



CENTRIFUGAL GRAIN DRYER

**Continuous Flow / Automatic Batch
QuadraTouch™ Dryer Control System**



OWNER'S OPERATION MANUAL

Sukup Manufacturing Company

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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 Company
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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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.

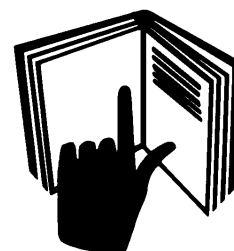


NOTICE alerts you to practices unrelated to personal injury, such as messages related to property damage.

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 & 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.



Learn how to use controls and operate machine. Do not let anyone operate unit without thorough training of basic operating and safety procedures.

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.

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.

Ambulance • Fire • Police 9-1-1

Farm rescue team: _____

Local EMS team: _____

Address of work site: _____

Directions to work site: _____



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.



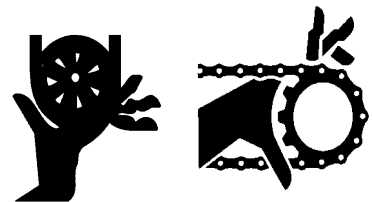
- Carefully review operator's manual.
- Keep dryer clean inside and out, as fines may cause a fire.
- Check for gas leaks. Spray soapy solution on piping and joints.
- Run fan at least half a minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater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



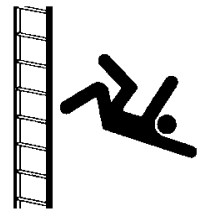
Failure to follow precautions above may result in serious injury or death.



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.



ANALYZE ARC FLASH/SHOCK HAZARD. Installations of equipment containing switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers are subject to National Electrical Code (NEC) and National Fire Protection Association (NFPA), and enforced under Occupational Safety and Health Administration (OSHA) regulations. These installations must be analyzed for arc flash and shock hazard. Additional requirements under these standards include:

- Facility needs to have written electrical safety program.*
- Equipment shall be FIELD MARKED with a label containing available incident energy and/or required Personal Protective Equipment (PPE) level.

This labeling requirement is employer's responsibility and not that of equipment manufacturer or installer.

- All persons working on or near affected equipment must be properly trained.
 - Proper tools and equipment must be provided by installation operator or employer.
- *NFPA 70E has numerous significant changes in 2012 edition. Be sure to update your facility's safety program.



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. **NOTE:** Refer to OSHA document 1910.147 App A for a typical minimum lockout procedure.

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.

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.

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!

