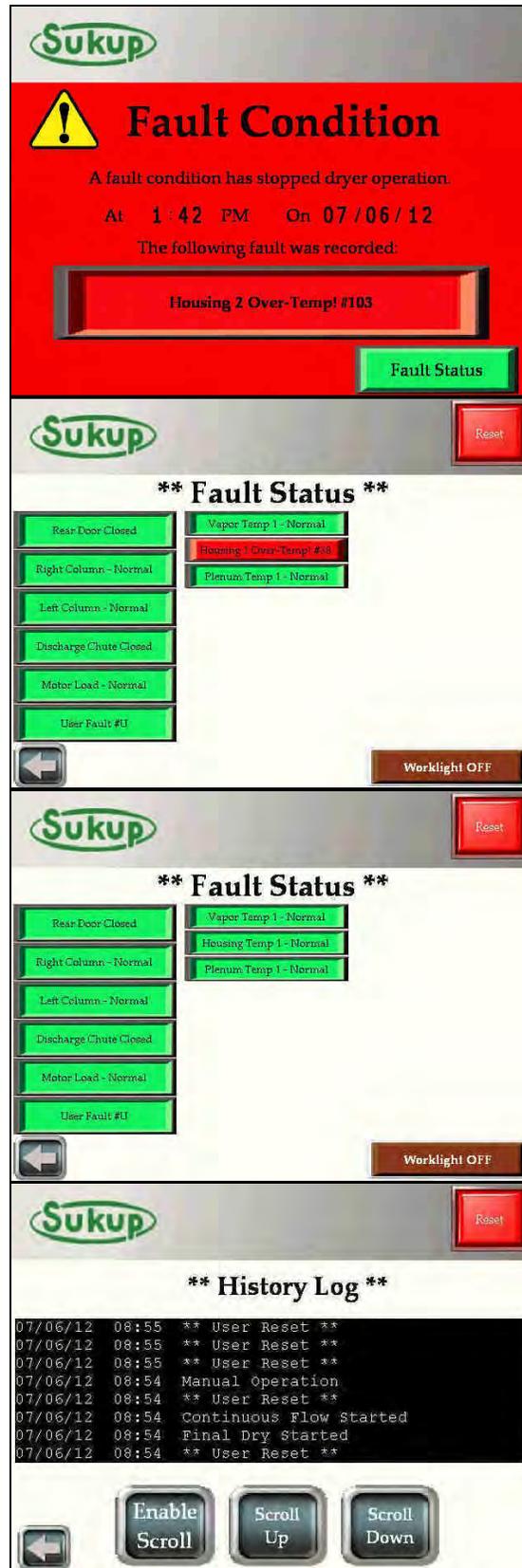
There are many safety switches and relays that are constantly being monitored on the dryer. Sukup Manufacturing Company uses these fault devices to ensure the safety of the product and our customers.

The dryer has an intelligent system that monitors all faults. If at any time a 24 VDC signal is lost through a safety circuit, a fault is triggered and the PLC shuts all dryer function down. It also contains the wire number of the fault in question

The set of images to the right shows an example of the Housing #1 Over-Temp safety circuit. When the fault occurs, the dryer immediately shuts down the dryer and records the date and time of the fault. It shows the fault on the screen that shut the dryer down, and it will remain on the screen until someone checks its status. The only button available to press on the screen is the “Fault Status” button located in the lower right-hand corner of the “Fault Condition” screen.

When the “Fault Status” button is pressed, the faults that still exist will be displayed in RED. The faults that are cleared will be displayed in GREEN. When a fault condition exists, the worklight will automatically turn off. If the user needs to turn the worklight on to work on the dryer, it’s possible to turn it on from this screen. (This is a press and hold button located on the lower right-hand corner of the screen)

When a fault occurs or a drying mode is selected, it is recorded in the “History Log”



The dryer also has some special sensing features.

Each analog input sensor of the dryer is constantly monitored as well. In the event of a missing or inoperative sensor, these messages located to the right will appear.

**These examples are errors from a Single Fan Dryer. More error messages are possible in multiple fan models.

Each fan and heater has its own Plenum RTD sensor. Therefore, a Two Fan Dryer will have an additional Plenum RTD error message.

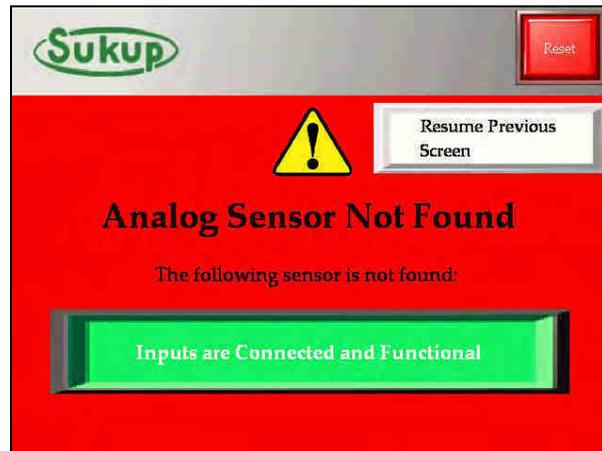
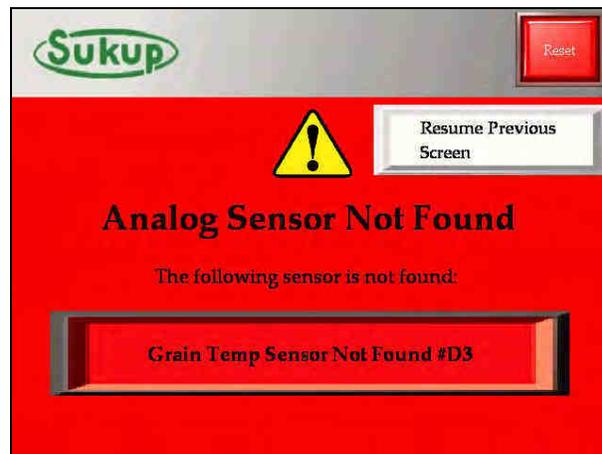
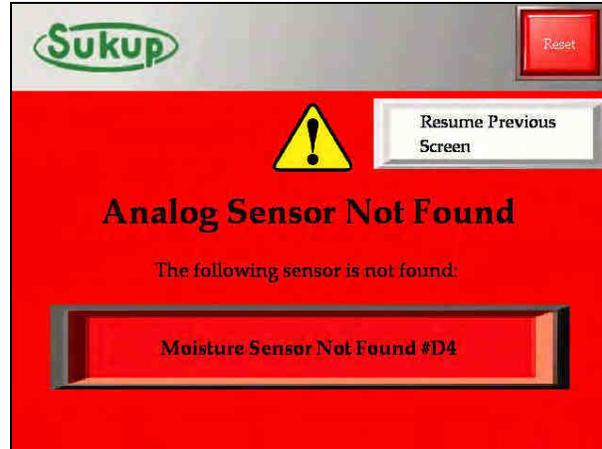
**Diagnosing a Problem:

Each sensor is monitored for voltage. If less than .05VDC is read by the PLC, this error will come up. This either means that the individual sensor is bad, or the connection between the PLC and the sensor needs to be checked. Use a voltmeter to check for voltage and continuity between the PLC, the connection terminals, and the device itself.

SPECIAL NOTE!!!

This is NOT a FAULT. The dryer will not shut down unless the Reset key is pressed.

Pressing the “Resume Previous Screen” button will allow the user to continue using the dryer. This screen will appear every 30 seconds until the sensor has been re-connected.



BASIC OPERATION TIPS

All screens are touch-navigable using the buttons provided on page. When a screen has a GREEN box with a grey border, it indicates that that value is user selectable.

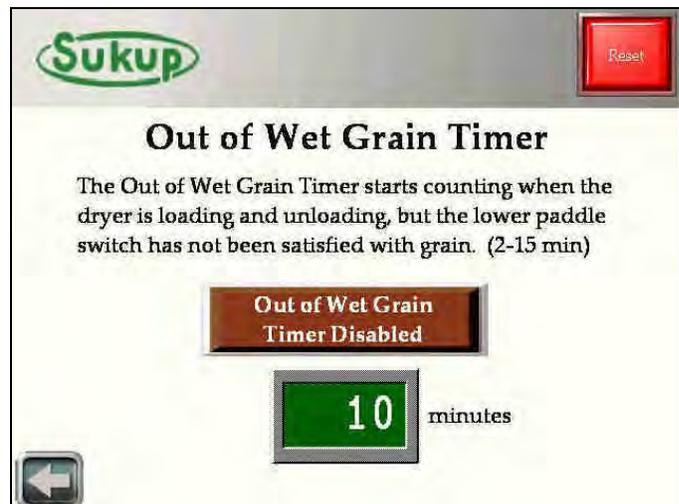
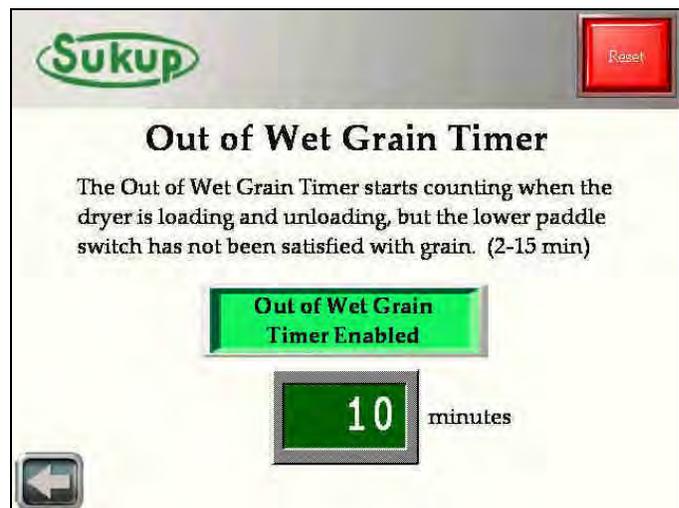
Also available on each screen is a **RESET** key located in the top right-hand corner. If the **RESET** key is pressed at any time, the dryer will shut down all fans, heaters, and augers and return to the main screen. The **RESET** key is never used for program navigation.

If the user is able to return to the previous screen, a back arrow is placed in lower left-hand part of the screen. If the user is deep into a menu, it may be necessary to press the back arrow multiple times to return to the desired screen.

Press-and-Hold Buttons

All buttons that appear burgundy (“OFF” state) in color require you to press and hold that button for a full second before the button’s action will be processed. When these buttons are activated, the button will appear in an “ON” state denoted by depressed button style and a light, neon-green color (like this first image).

The Fill timer and the Out-of-Wet Grain timer are both factory enabled. To turn them off, press and hold the neon-green button, and they will turn burgundy in color (their “OFF” state as in the picture to the right). If the user wishes to turn them on, press and hold the burgundy button until it becomes neon-green in color.



Appendix H

Electrical Drawings

Wire numbers and uses

Heater wiring

Single-fan drawings

Wire Numbers and Uses

Wire #	Description	Use
0	110VAC supply from transformer	Conductor between transformer and E-Stop
1	110VAC supply after E-Stop	Emergency Switched Control Supply
2	Neutral Wire	Provides Return for 110V circuits
4	110VAC heater power ON (pos. #1)	110V present heater circuit will begin firing sequence
5	5 second load auxiliary 1 – Supply Side	Voltage supplied to 5 will relay to 7 upon K6 PLC relay being activated (27A).
6A	24VDC K1 PLC Load Relay Coil	24VDC present energizes PLC Load Relay K1
6	110V load contactor	110V present energizes load contactor
7	5 second load auxiliary 1 – Coil Side	Connect 7 to the coil on load auxiliary 1 contactor.
8	10 second load auxiliary 2 – Supply Side	Voltage supplied to 8 will relay to 9 upon K7 PLC relay being activated (28A).
9	10 second load auxiliary 2 – Coil Side	Connect 9 to the coil on load auxiliary 2 contactor.
10	110V unload power ON	110V present energizes unload contactor
10A	24VDC K2 PLC Unload Relay Coil	24VDC present energizes PLC Unload Relay K2
11A	110V fan power ON (pos. #1)	110V present energizes fan (pos. #1) contactor
12A	110V heater switch leg (pos. #1)	110V present; power available for heater pending upon fan on/off
14	Dry Contact Unload Auxiliary – Supply Side	Voltage supplied to 14 will relay to 15 upon Load contactor being energized.
15	Dry Contact Unload Auxiliary – Coil Side	Connect auxiliary device to 15 and voltage from 14 will pass to 15 when unload coil is energized.
17	Meter roll reference voltage	0 to 10 volt reference for AC Drive, 1V=10% meter roll, 10V=100% meter roll
17B	Manual Backup Reference AC Drive Voltage	0 to 10 volt reference for AC Drive, 1V=10% meter roll, 10V=100% meter roll
17C	PLC Reference AC Drive Voltage	0 to 10 volt reference for AC Drive, 1V=10% meter roll, 10V=100% meter roll
18	24V supply	Powered from PLC DC supply, provides voltage for sensors
19	110V switch leg for worklight	Provides switched 110V for worklight (110V present, worklight ON)
19A	24VDC K5 PLC Worklight Relay Coil	24VDC present energizes PLC Worklight Relay K5
21B	PLC AC Drive ON signal	24VDC present tells AC Drive to turn meter rolls in forward direction.
21C	Manual Backup AC Drive ON signal	24VDC present tells AC Drive to turn meter rolls in forward direction.
21D	AC Drive ON signal	24VDC present tells AC Drive to turn meter rolls in forward direction.
27A	24VDC K6 PLC Load Aux 1 Relay Coil	24VDC present energizes PLC Load Aux 1 Relay K6
28A	24VDC K7 PLC Load Aux 2 Relay Coil	24VDC present energizes PLC Load Aux 2 Relay K7
30	Special Aux Unload – Supply Side	Potential Free Contact with 31
31	Special Aux Unload – Coil Side	Potential Free Contact with 30
32	Special Aux Unload – Supply Side	24VDC supplied to 32 and Factory Jumper between 32 & 33.
33	Special Aux Unload – Coil Side	33 carries 24VDC and goes through the Special Aux Unload Relay and energizes K2 unload relay
36	Rear door signal wire	24V present = Door closed, provides voltage at PLC for rear door status (Doors are in series)
37	Vapor high limit switch (pos. #1)	Reference voltage for the EMOV
38	Housing high limit switch (pos. #1)	24V present = status ok, provides voltage at PLC for heater housing high temperature status
39	Plenum over-temperature switch (pos. #1)	24V present = status ok, provides voltage at PLC for plenum high temperature status

Wire Numbers and Uses, continued

Wire #	Description	Use
40	Right grain column over-temperature	24V present = status ok, provides voltage at PLC for plenum high temperature status
41	Left grain column over-temperature	24V present = status ok, provides voltage at PLC for plenum high temperature status
42	Grain discharge chute	24V present = status ok, provides voltage back to PLC for grain discharge chute status
43	Plenum static air switch (pos. #1)	24V present = status ok, provides voltage back to PLC for static air status
44	Lower Grain paddle switch	24V present = status grain not empty, lower grain switch
45	Heater flame sense (pos. #1)	Reference voltage for the EMOV
46	PLC fan ON input (pos. #1)	24V present = fan ON, provides PLC with status of fan operation
47	PLC load ON input	24V present = load auger ON, provides PLC with status of load operation (on or off)
48	Heater ON relay signal to PLC 24V = ON (pos. #1)	24V present = ON, Tells the PLC the system is calling for the heater to turn on
49&49 A-49L	Motor overload switches	24V present = status ok, provides voltage back to PLC for overload status. All wired in SERIES.
53	Upper Grain paddle switch	24V present = Status Dryer FULL
61	EMOV (0-10V) (pos. #1)	Reference voltage for the EMOV
70	Automatic batch RTD signal wire	Provides signal to processor for autobatch temperature drying, 0 – 5 volt DC reference
71	RTD Signal wire fan (pos. #1 - lowest)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
72	RTD Signal wire fan (pos. #2)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
73	RTD Signal wire fan (pos. #3)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
74	RTD Signal wire fan (pos. #4)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
75	RTD Signal wire fan (pos. #5)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
76	RTD Signal wire fan (pos. #6)	Provides control system with 0 – 5 volt DC reference for plenum temperature indication
93	Meter Roll Proximity Signal Wire	24VDC oscillating square wave = meter roll rotation confirmed.
94	Unload ON signal	24VDC = Unload Coil has been energized.
95	Common reference on PLC for 24V supply	All items referenced to this terminal
96	Unload Auger Proximity Signal Wire	24VDC oscillating square wave = unload auger rotation confirmed.
97	Differential Air Switch 1 (CSA & CE Only)	24VDC = Air Pressure Confirmed
98	Differential Air Switch 2 (CSA & CE Only)	24VDC = Air Pressure Confirmed
99	Differential Air Switch 3 (CSA & CE Only)	24VDC = Air Pressure Confirmed
100	Differential Air Switch 4 (CSA & CE Only)	24VDC = Air Pressure Confirmed
U	User Fault Circuit	24VDC = User Fault OK – Jumped out from the factory.
D1	Moisture sensor red, 24VDC moisture sensor circuit supply	Supply voltage for the moisture sensor circuit
D3	Moisture sensor blue, 0V to 3VDC temperature signal to the PLC	Provides the processor with a voltage signal corresponding to temperature
D4	Moisture sensor black, 0 to 10VDC moisture signal to the PLC	Provides the processor with a voltage signal corresponding to moisture