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



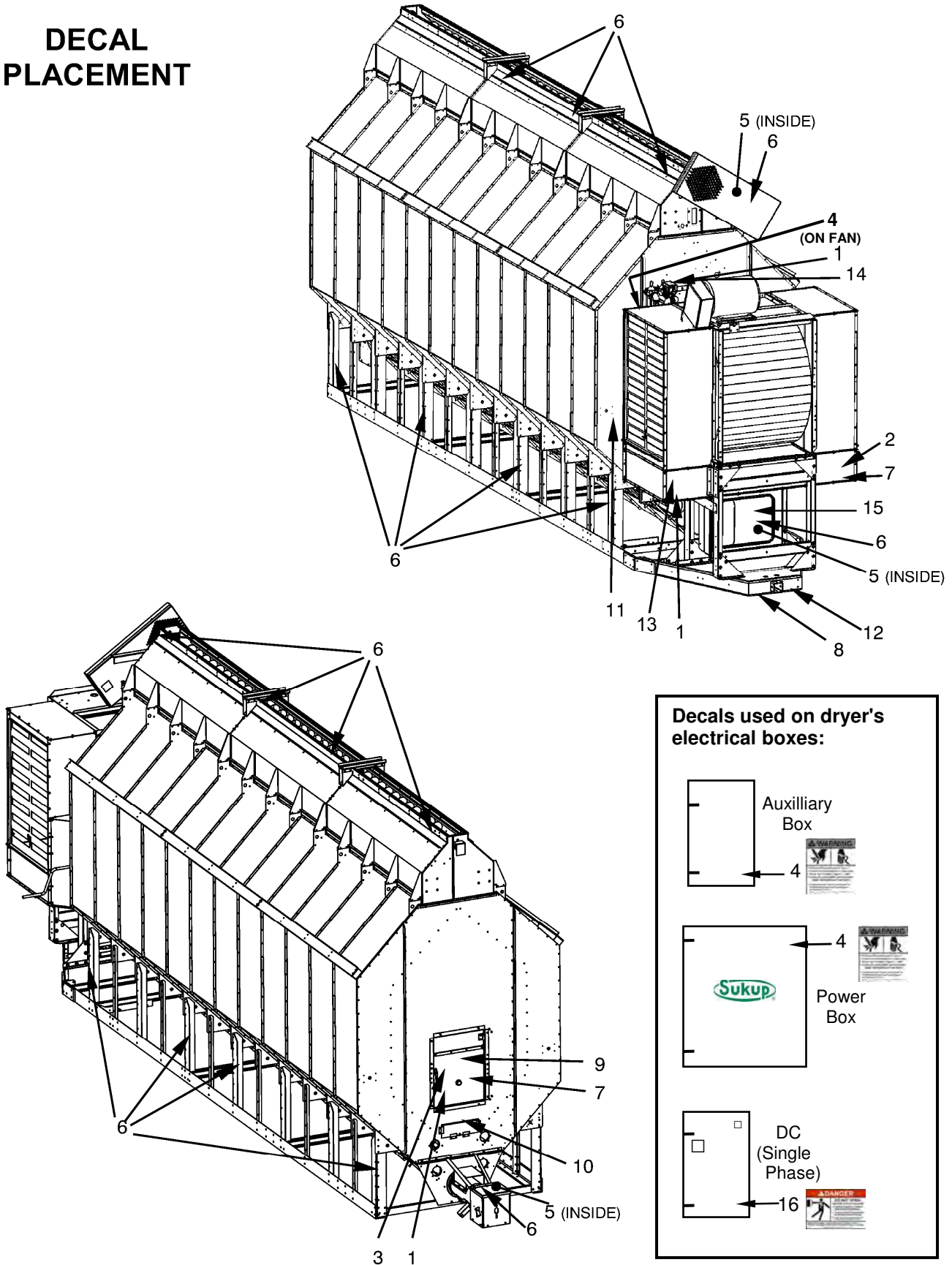
with service door removed.

16. L0163 - DANGER: Do not open! Severe



shock hazard. Mounted on single-phase DC power box.

DECAL PLACEMENT



Emergency Shutdown Locations

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
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.