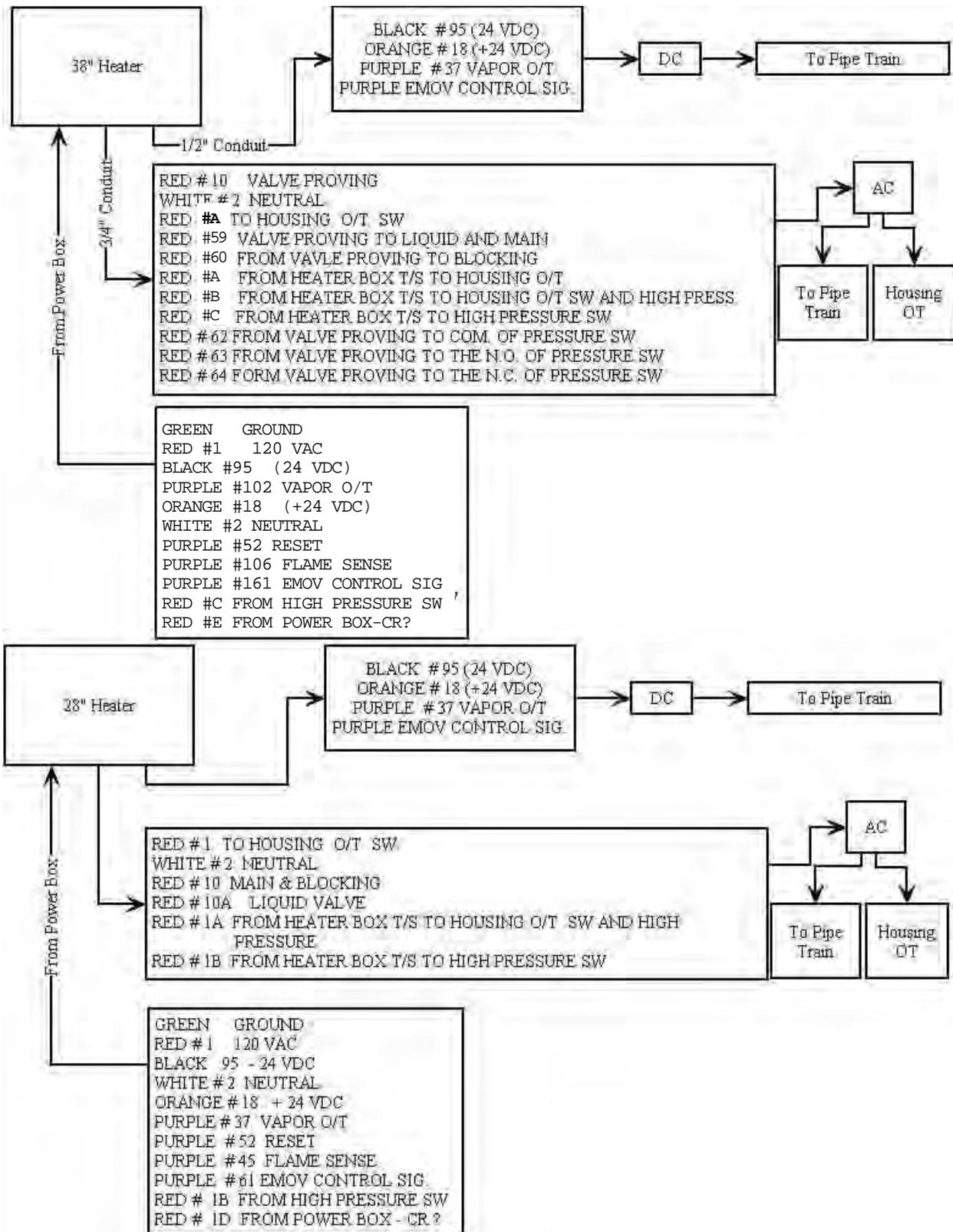
Wire Numbers and Uses, continued

Wire #	Description	Use
D6	Moisture sensor green, ground	Ground
D7	Moisture sensor grounding braid (shielded ground)	Grounds the shielding for noise purposes
102	Vapor high limit switch (pos. #2)	Reference voltage for the EMOV
103	Housing high limit switch (pos. #2)	24V = status ok, provides voltage at PLC for heater housing high temperature
104	Plenum over-temp switch (pos. #2)	24V = status ok, provides voltage at PLC for plenum high temperature status
105	Plenum static air switch (pos. #2)	24V present = status ok, provides voltage back to PLC for static air status
106	Heater flame sense (pos. #2)	Reference voltage for the EMOV
107	PLC fan ON input (pos. #2)	24V present = fan ON, provides PLC with status of fan operation
108	PLC heat ON input (pos. #2)	24V present = ON, tells the PLC the system is calling for the heater to turn on
109A	110V heater switch leg (pos. #2)	110V present; power available for heater pending upon fan on/off
110A	110V fan power ON (pos. #2)	110V present energizes lower fan (pos. #2) contactor
111	110V power CR6 relay (lower) heat turn on safety due to fan failure	110V present energizes CR3 relay, system calls for heat. Wired to aux. contact or relay to provide protection due to fan not running while contactor energized
112	110V heater power ON (pos. #2)	110V present heater circuit will begin firing sequence
116	110V Main Gas Valve ON	110V present energizes Main Gas Valve (2 Fan & up)
116A	24VDC K10 PLC Main Gas Valve Relay	24VDC present energizes PLC Main Gas Valve Relay K10
161	EMOV (0-10V) (pos. #2)	Reference voltage for the EMOV
202	Vapor high limit switch (pos. #3)	Reference voltage for the EMOV
203	Housing high limit switch (pos. #3)	24V = status ok, provides voltage at PLC for heater housing high temperature
204	Plenum-over-temp switch (pos. #3)	24V = status ok, provides voltage at PLC for plenum high temperature status
205	Plenum static air switch (pos. #3)	24V present = status ok, provides voltage back to PLC for static air status
206	Heater flame sense (pos. #3)	Reference voltage for the EMOV
207	PLC fan ON input (pos. #3)	24V present = fan ON, provides PLC with status of fan operation
208	PLC heat ON input (pos. #3)	24V present = ON, tells the PLC the system is calling for the heater to turn on
209A	110V heater switch leg (pos. #3)	110V present; power available for heater pending upon fan on/off
210A	110V fan power ON (pos. #3)	110V present energizes lower fan (pos. #3) contactor
261	EMOV (0-10V) (pos. #3)	Reference voltage for the EMOV
302	Vapor high limit switch (pos. #4)	Reference voltage for the EMOV
303	Housing high limit switch (pos. #4)	24V = status ok, provides voltage at PLC for heater housing high temperature
304	Plenum over-temp switch (pos. #4)	24V = status ok, provides voltage at PLC for plenum high temperature status
305	Plenum static air switch (pos. #4)	24V present = status ok, provides voltage back to PLC for static air status
306	Heater flame sense (pos. #4)	Reference voltage for the EMOV

Wire Numbers and Uses, continued

Wire #	Description	Use
307	PLC fan ON input (pos. #4)	24V present = fan ON, provides PLC with status of fan operation
308	PLC heat ON input (pos. #4)	24V present = ON, tells the PLC the system is calling for the heater to turn on
309A	110V heater switch leg (pos. #4)	110V present; power available for heater pending upon fan on/off
310A	110V fan power ON (pos. #4)	110V present energizes lower fan (pos. #4) contactor
361	EMOV (0-10V) (pos. #4)	Reference voltage for the EMOV
402	Vapor high limit switch (pos. #5)	Reference voltage for the EMOV
403	Housing high limit switch (pos. #5)	24V = status ok, provides voltage at PLC for heater housing high temperature
404	Plenum over-temp switch (pos. #5)	24V = status ok, provides voltage at PLC for plenum high temperature status
405	Plenum static air switch (pos. #5)	24V present = status ok, provides voltage back to PLC for static air status
406	Heater flame sense (pos. #5)	Reference voltage for the EMOV
407	PLC fan ON input (pos. #5)	24V present = fan ON, provides PLC with status of fan operation
408	PLC heat ON input (pos. #5)	24V present = ON, tells the PLC the system is calling for the heater to turn on
409A	110V heater switch leg (pos. #5)	110V present; power available for heater pending upon fan on/off
410A	110V fan power ON (pos. #5)	110V present energizes lower fan (pos. #4) contactor
461	EMOV (0-10V) (pos. #5)	Reference voltage for the EMOV
502	Vapor high limit switch (pos. #6)	Reference voltage for the EMOV
503	Housing high limit switch (pos. #6)	24V = status ok, provides voltage at PLC for heater housing high temperature
504	Plenum over-temp switch (pos. #6)	24V = status ok, provides voltage at PLC for plenum high temperature status
505	Plenum static air switch (pos. #6)	24V present = status ok, provides voltage back to PLC for static air status
506	Heater flame sense (pos. #6)	Reference voltage for the EMOV
507	PLC fan ON input (pos. #6)	24V present = fan ON, provides PLC with status of fan operation
508	PLC heat ON input (pos. #6)	24V present = ON, tells the PLC the system is calling for the heater to turn on
509A	110V heater switch leg (pos. #6)	110V present; power available for heater pending upon fan on/off
510A	110V fan power ON (pos. #6)	110V present energizes lower fan (pos. #4) contactor
561	EMOV (0-10V) (pos. #6)	Reference voltage for the EMOV

Heater Wiring

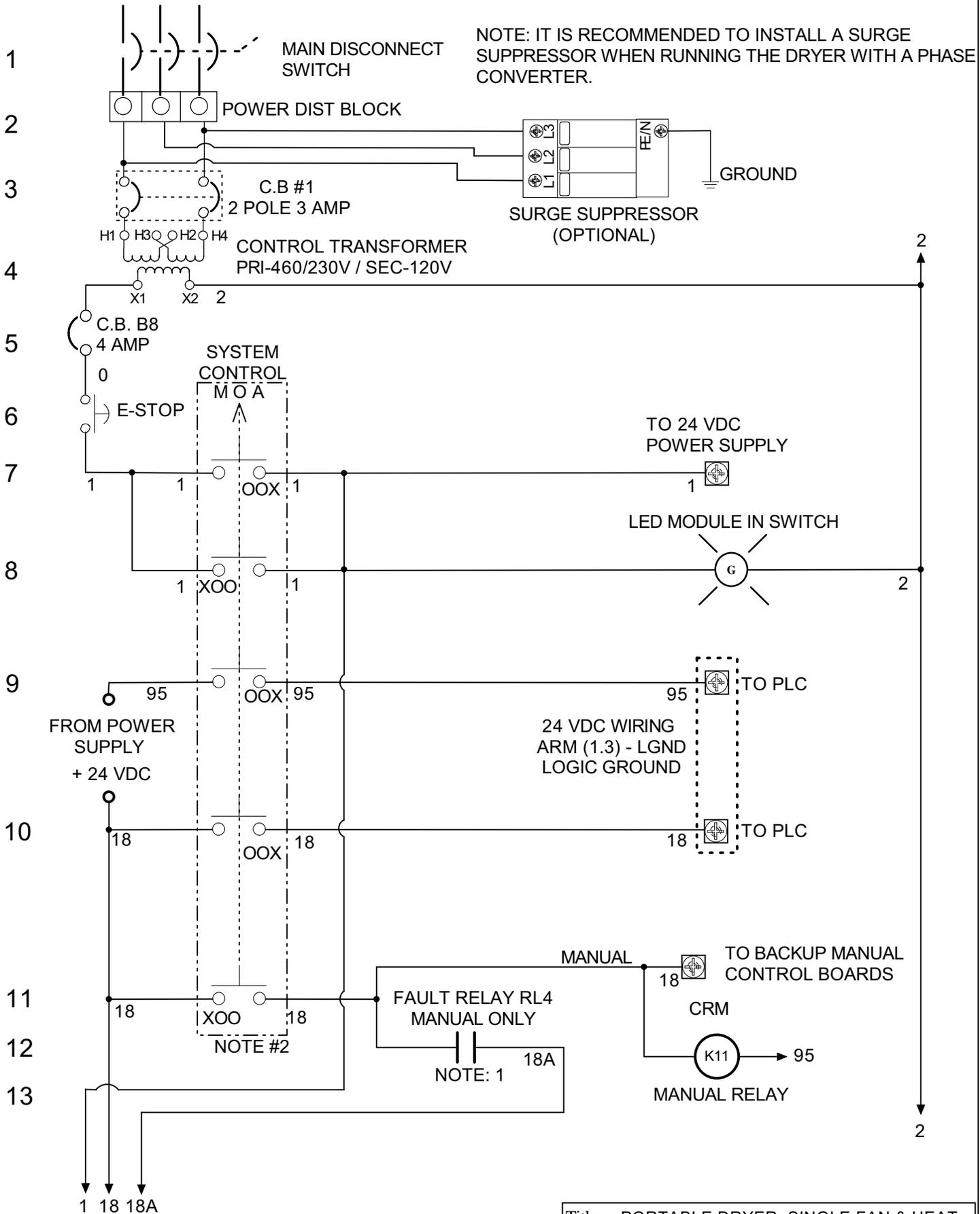


Auxiliary Load and Unload Terminals

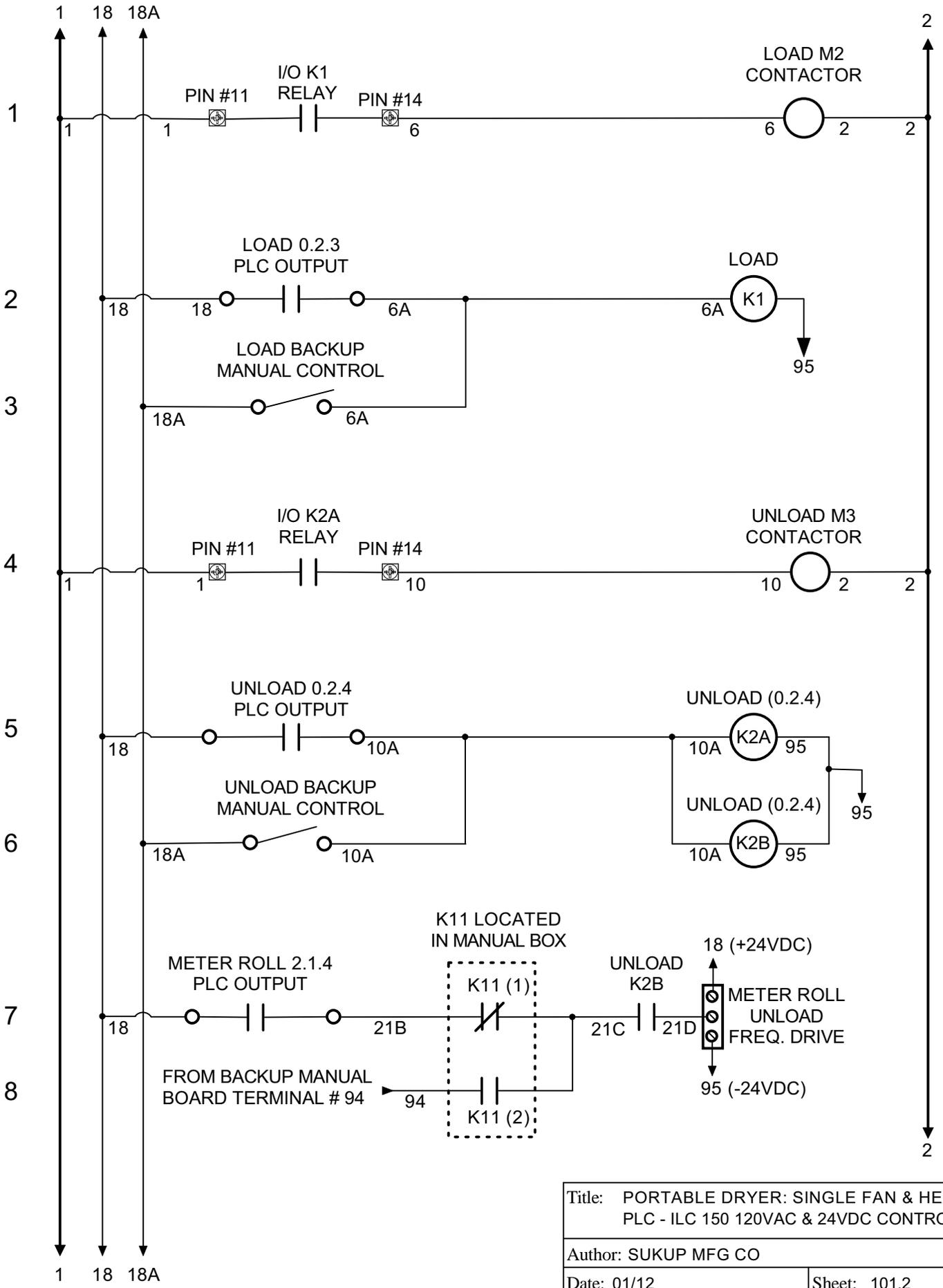
Note: Terminals 5 & 7, 8 & 9, and 14 & 15 can be used as either dry contacts or 115VAC by using Terminals 1 (115VAC) and 2 (Neutral)

1	2	5	7	8	9	14	15	49D	49E	115VAC	Neutral	1 st Aux Load 5 Sec. Delay On	2 nd Aux Load 10 Sec. Delay On	Aux Unload	Motor Overload Safety Circuit
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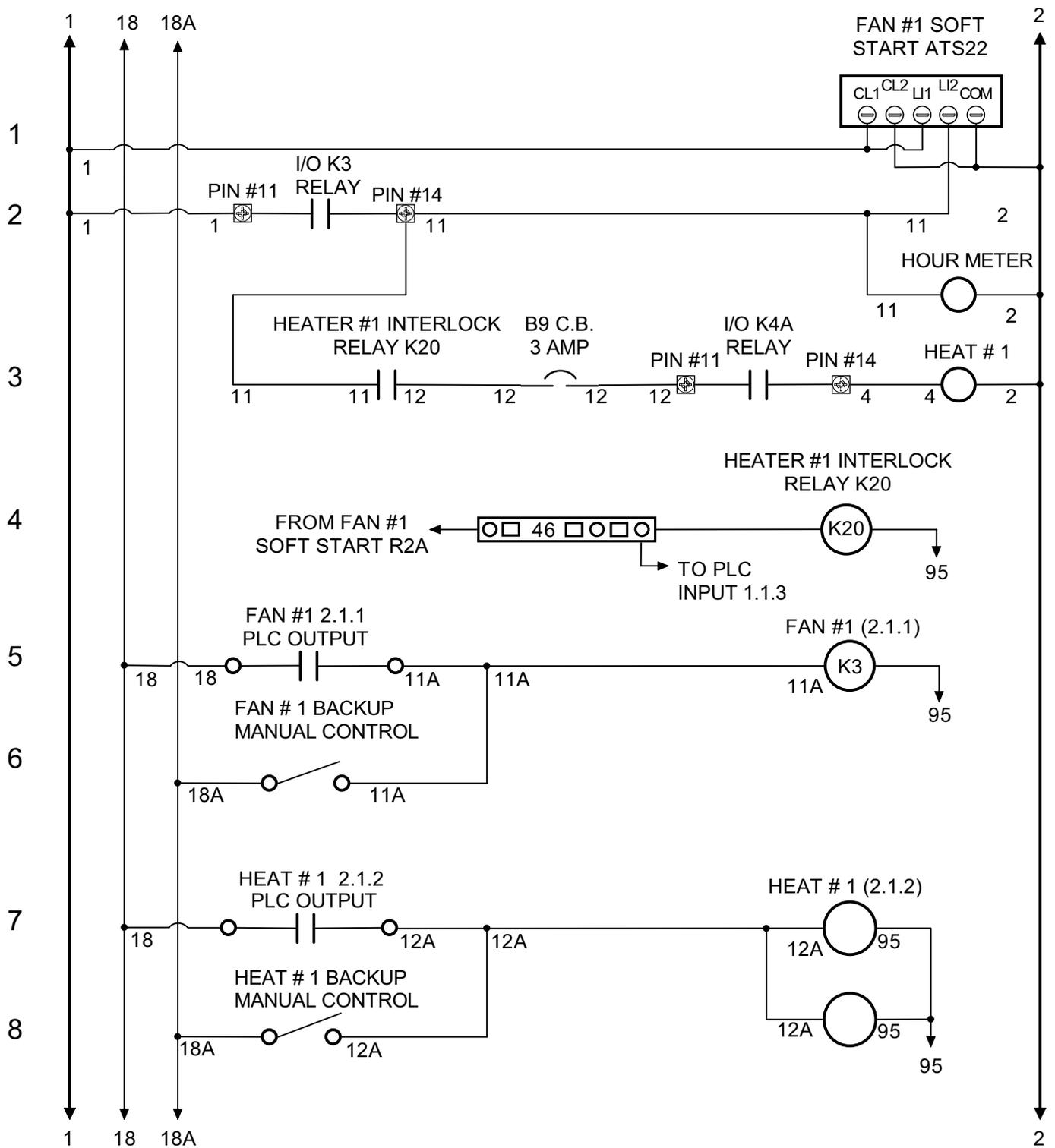
2012
ELECTRICAL DRAWINGS
SINGLE FAN & HEAT
WITH ATS22 SOFT START
FOR FAN CONTROL



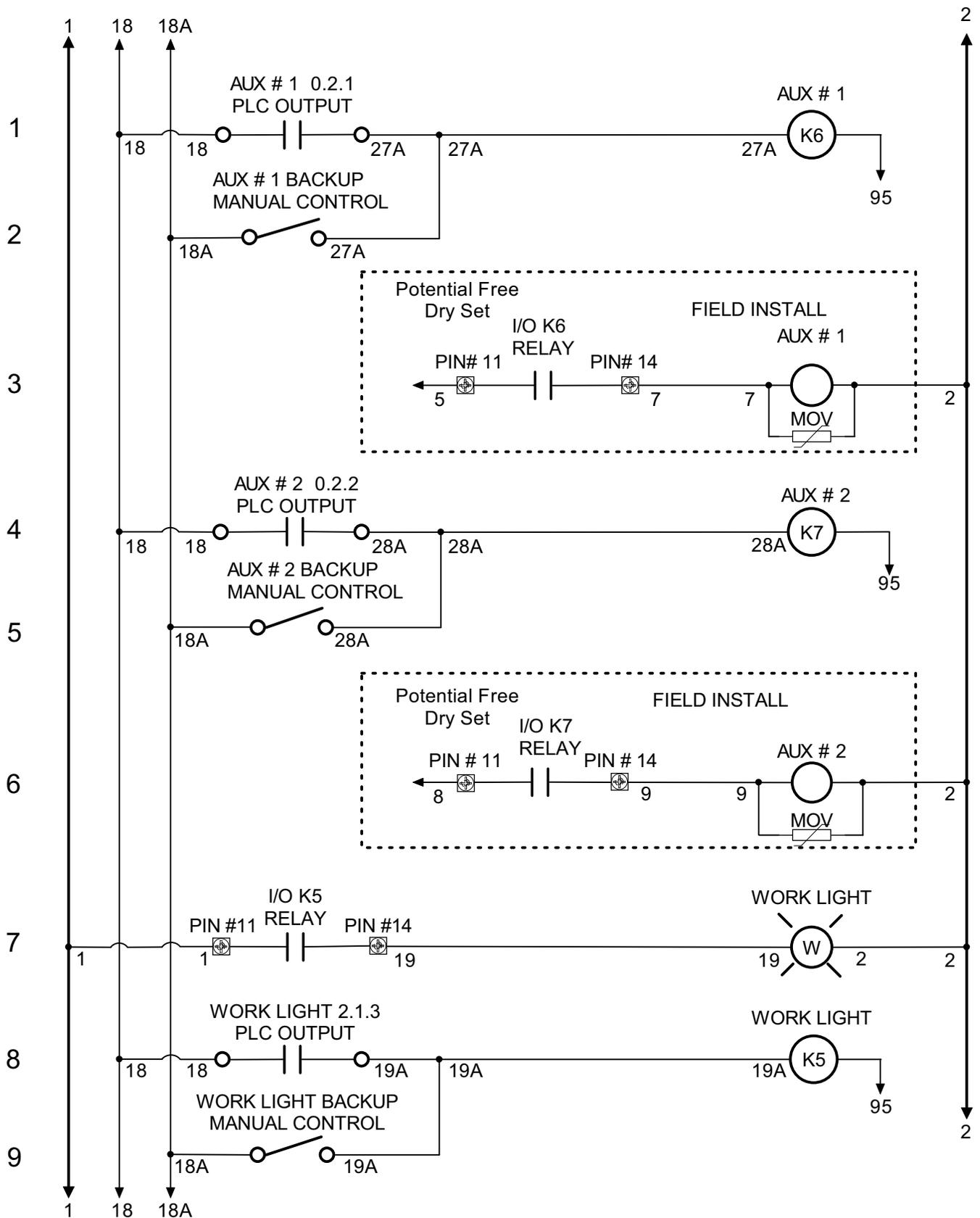
Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150 120 VAC & 24VDC CONTROL	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.1
Revision:	SOFT START



Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150 120VAC & 24VDC CONTROL	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.2
Revision:	SOFT START



Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150 120VAC & 24VDC CONTROL	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.3
Revision:	SOFT START



Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150 120VAC & 24 VDC CAONTROL	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.4
Revision:	SOFT START

NOTE PAGE

1. The following note applies to MANUAL operation only.

This contact is located on fault relay RL4. The relay is physically mounted on the manual control board. The contact is closed if no faults are present. Check LED # 57 (NO Fault) on the manual control board. This LED should be ON if no faults are present. (Load, Unload, and all Fan switches need to be in the OFF position before the NO Fault LED will turn ON - assuming no other faults are present)

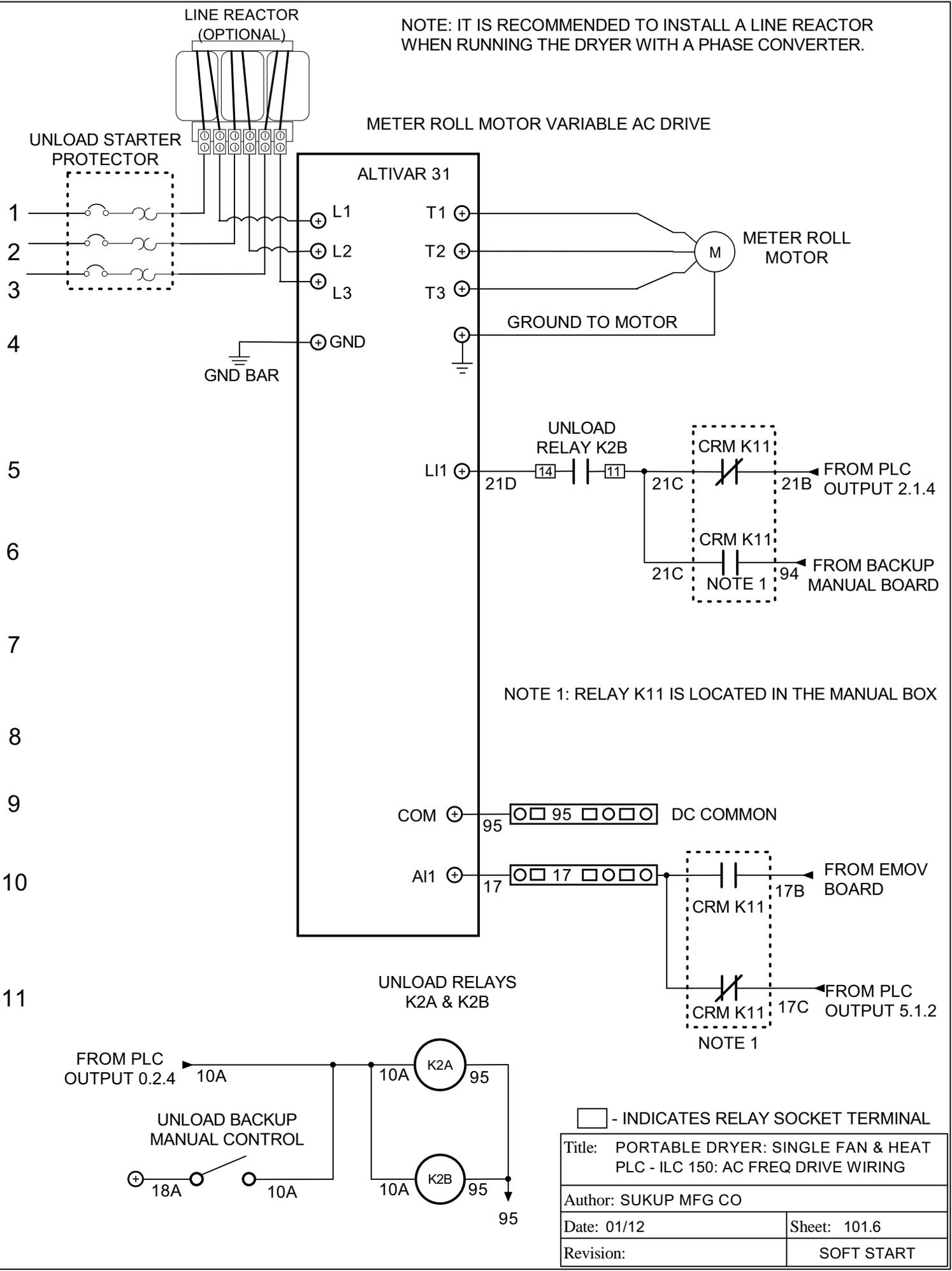
If a fault condition was present, the manual reset (located on the manual control board - upper left corner) will need to be pressed to clear the fault. If the fault condition *has not* been corrected, the RED LED associated with that fault will go out when the reset has been pushed, but will turn ON again within a few seconds, after the faults are scanned.

2. The X indicates the switch position. An X to the left, indicates the switch is in the Manual position, and an X to the right indicates the switch is in the Automatic position.

 - Indicates a power box connection terminal.

Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150 NOTE PAGE	
Author: SUKUP MFG CO	
Date: 01/10	Sheet: 101.5
Revision:	SOFT START

NOTE: IT IS RECOMMENDED TO INSTALL A LINE REACTOR WHEN RUNNING THE DRYER WITH A PHASE CONVERTER.



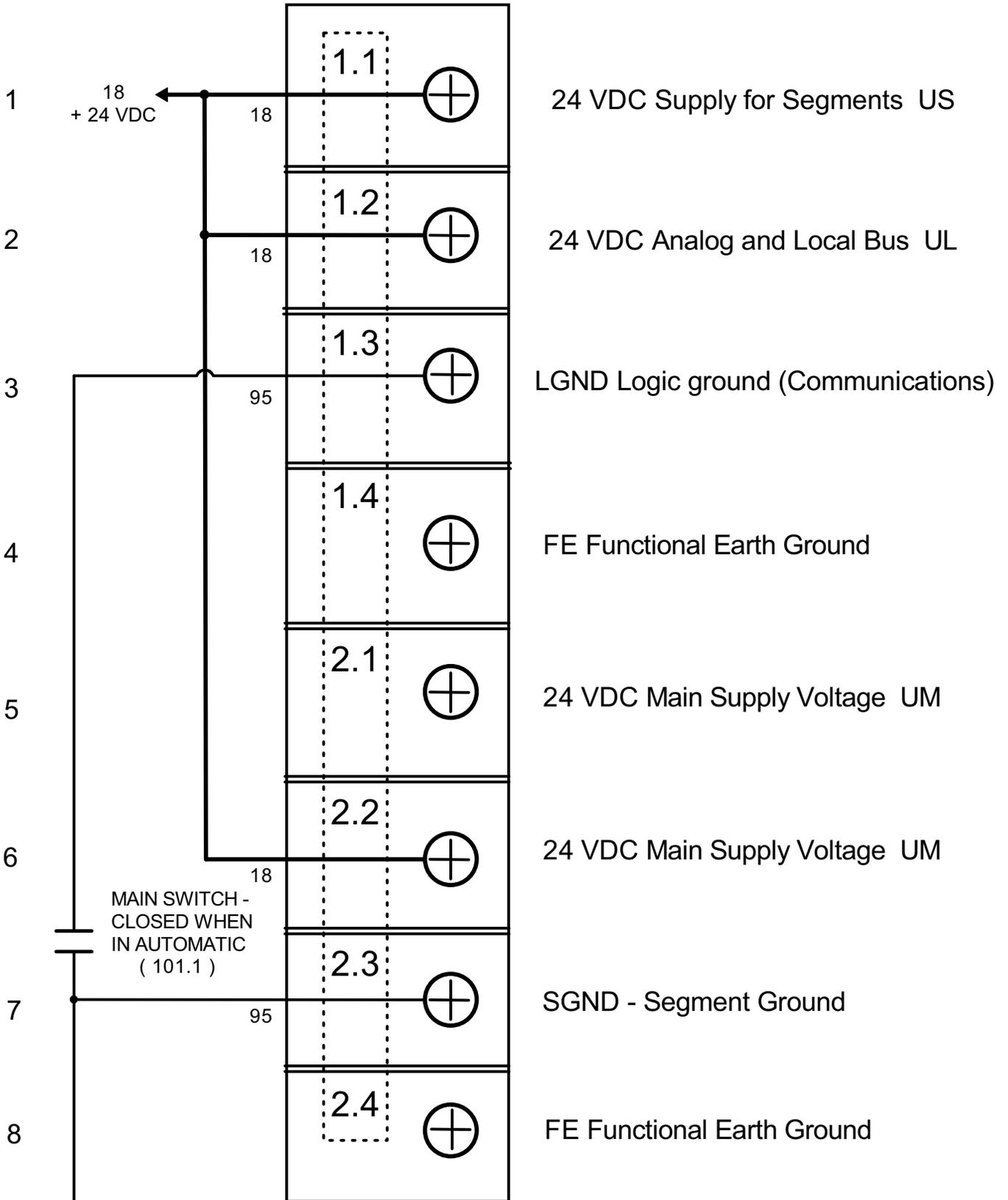
NOTE 1: RELAY K11 IS LOCATED IN THE MANUAL BOX

NOTE 1

□ - INDICATES RELAY SOCKET TERMINAL

Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC 150: AC FREQ DRIVE WIRING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.6
Revision:	SOFT START

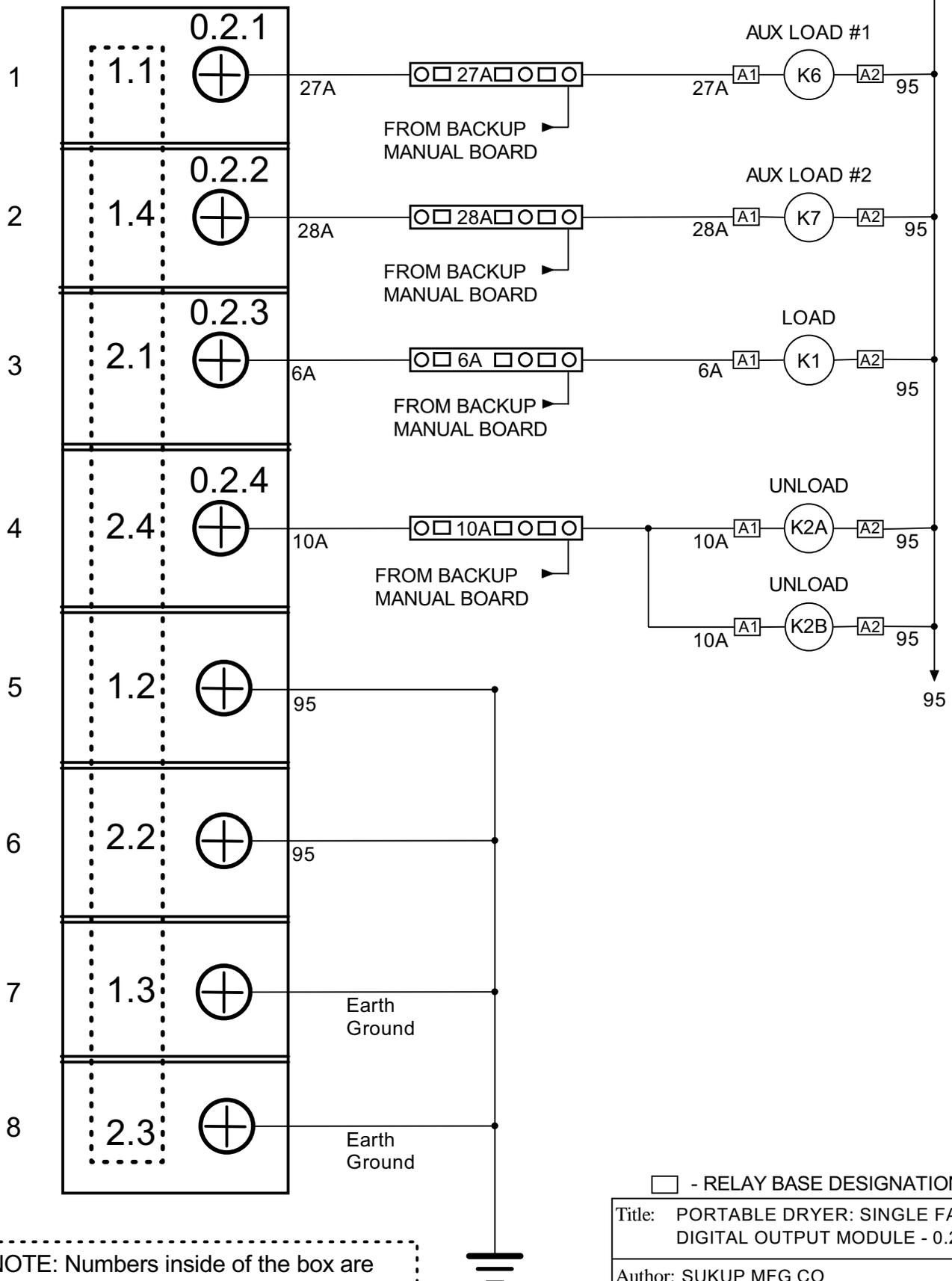
24 VDC POWER SUPPLY MODULE - 0.1 (ORANGE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC - ILC150, 24VDC POWER SUPPLY	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.7
Revision:	SOFT START

DIGITAL OUTPUT MODULE - 0.2 (ORANGE)

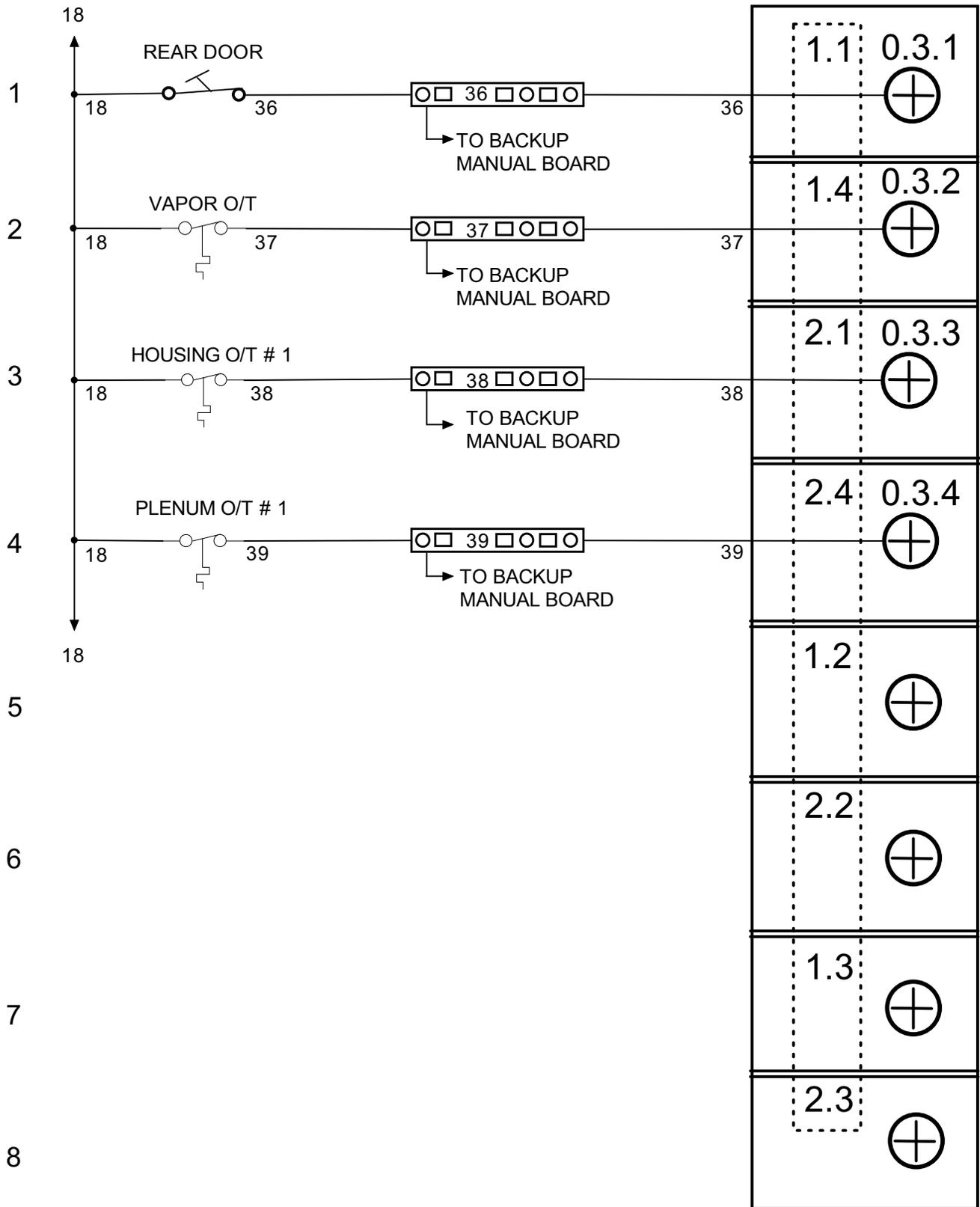


NOTE: Numbers inside of the box are terminal designators printed on the module.