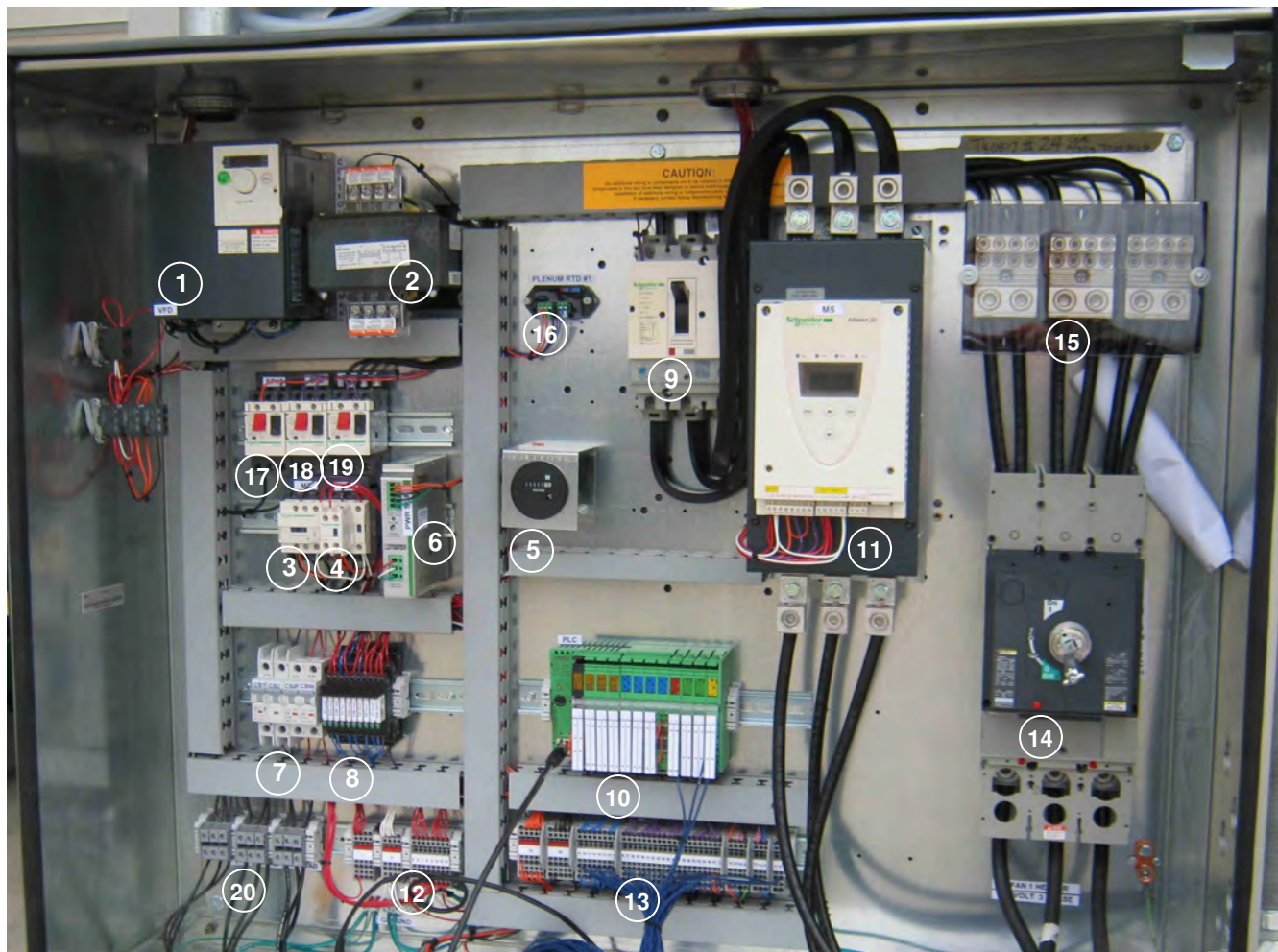


Image 6 – Power box components

- | | |
|--------------------------------------|---|
| 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). Natural gas-fueled dryers will look different, with fuel supply hose coming from lower left.



Image 7 – Pipe train components

- | | |
|--|---|
| 1. LP inlet | 8. Vapor hose |
| 2. Shut-off valve | 9. Vapor over-temp switch |
| 3. Wye strainer | 10. Regulator |
| 4. High-pressure pop-off valve | 11. Vapor solenoid valve |
| 5. Liquid solenoid valve | 12. Electronic actuator and butterfly valve |
| 6. Liquid vaporizer hose | 13. Pressure gauge |
| 7. LP vaporizer inlet (lower) and outlet (upper) | |