□ - RELAY BASE DESIGNATION

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL OUTPUT MODULE - 0.2	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.8
Revision:	SOFT START

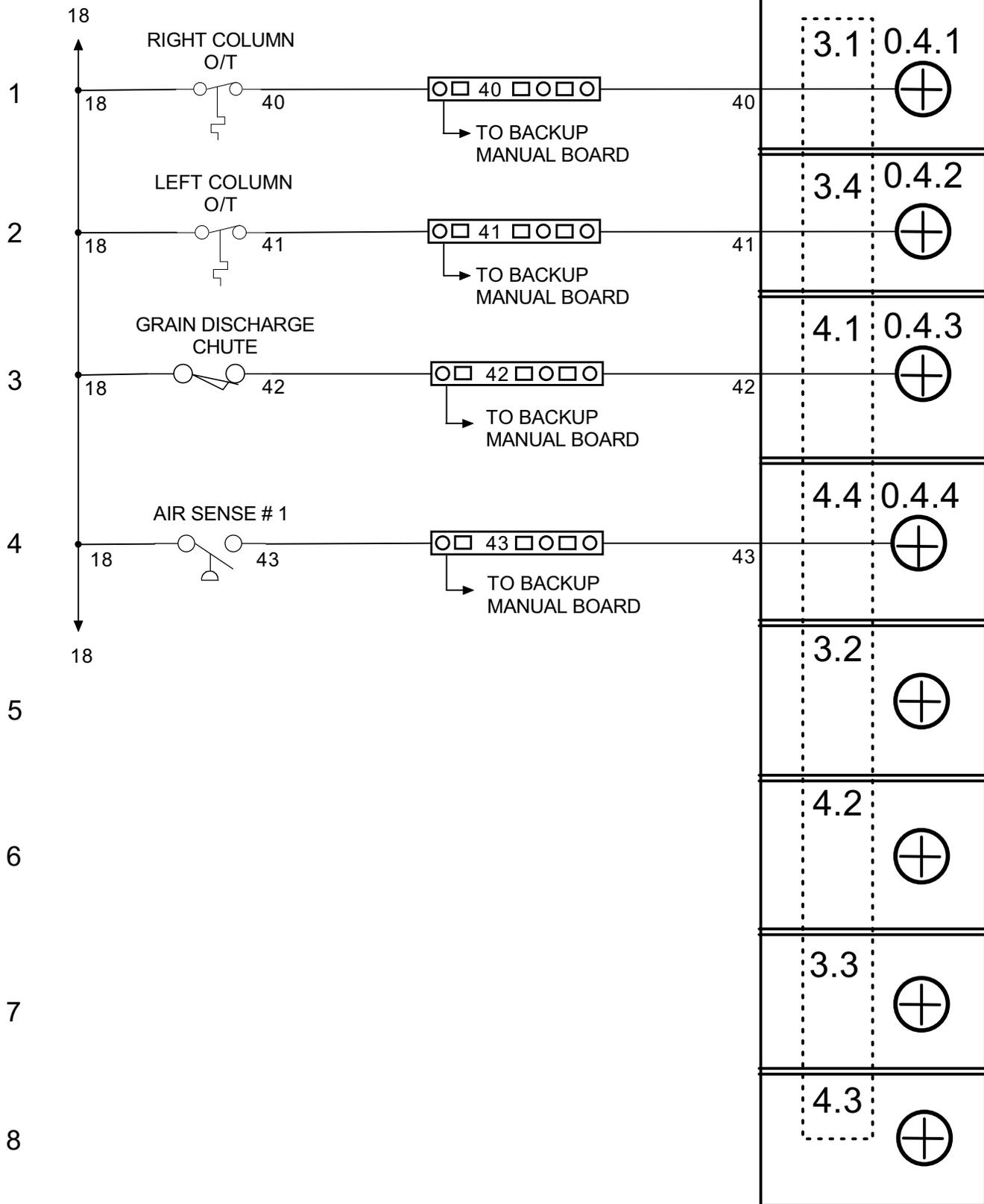
DIGITAL INPUT MODULE - 0.3 (ORANGE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 0.4	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.9
Revision:	SOFT START

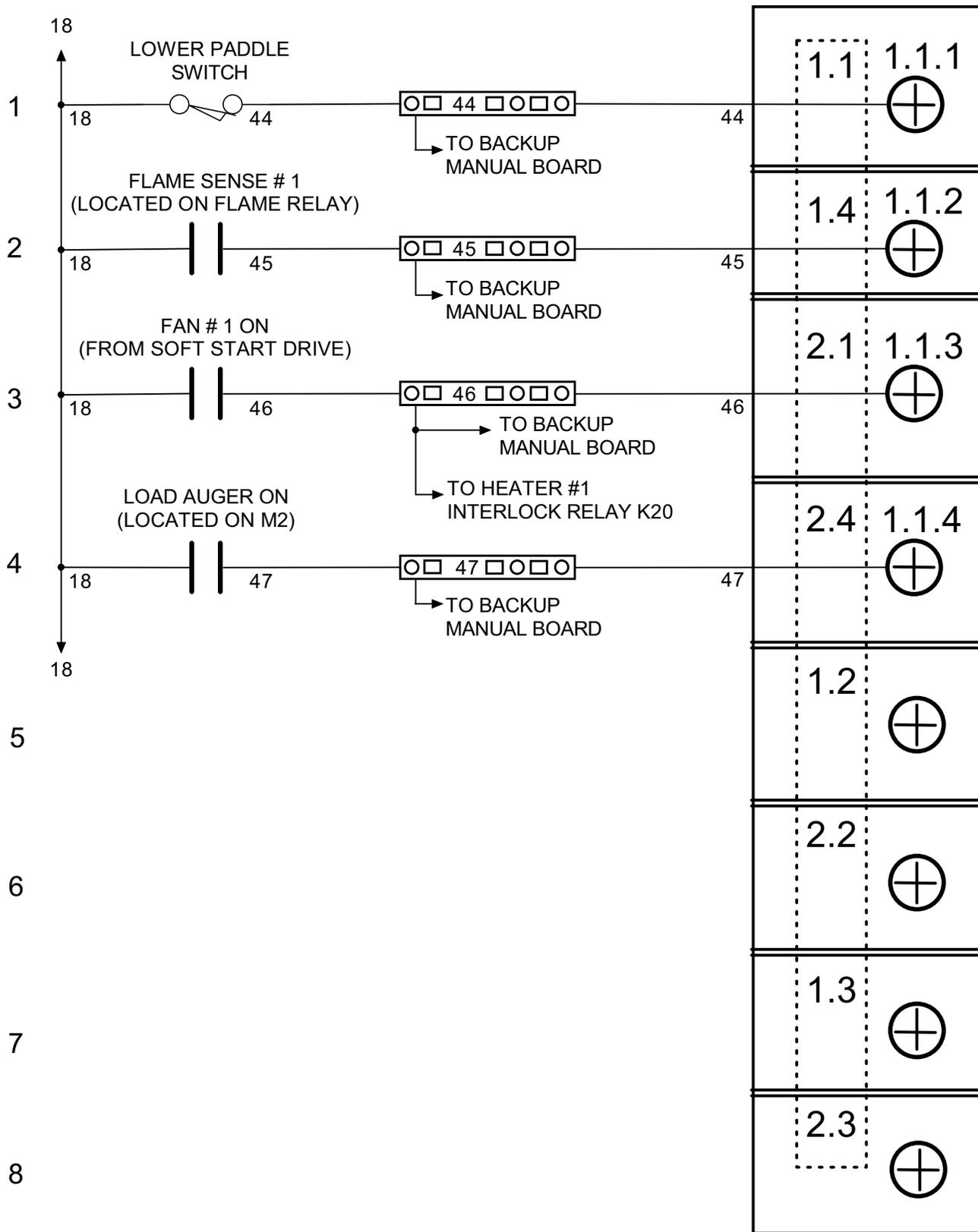
DIGITAL INPUT MODULE - 0.4 (ORANGE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUTMODULE - 0.4	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.10
Revision:	SOFT START

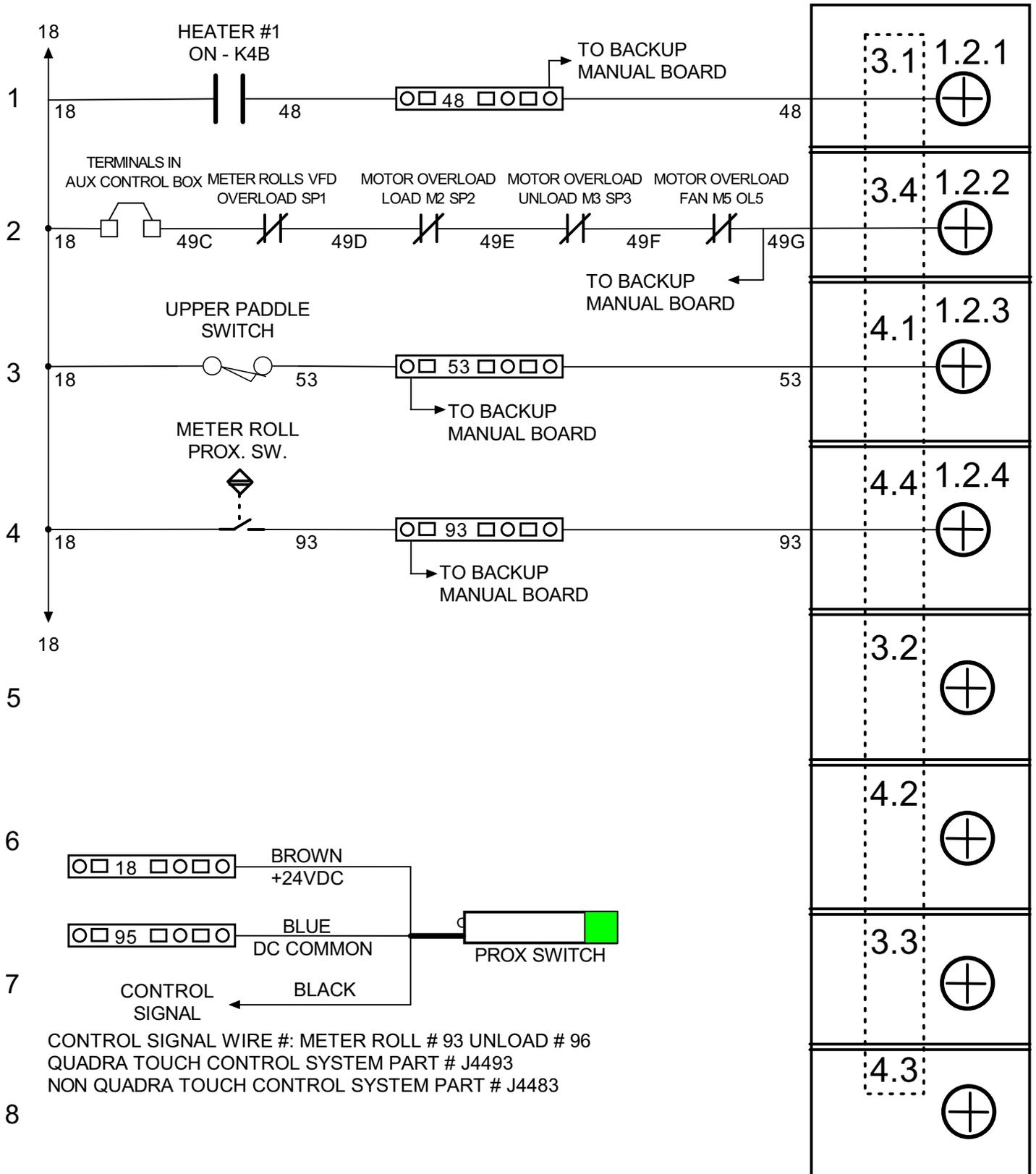
DIGITAL INPUT MODULE - 1.1 of 4 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 1.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.11
Revision:	SOFT START

DIGITAL INPUT MODULE - 1.2 OF 4 (BLUE)

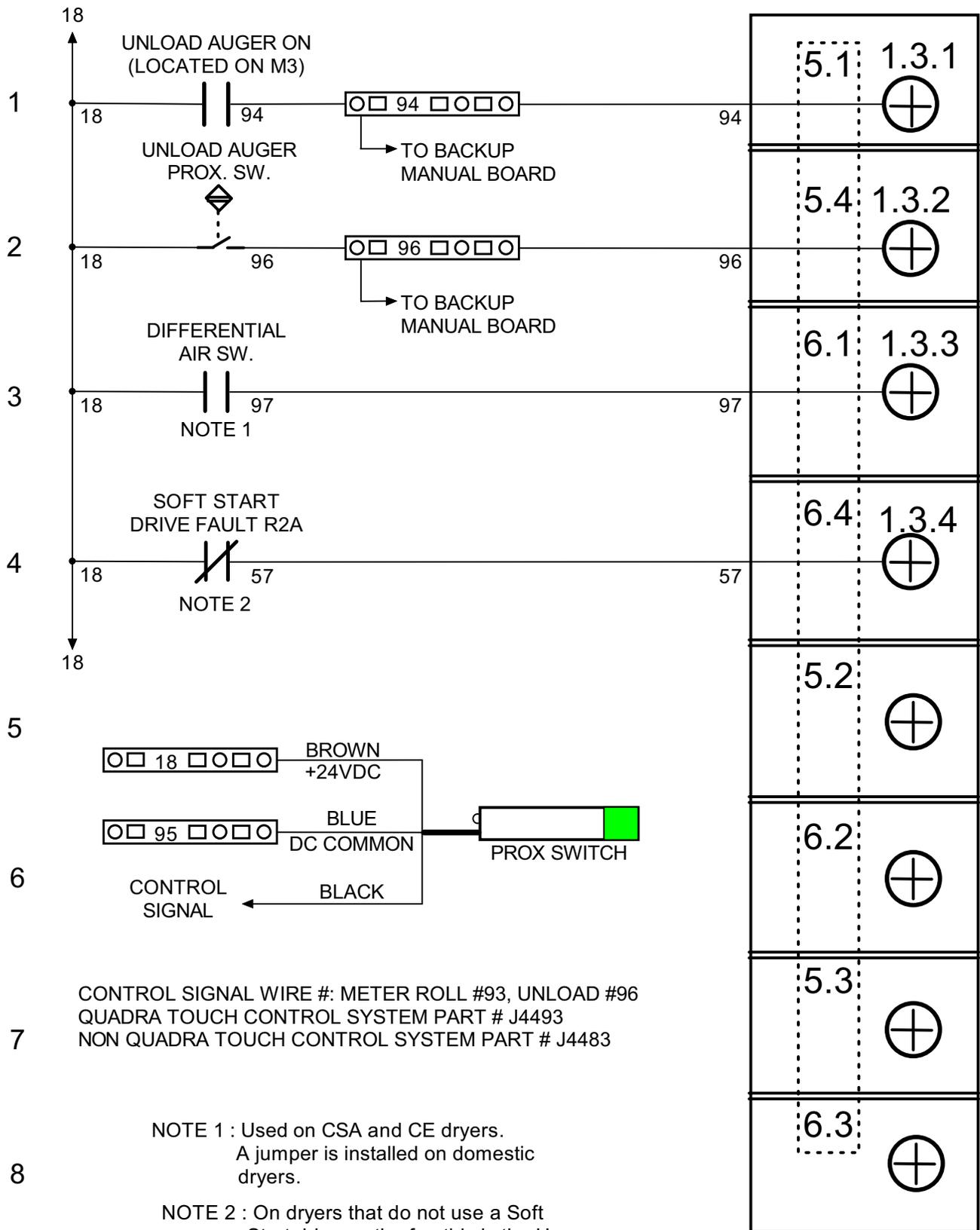


CONTROL SIGNAL WIRE #: METER ROLL # 93 UNLOAD # 96
 QUADRA TOUCH CONTROL SYSTEM PART # J4493
 NON QUADRA TOUCH CONTROL SYSTEM PART # J4483

NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 1.2	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.12
Revision:	SOFT START

DIGITAL INPUT MODULE - 1.3 OF 4 (BLUE)



CONTROL SIGNAL WIRE #: METER ROLL #93, UNLOAD #96
 QUADRA TOUCH CONTROL SYSTEM PART # J4493
 NON QUADRA TOUCH CONTROL SYSTEM PART # J4483

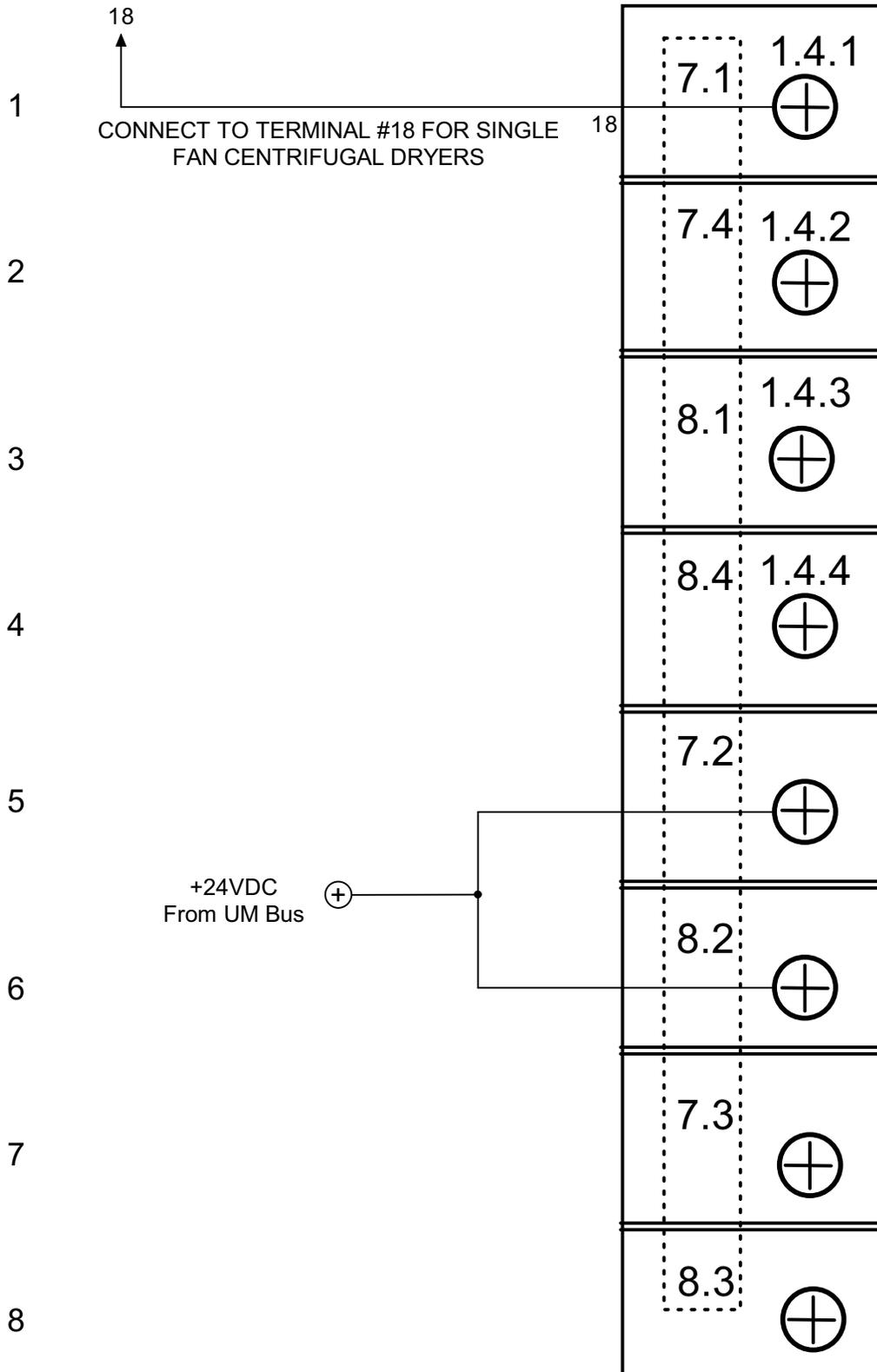
NOTE 1 : Used on CSA and CE dryers.
 A jumper is installed on domestic dryers.

NOTE 2 : On dryers that do not use a Soft Start drive on the fan this is the User Fault Input. So when the drive faults out a User Fault will come up on the display.

NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PROTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 1.3	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.13
Revision:	SOFT START

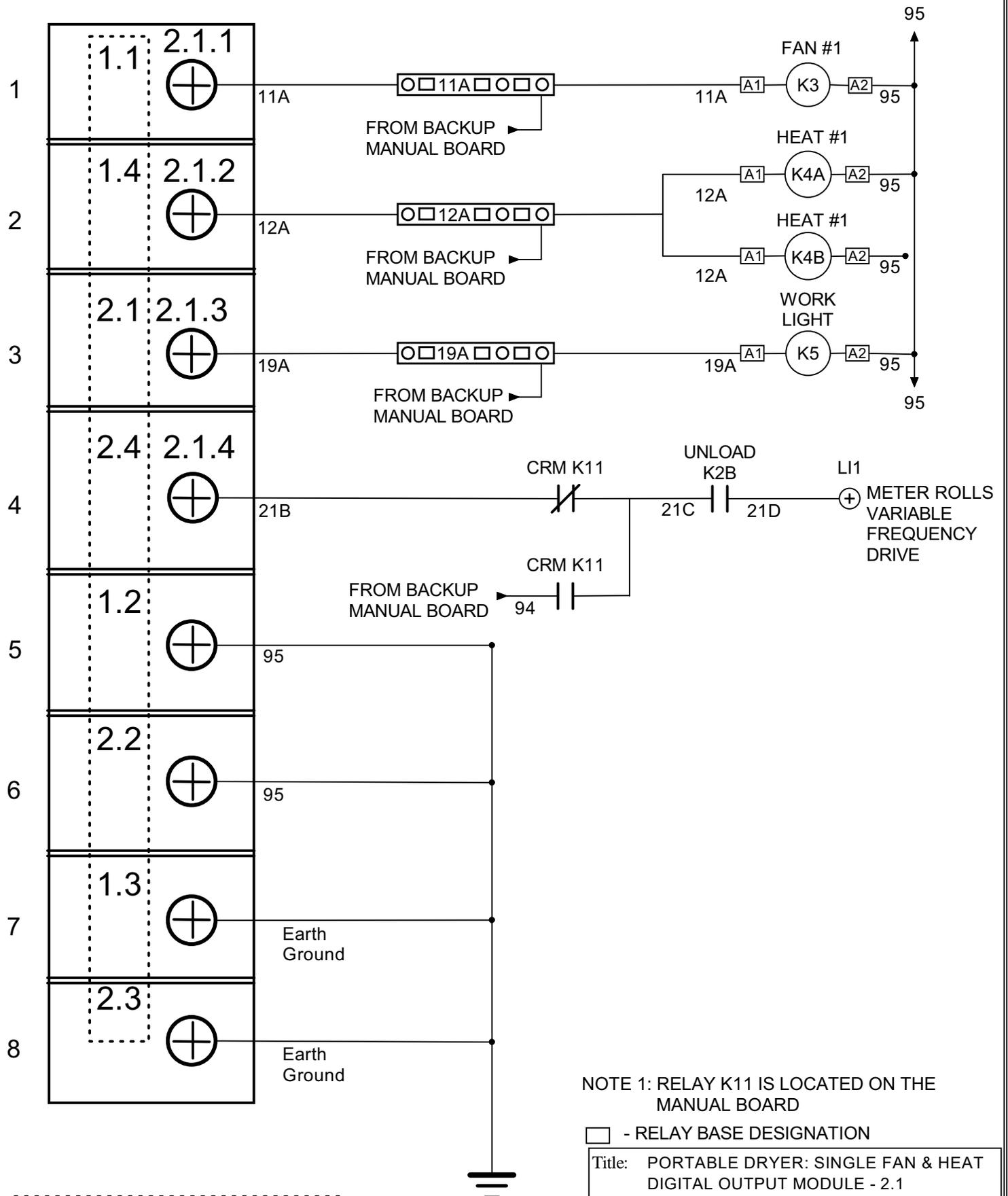
DIGITAL INPUT MODULE - 1.4 OF 4 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 1.4	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.14
Revision:	SOFT START

DIGITAL OUTPUT MODULE 2.1 (RED)



NOTE: Numbers inside of the box are terminal designators printed on the module.