Heater Component Identification

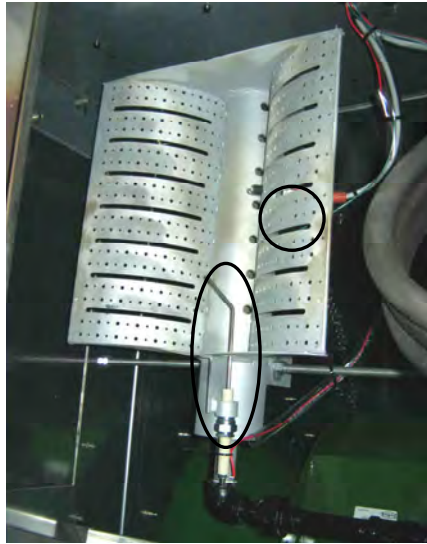


Image 8 – Front view of burner

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

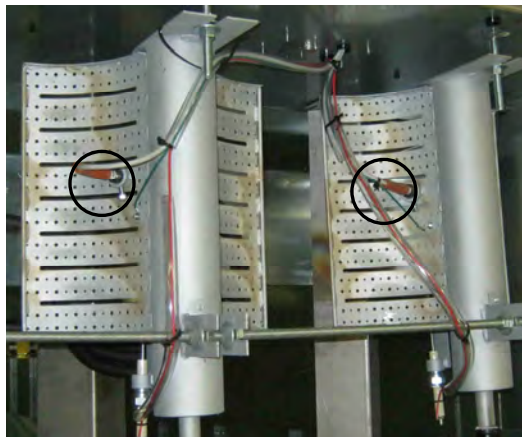


Image 9 – Rear view of burners

Image 9 shows rear view of burners, with spark plugs/igniters in circles.

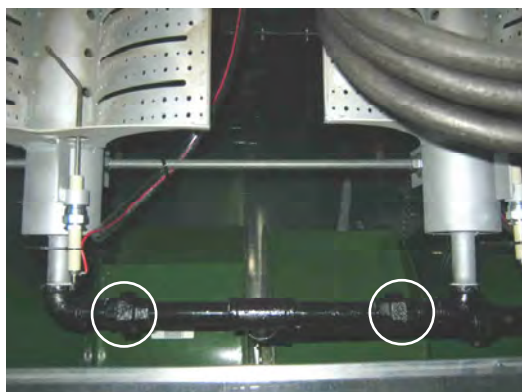


Image 10 – Orifice locations

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).

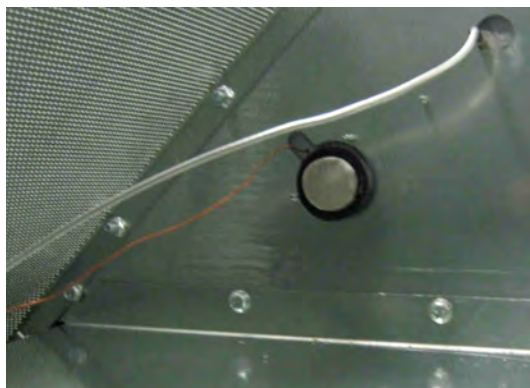


Image 13 – Plenum RTD (thermometer) tube and static air pressure switch

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

Switches



Image 14 – Rear door switch

Image 14 shows rear door switch.
There is one for each door.