NOTE 1: RELAY K11 IS LOCATED ON THE MANUAL BOARD

□ - RELAY BASE DESIGNATION

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL OUTPUT MODULE - 2.1

Author: SUKUP MFG CO

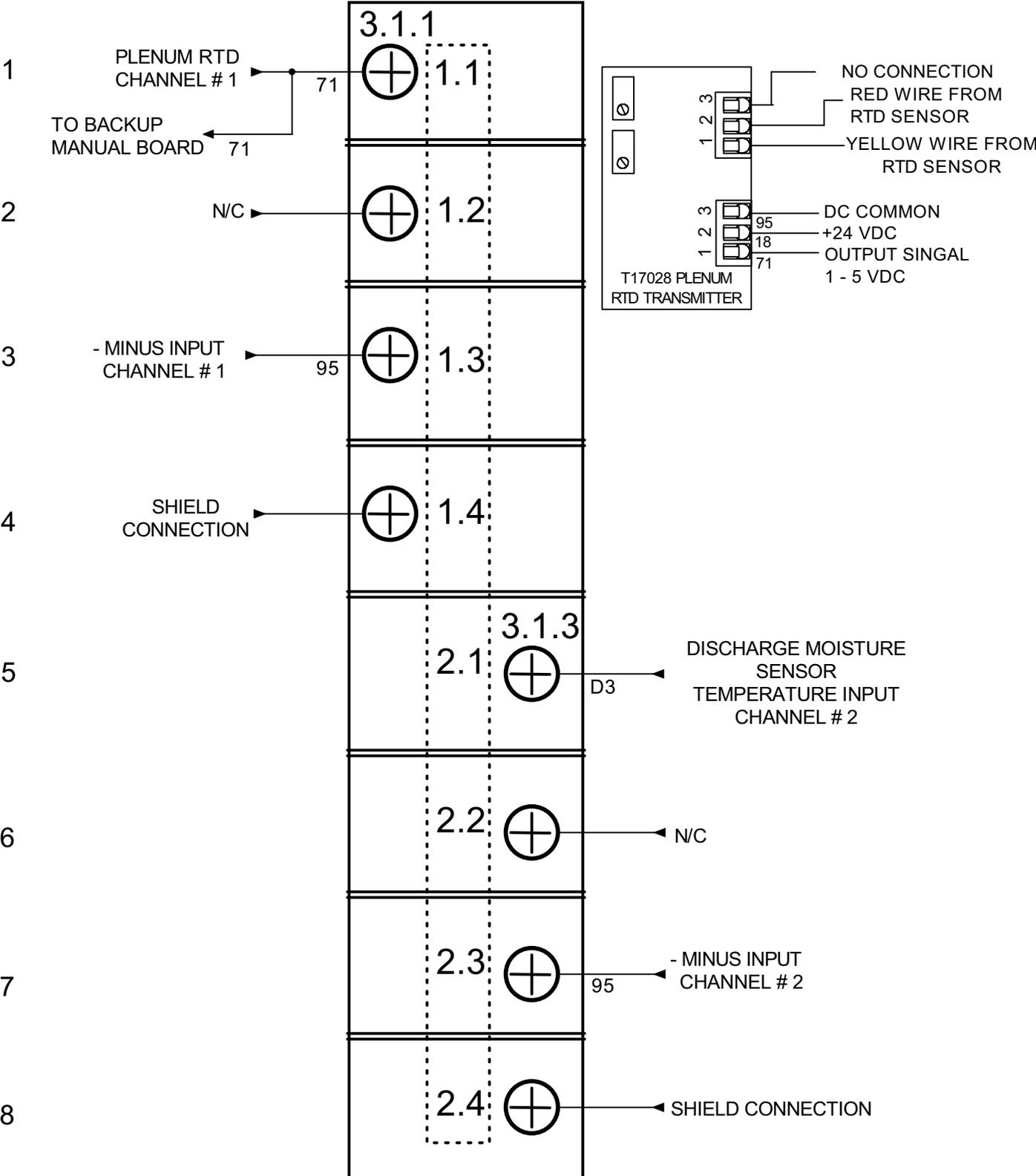
Date: 01/12

Sheet: 101.15

Revision:

SOFT START

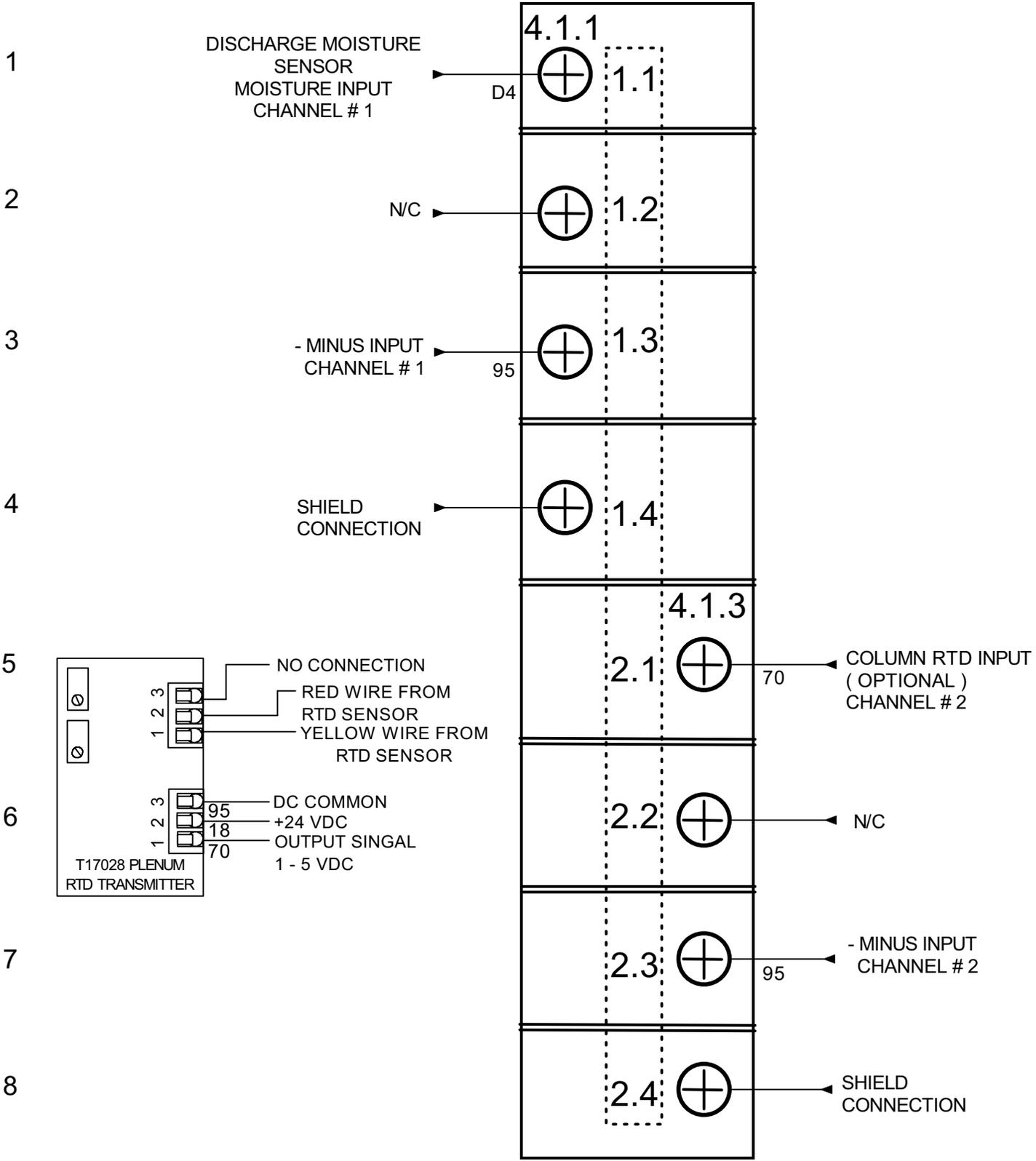
ANALOG INPUT MODULE - 3.1 (GREEN)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT ANALOG INPUT MODULE - 3.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.16
Revision:	SOFT START

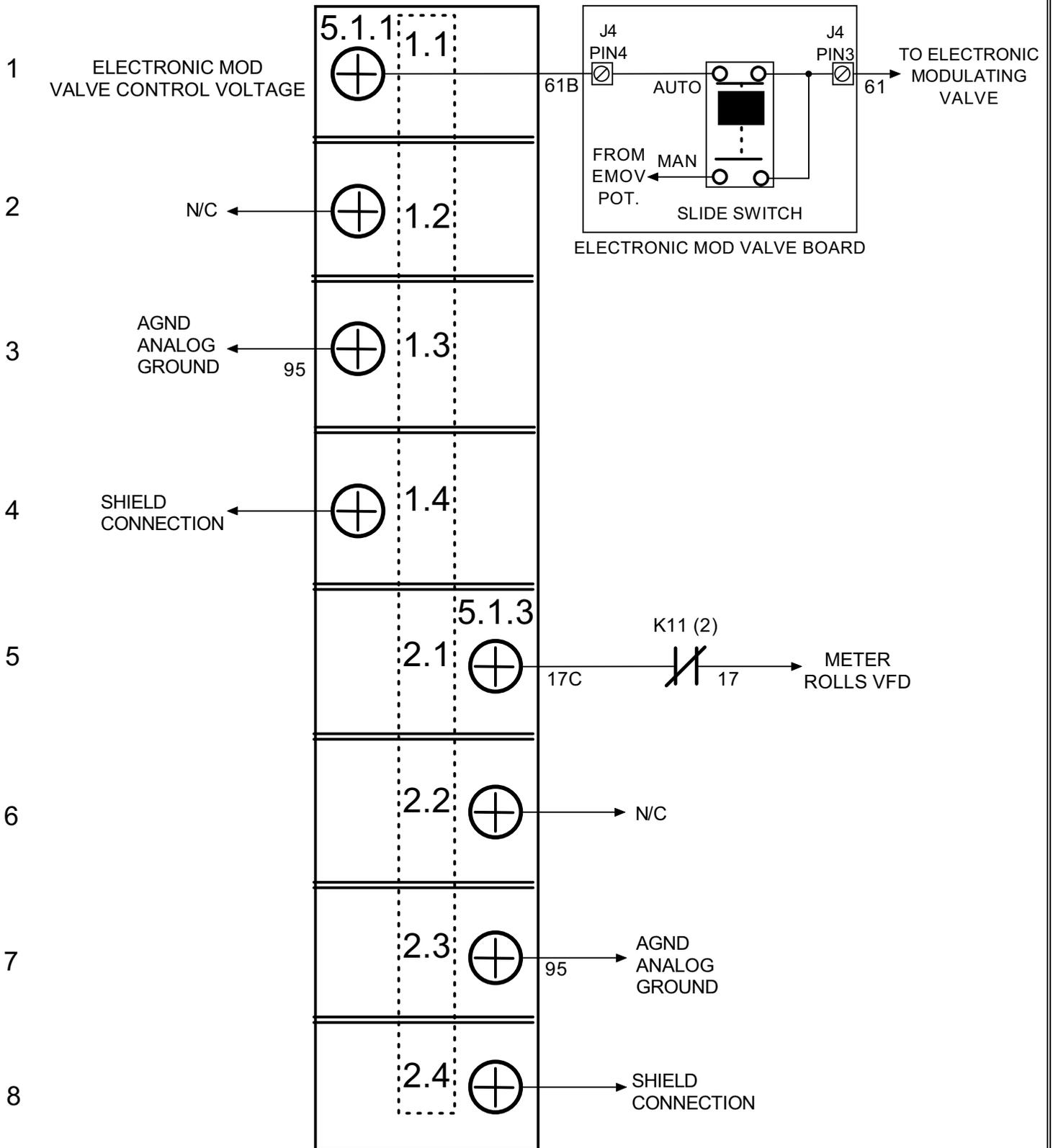
ANALOG INPUT MODULE - 4.1 (GREEN)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT ANALOG INPUT MODULE - 4.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.17
Revision:	SOFT START

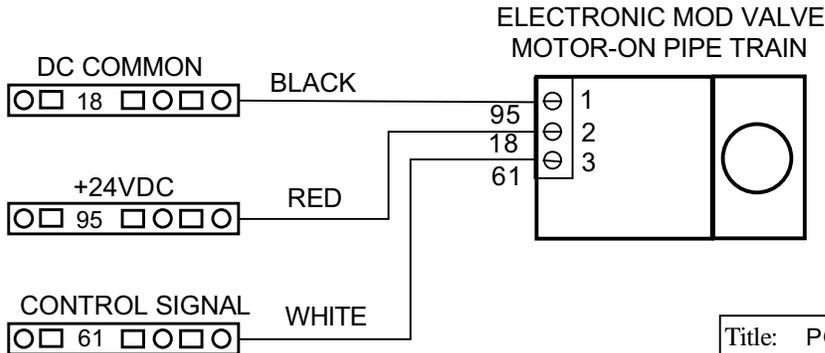
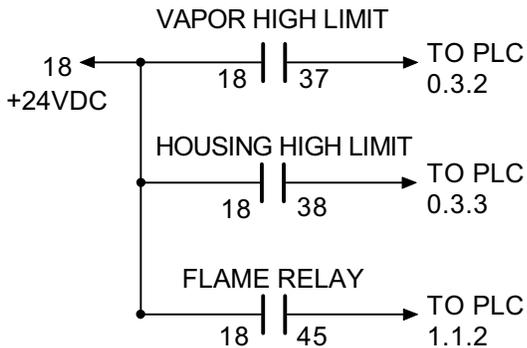
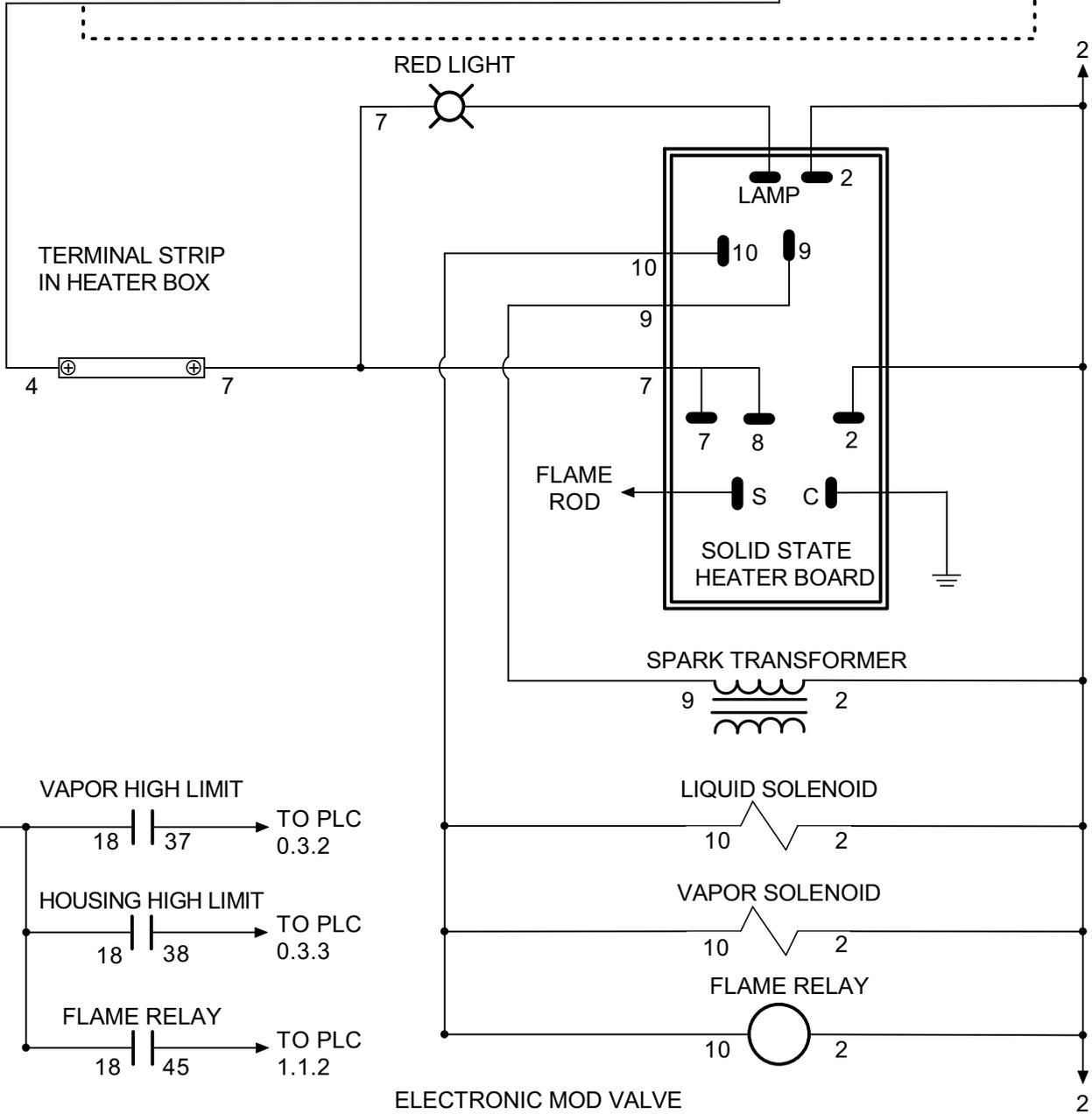
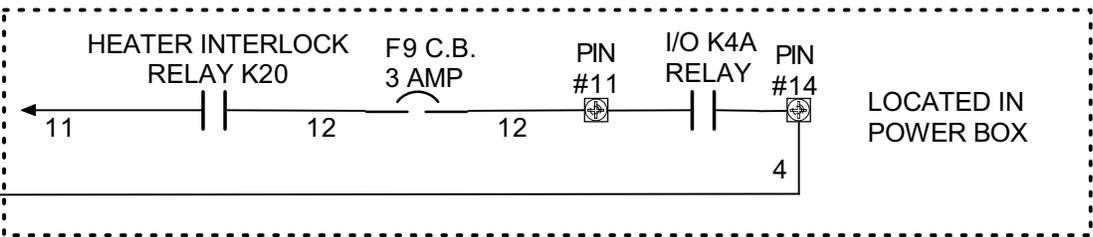
ANALOG OUTPUT MODULE 5.1 (YELLOW)