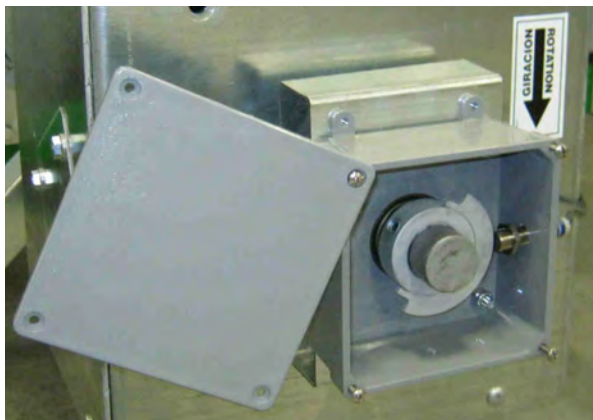


Image 15 – Unload proximity switch

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



**Image 16 – Unload proximity switch
mounted on jump auger**

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

Lower Plenum Vacuum Fan Inlet Door, Opening Handle



Image 17 – Vacuum door closed

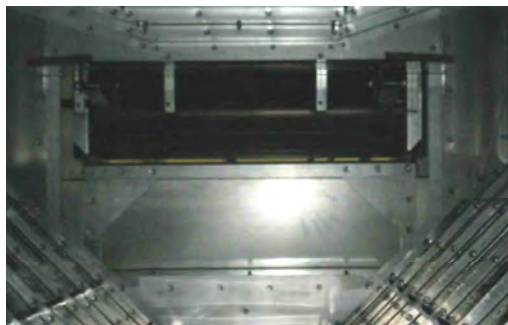


Image 18 – Vacuum door open



Image 19 – Vacuum door opener

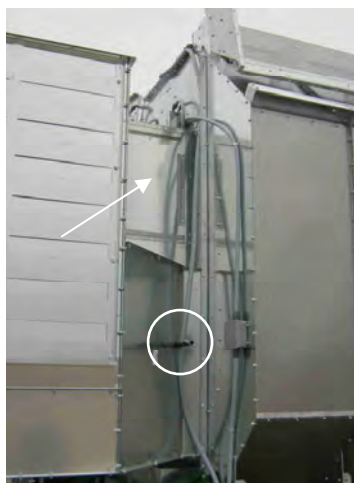


Image 20 – Vacuum door opener, service door locations

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

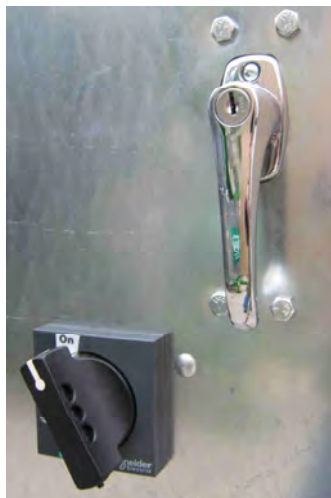


Image 22 – Latch and switch in “On” position



Image 23 – Emergency stop button and system control switch

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

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

Image 23 shows emergency stop button and system control switch.

Moisture Sensor, Paddle Switch Box

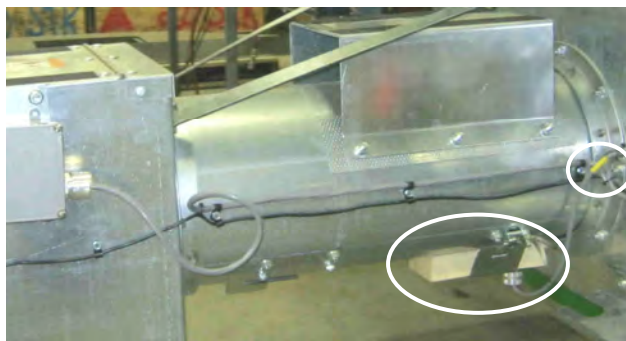


Image 24 – Moisture sensor

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

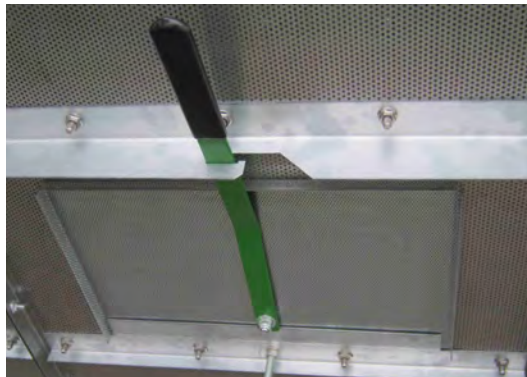


Image 27 – Cleanout/inspection door

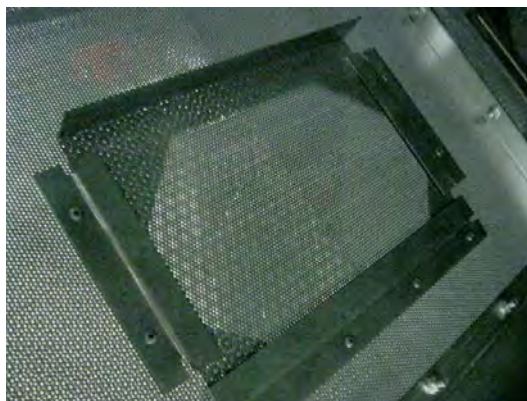


Image 28 – Inner plenum cleanout slide gate



Image 29 – Unload auger cleanout door cam lock



Image 30 – Plenum cleanout/blowout door

Image 27 shows lower plenum cleanout/inspection door.

Image 28 shows inner plenum cleanout slide gate.