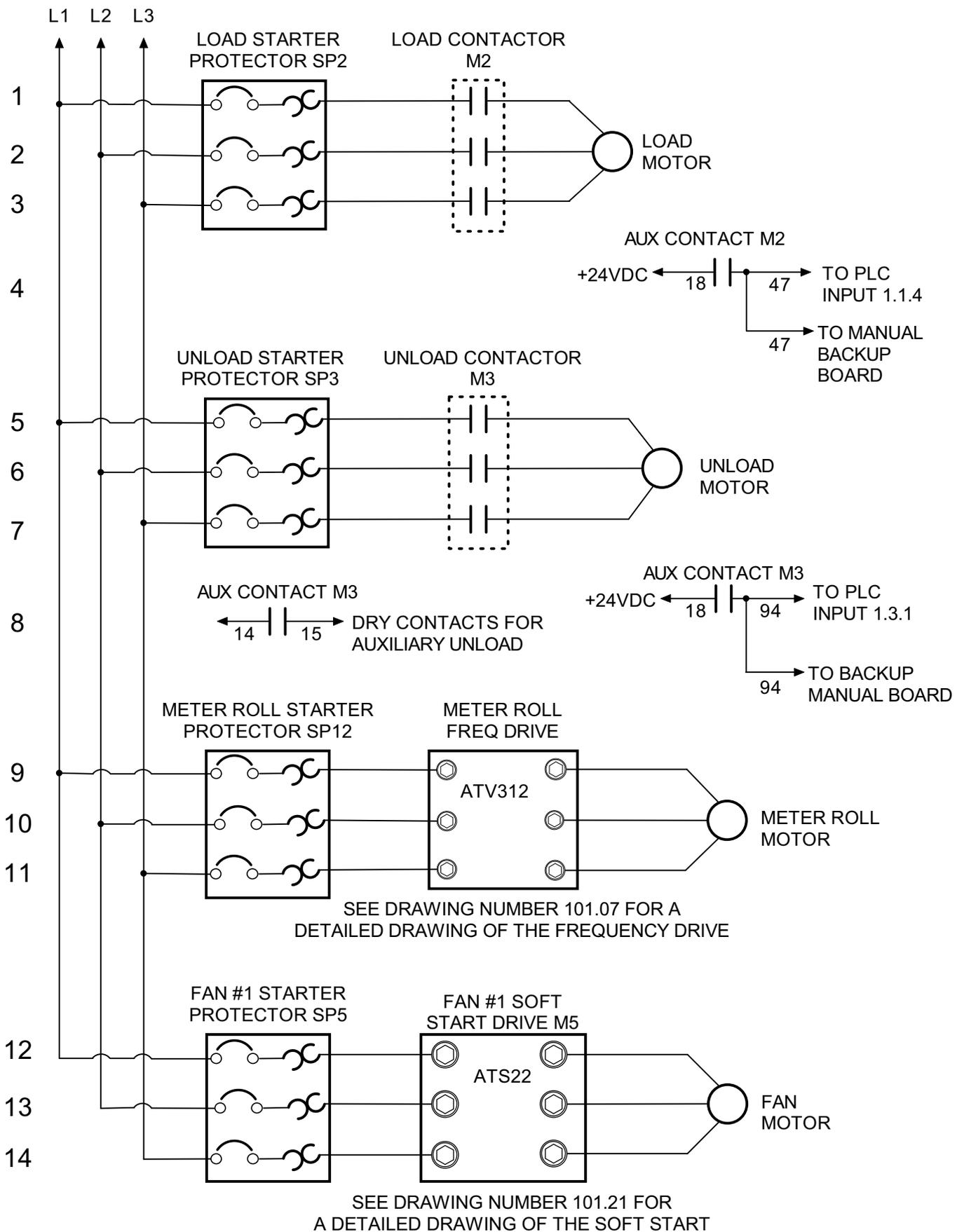
NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT ANALOG OUTPUT MODULE - 5.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.18
Revision:	SOFT START

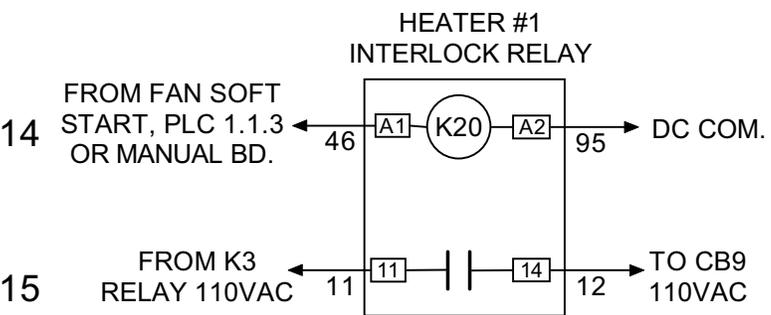
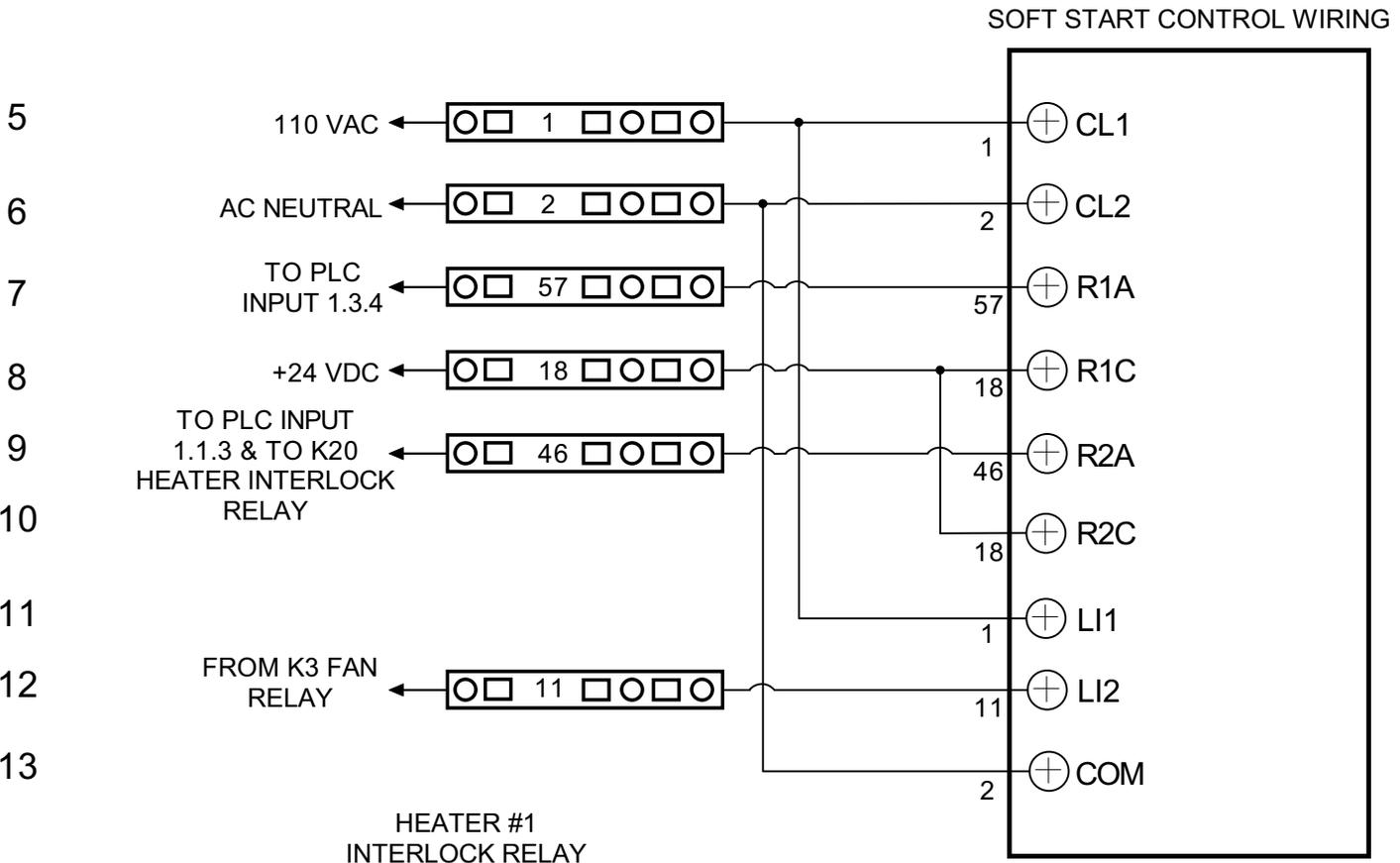
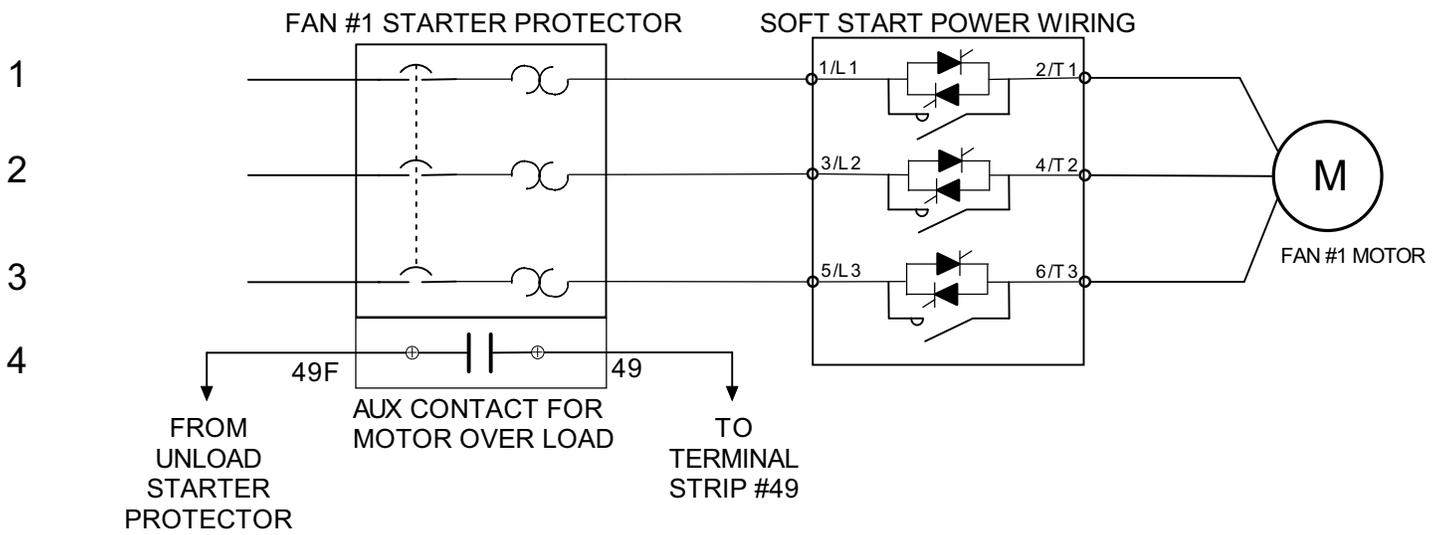
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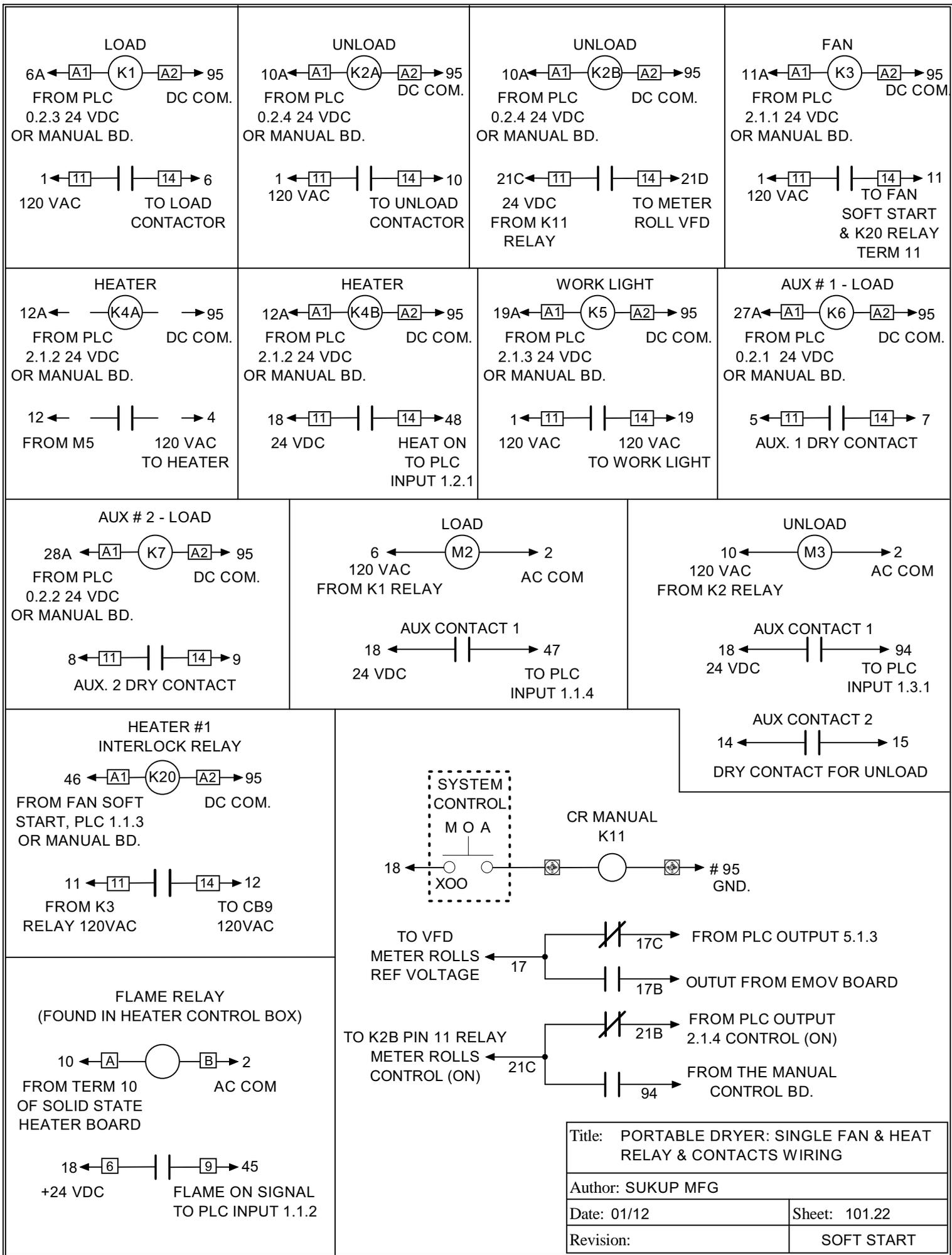
Title: PORTABLE DRYER: SINGLE FAN & HEAT HEATER CONTROL BOARD	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.19
Revision:	SOFT START

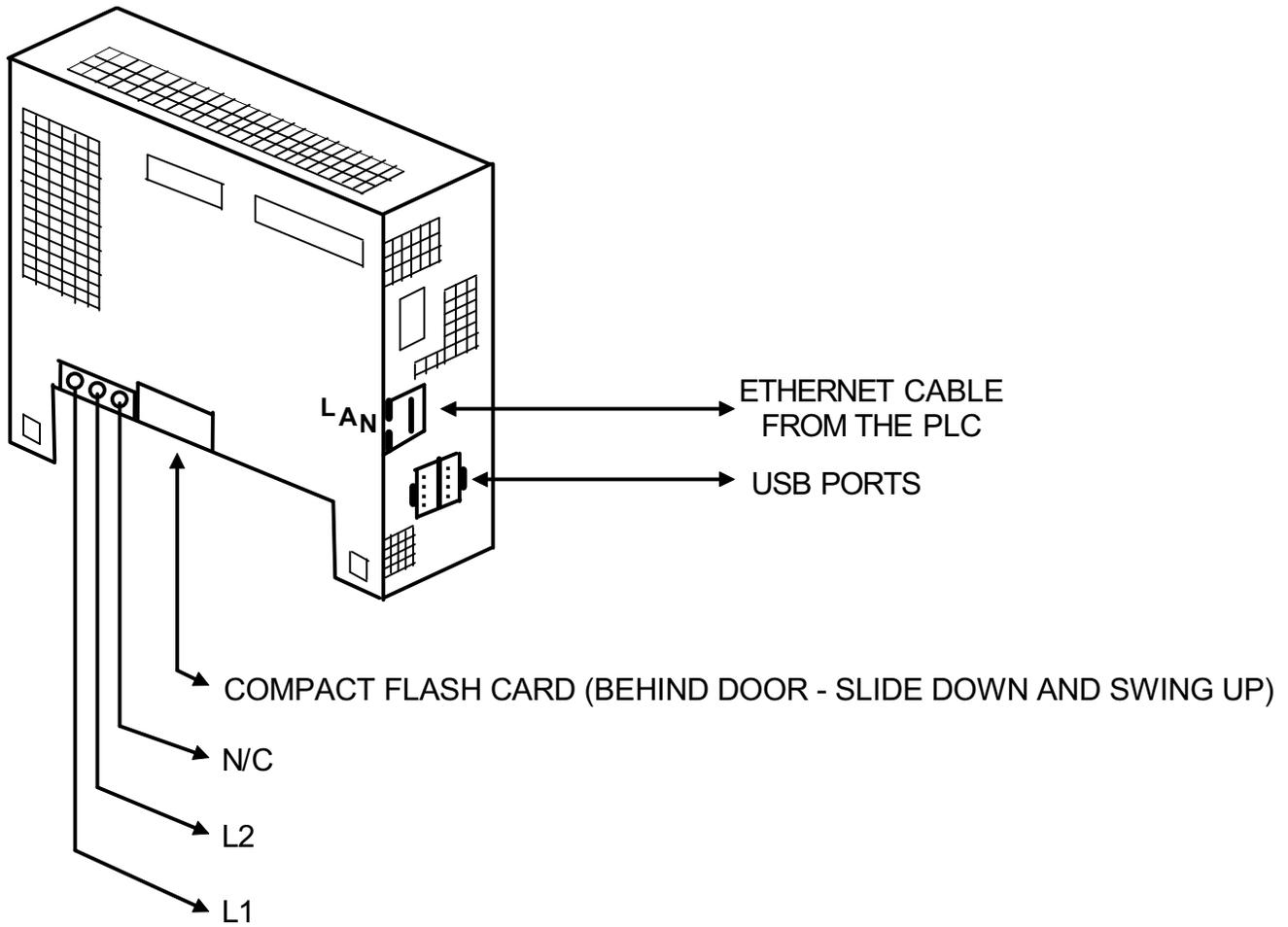


Title: PORTABLE DRYER: SINGLE FAN & HEAT MOTOR CONTACTOR & RELAY WIRING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.20
Revision:	SOFT START



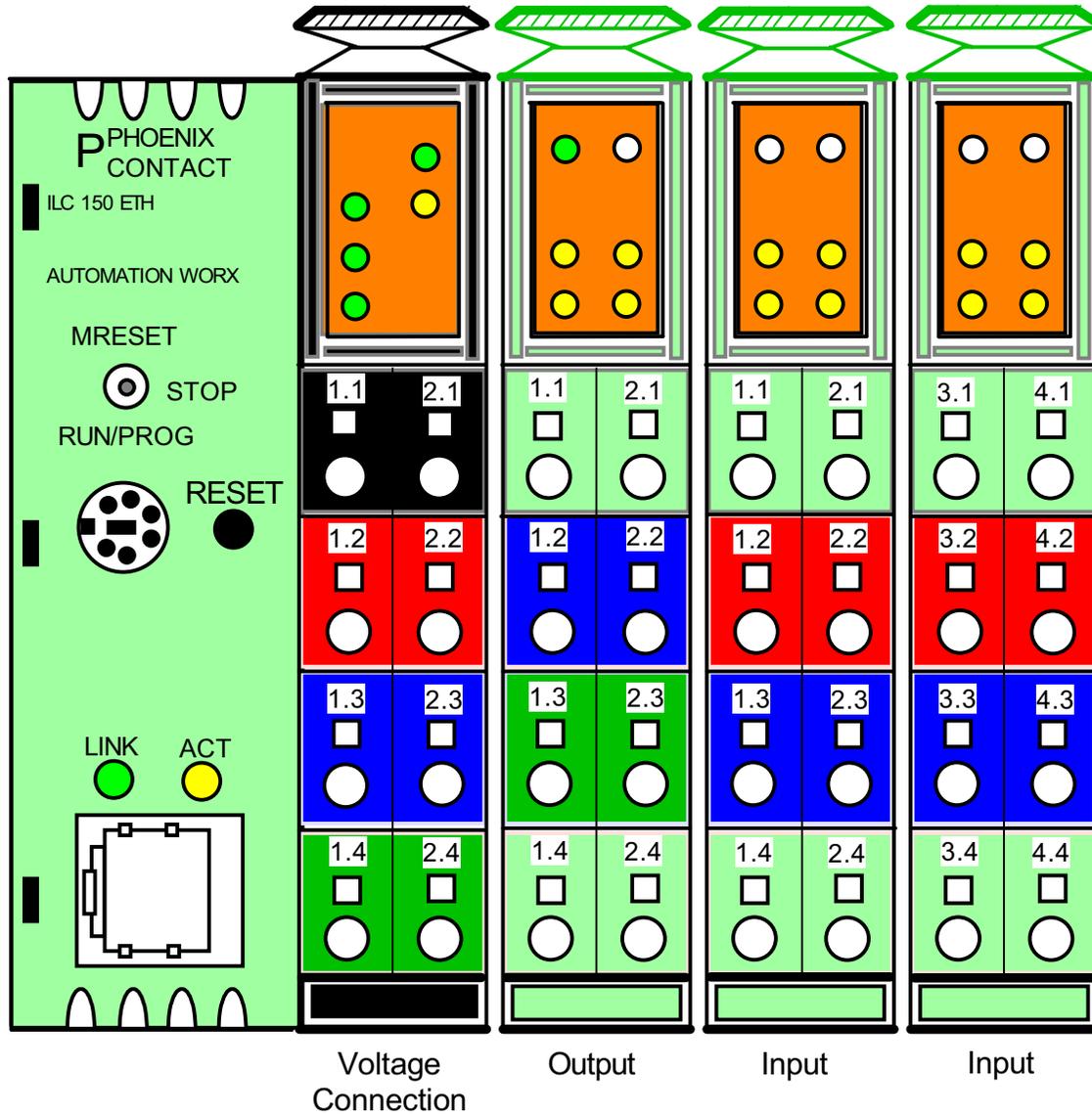
Title: PORTABLE DRYER: SINGLE FAN & HEAT FAN SOFT START WIRING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.21
Revision:	SOFT START





Title: PORTABLE DRYER: SINGLE FAN & HEAT HMI - TOUCH SCREEN	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.23
Revision:	SOFT START

PHOENIX CONTACT PLC MODULE ILC 150 (ORANGE)



Title: PORTABLE DRYER: SINGLE FAN & HEAT
PHOENIX CONTACT PLC -ILC 150

Author: SUKUP MFG CO

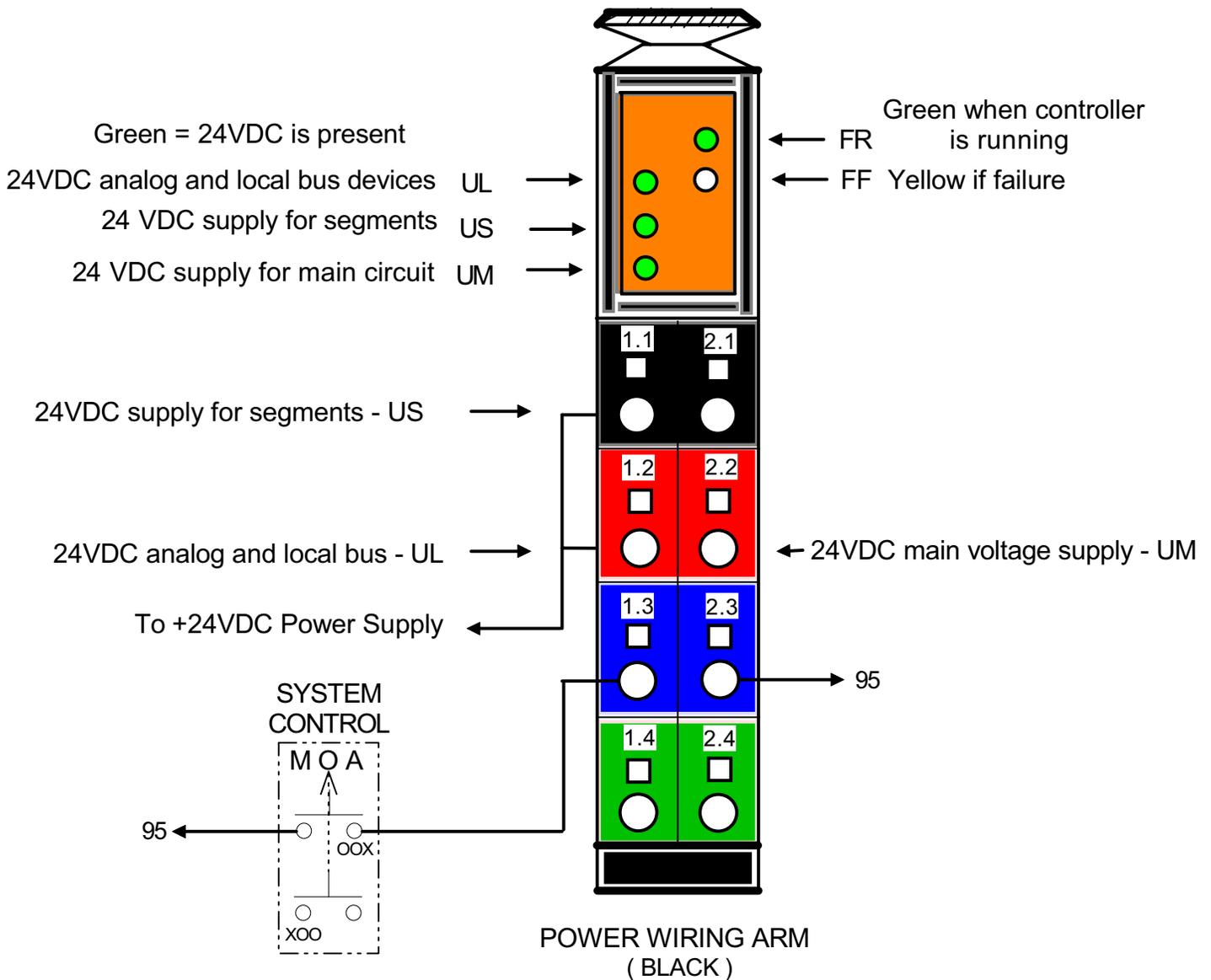
Date: 01/12

Sheet: 101.24

Revision:

SOFT START

POWER SUPPLY CONNECTION FOR THE ILC 150 (ORANGE)



NOTE: This wiring arm is not a power supply. 24VDC is provided by an independent power supply and connected to this arm, which then supplies the PLC and modules.

Title: PORTABLE DRYER: SINGLE FAN & HEAT
POWER SUPPLY MODULE 24VDC

Author: SUKUP MFG CO

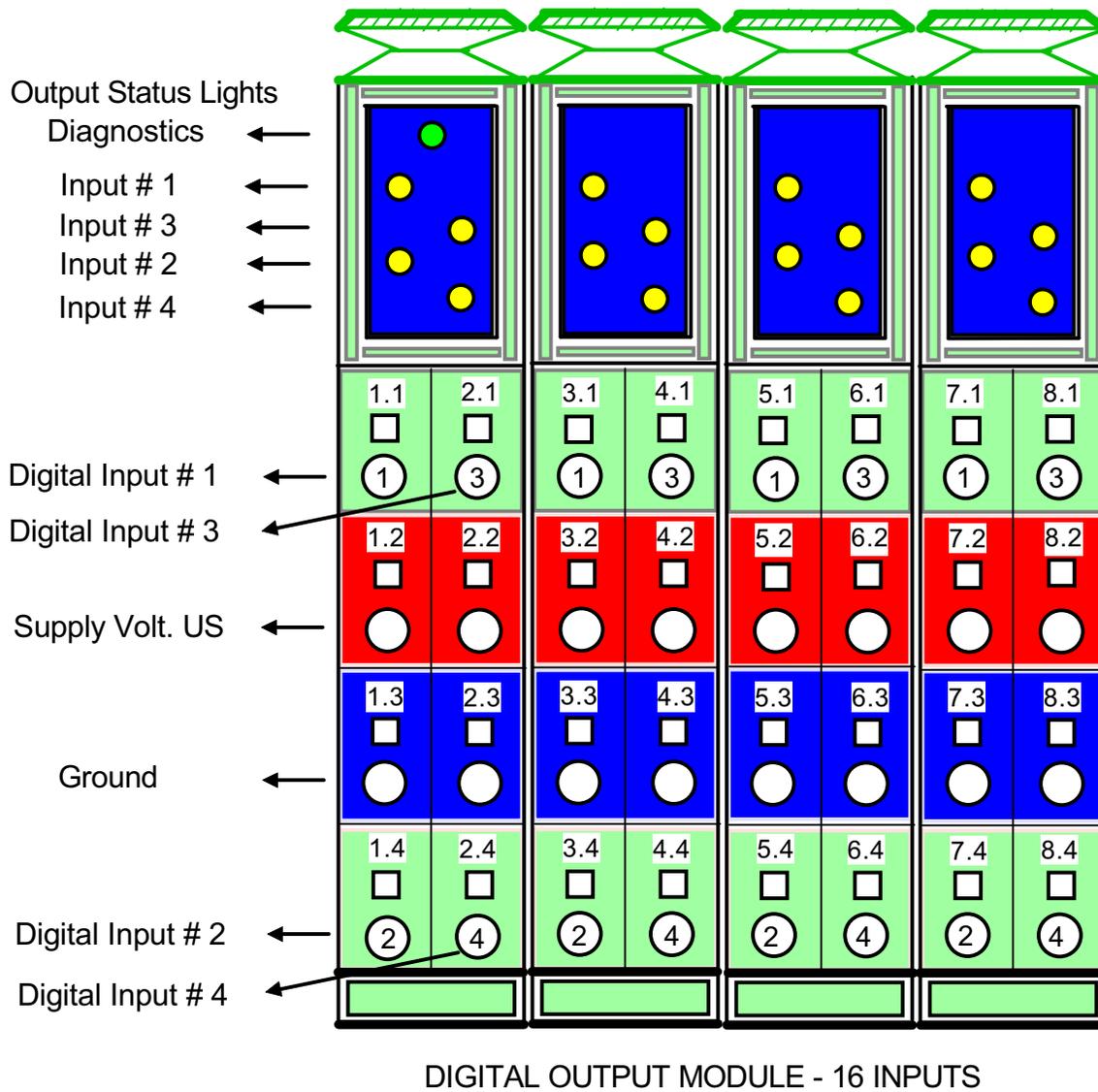
Date: 01/12

Sheet: 101.25

Revision:

SOFT START

DIGITAL INPUT MODULE - ILC 150 (BLUE)

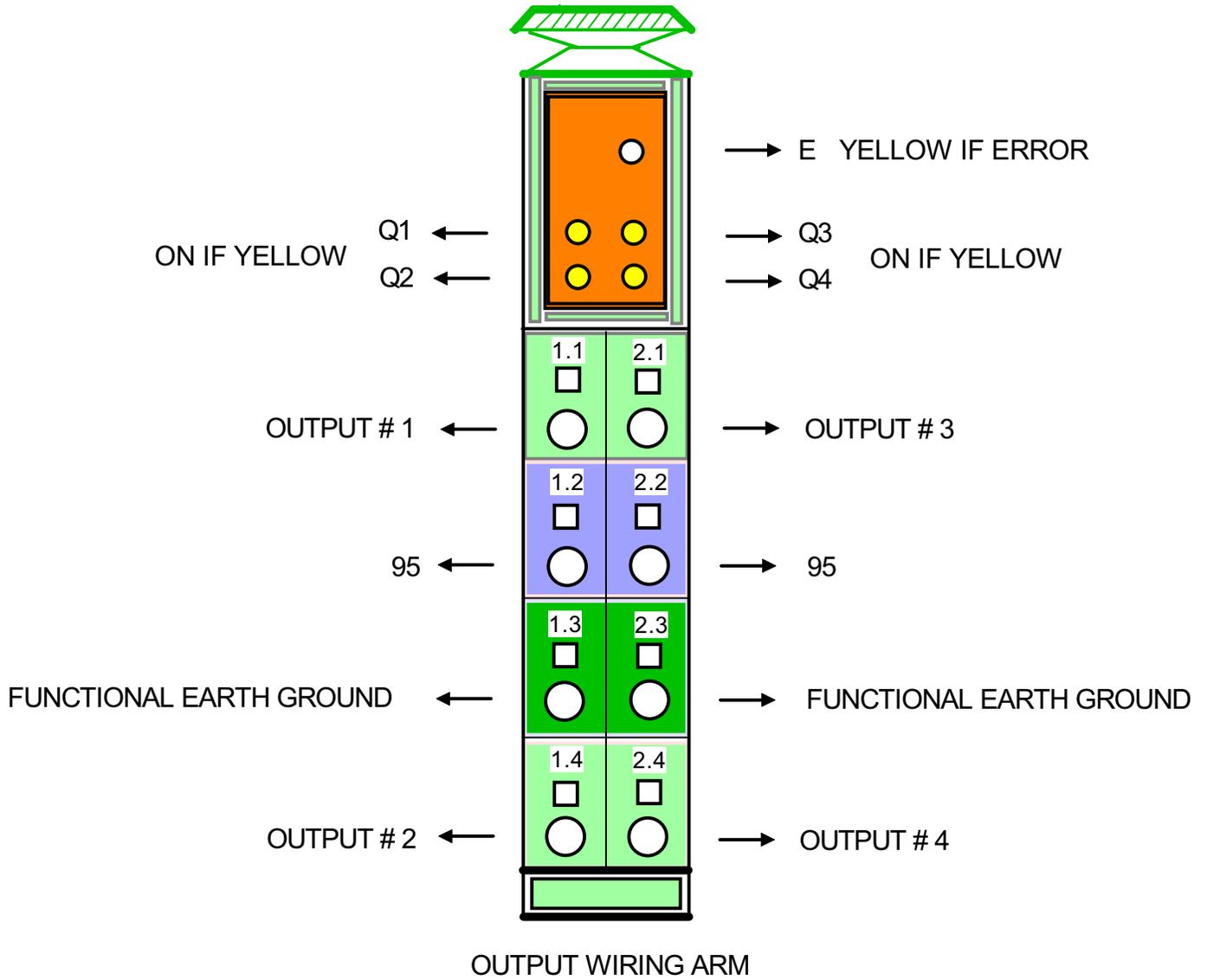


Diagnostics:

- 1) Green - OK
- 2) Flashing 0.5 Hz - communications power UL available but buss not active
- 3) Flashing 2 Hz - peripheral fault
- 4) Flashing 4 Hz - local bus error

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL INPUT MODULE - 16 INPUTS	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.26
Revision:	SOFT START

OUTPUT WIRING ARM - ILC 150 (ORANGE)



Title: PORTABLE DRYER: SINGLE FAN & HEAT
OUTPUT MODULE 4 - OUTPUT

Author: SUKUP MFG CO

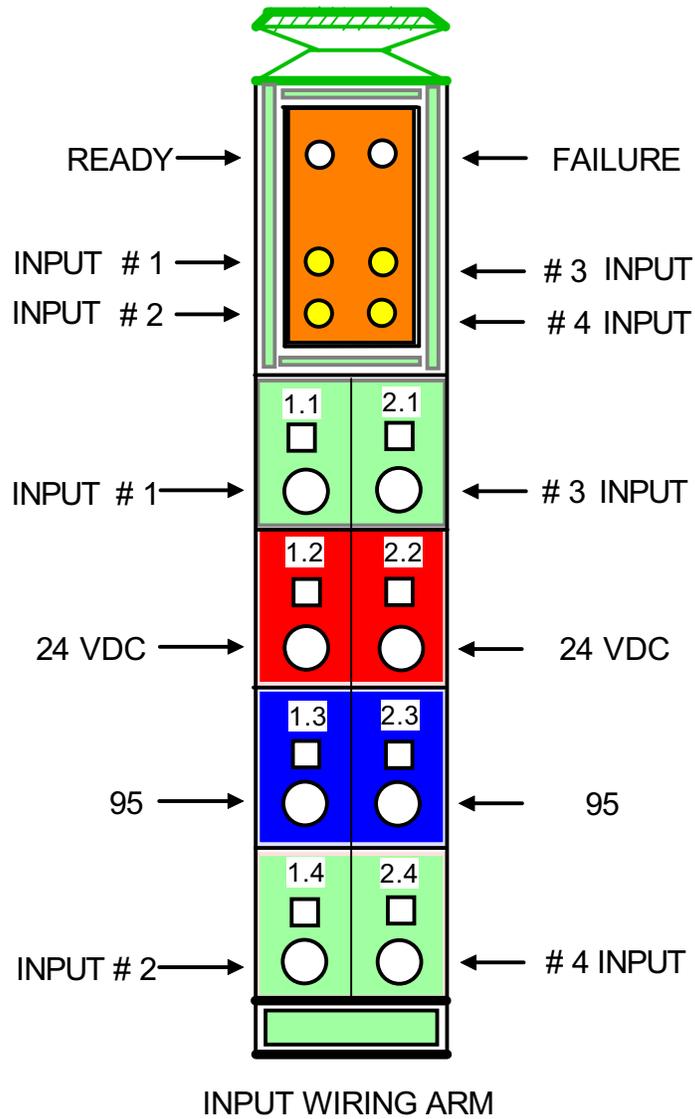
Date: 01/12

Sheet: 101.27

Revision:

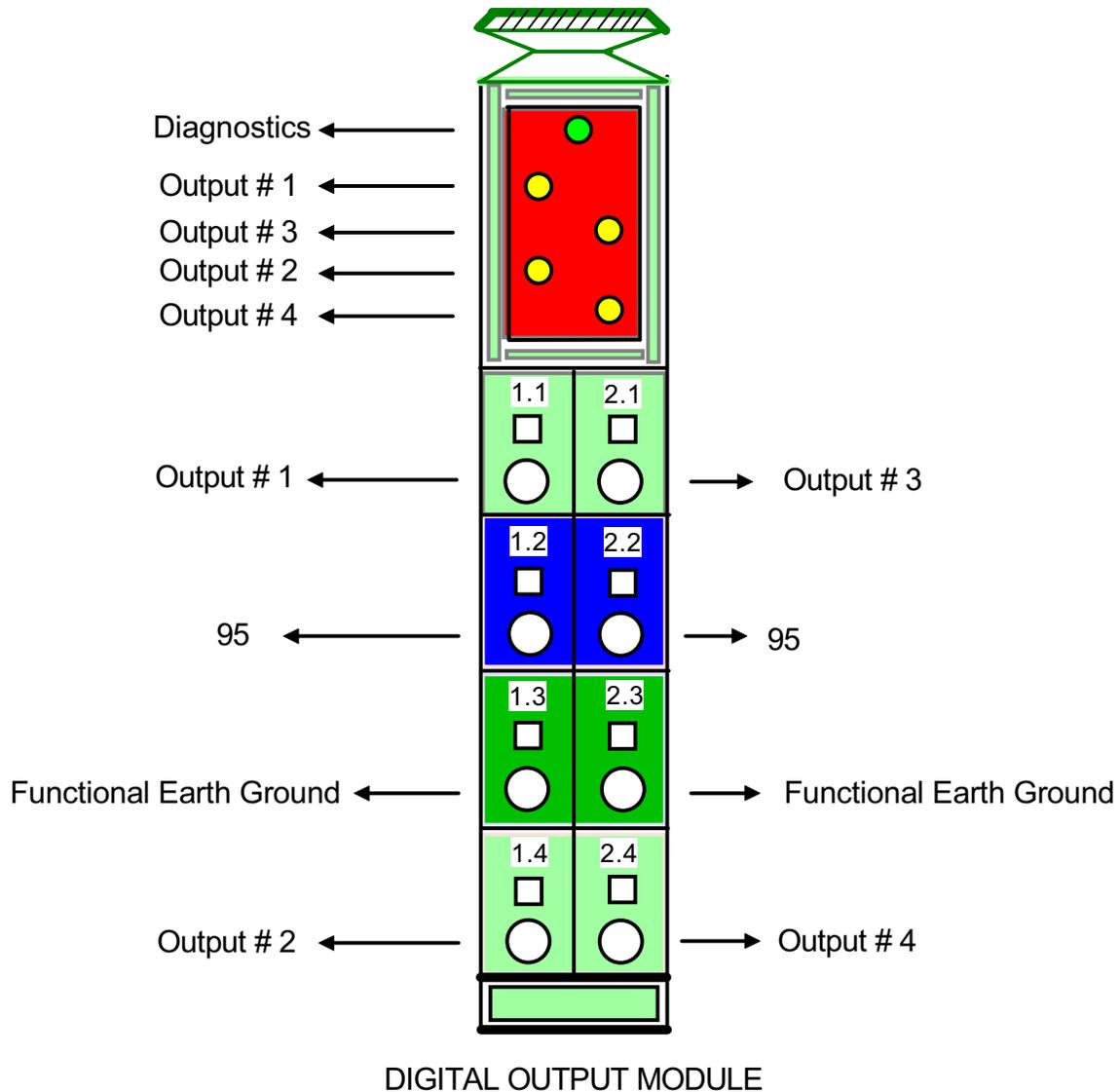
SOFT START

INPUT WIRING ARM - ILC 150 (ORANGE)



Title: PORTABLE DRYER: SINGLE FAN & HEAT INPUT MODULE - 4 INPUTS	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.28
Revision:	SOFT START

DIGITAL OUTPUT MODULE PLC - ILC - 150 (RED)

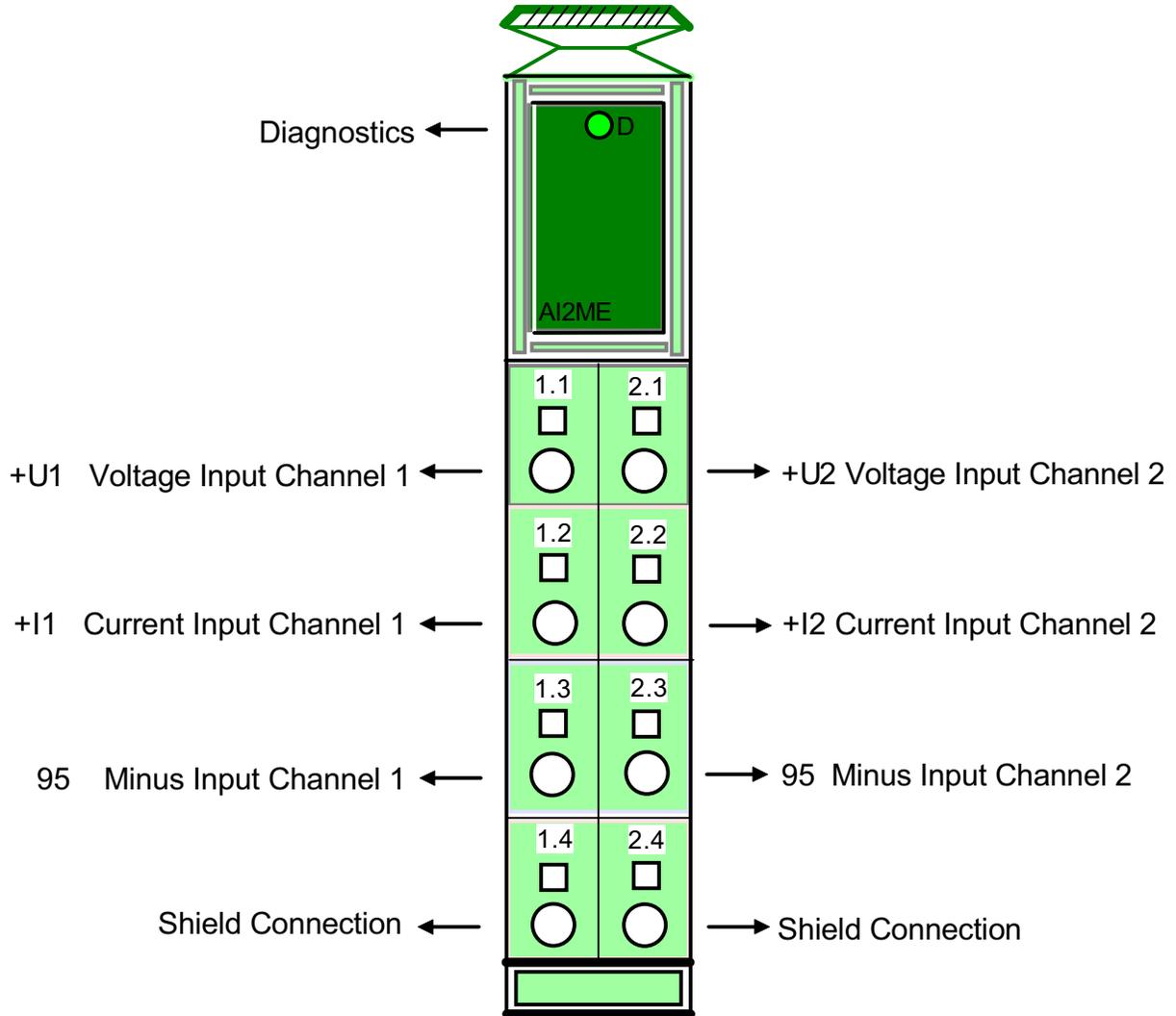


Diagnostics:

- 1) Green - OK - Bus Active
- 2) Flashing @ 0.5 HZ - Communications power UL available, bus not active
- 3) Flashing @ 2 HZ - Peripheral fault
- 4) Flashing @ 4 HZ - Local bus error

Title: PORTABLE DRYER: SINGLE FAN & HEAT DIGITAL OUTPUT MODULE - 4 OUTPUTS	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.29
Revision:	SOFT START

ANALOG INPUT MODULE PLC - ILC 150 (GREEN)



ANALOG INPUT MODULE

Title: PORTABLE DRYER: SINGLE FAN & HEAT
ANALOG INPUT MODULE 0 - 10 VDC

Author: SUKUP MFG CO

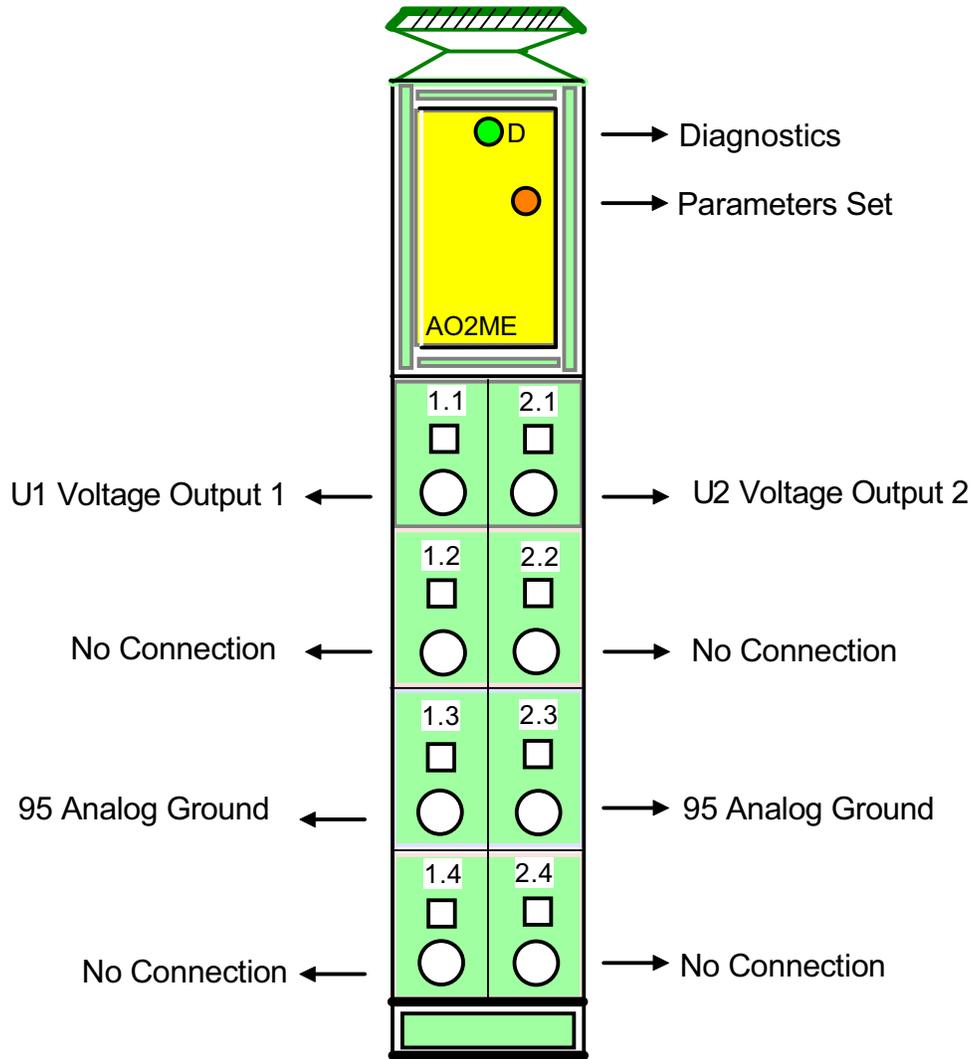
Date: 01/12

Sheet: 101.30

Revision:

SOFT START

ANALOG OUTPUT MODULE PLC - ILC 150 (YELLOW)



ANALOG OUTPUT MODULE

Title: PORTABLE DRYER: SINGLE FAN & HEAT
ANALOG OUTPUT MODULE0 - 10 VDC

Author: SUKUP MFG CO

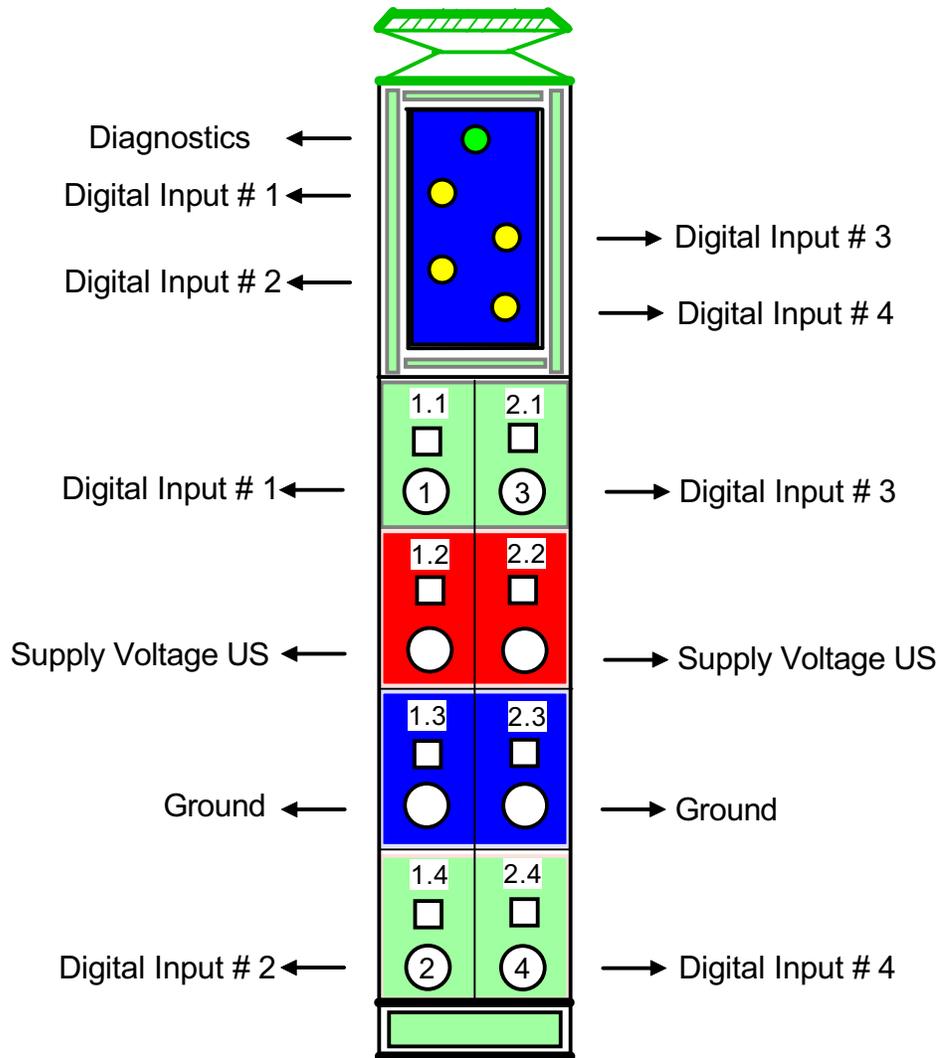
Date: 01/12

Sheet: 101.31

Revision:

SOFT START

DIGITAL INPUT MODULE - 4 INPUTS PLC - ILC - 150, 24 VDC (BLUE)



DIGITAL INPUT MODULE

Diagnostics:

- 1) Green - OK
- 2) Flashing 0.5 Hz - communications power UL available but buss not active
- 3) Flashing 2 Hz - peripheral fault
- 4) Flashing 4 Hz - local bus error

Title: PORTABLE DRYER: SINGLE FAN & HEAT
DIGITAL INPUT MODULE 4 INPUTS

Author: SUKUP MFG CO

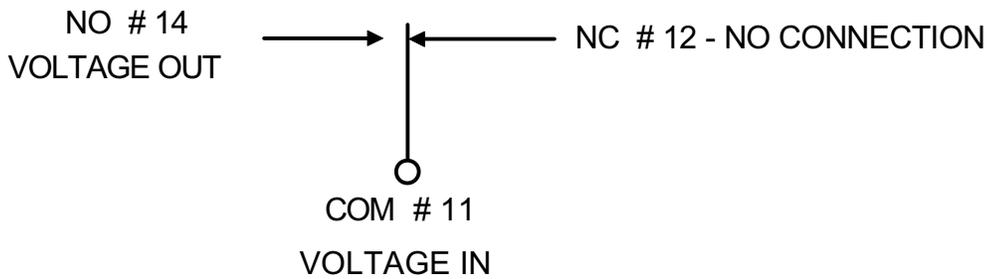
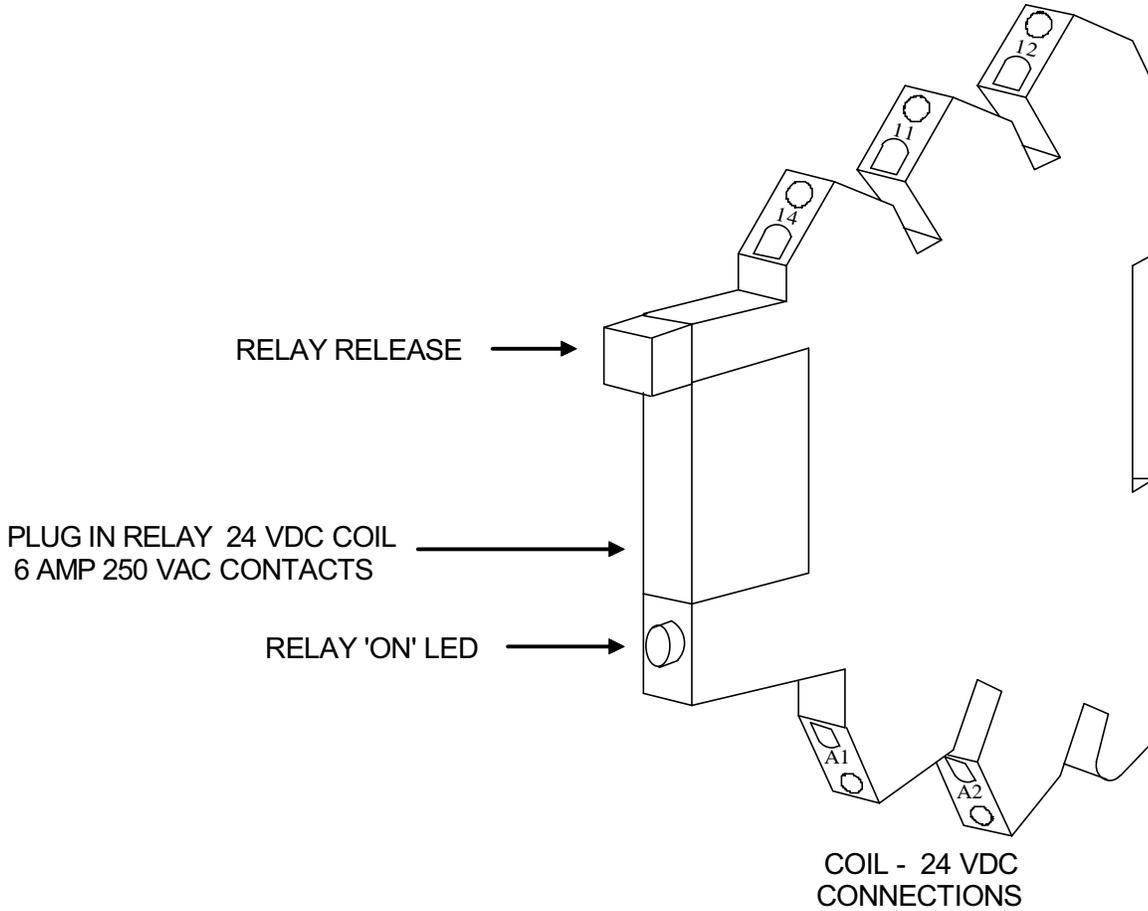
Date: 01/12

Sheet: 101.32

Revision:

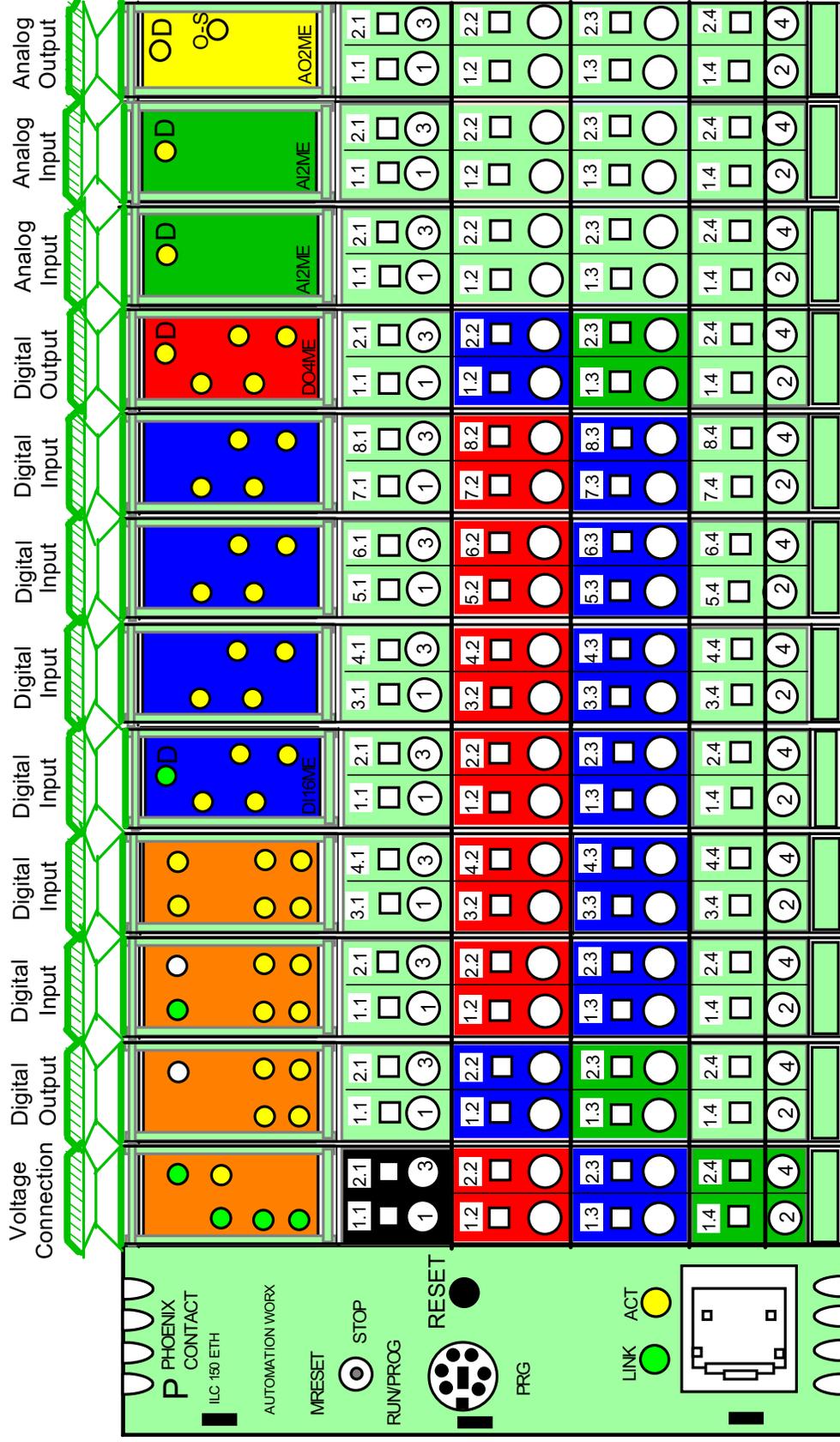
SOFT START

RELAY MODULE - 1 POLE



Title: PORTABEL DRYER: SINGLE FAN & HEAT RELAY MODULE 24V COIL, 1POLE	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.33
Revision:	SOFT START

BASE NUMBERING - SINGLE FAN PLC



NOTE: 1st number = module # 2nd number = segment # in that module 3rd number = I/O # on that segment

Title: PORTABLE DRYER: SINGLE FAN & HEAT	
PLC MODULE BASE NUMBERING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.34
Revision: SOFT START	