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

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

Cleanout, Plenum Divider Door

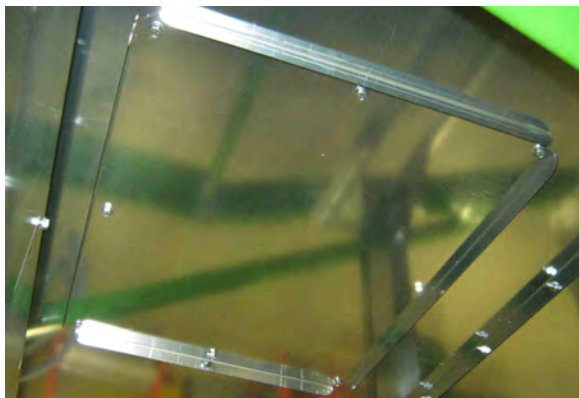


Image 31 – Cleanout door under vacuum-cool duct

Image 31 shows cleanout door under vacuum-cool duct.

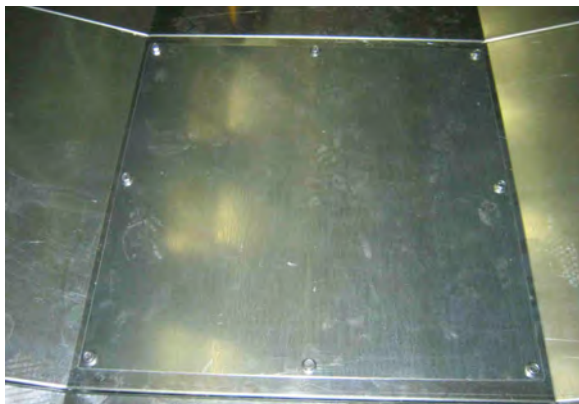


Image 32 – Plenum divider door

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

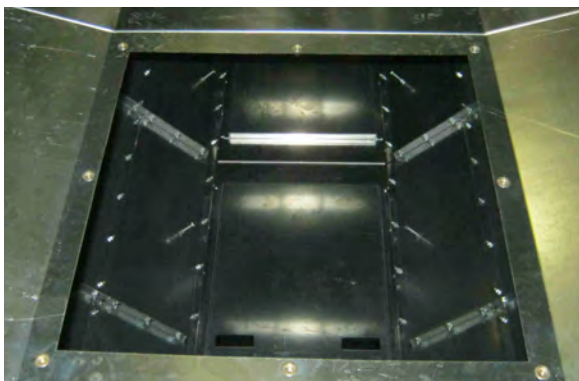


Image 33 – Plenum divider door removed

Take-Away Auger, Meter Roll Motor

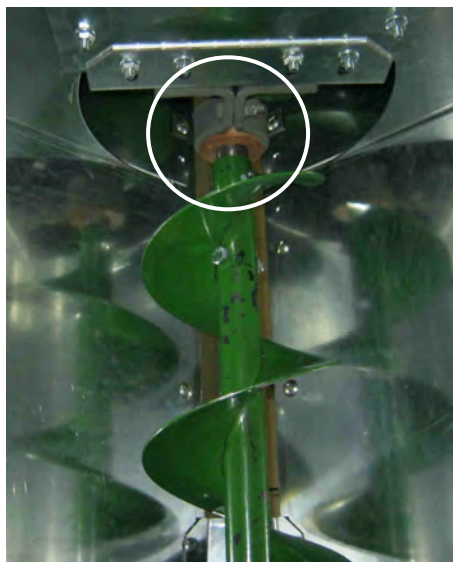


Image 34 – Take-away auger

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

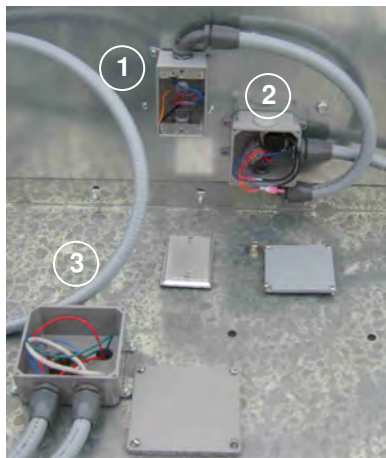


Image 37 – Control boxes on top of heater housing



Image 38 – Air inlet louvers



Image 39 – Fan motor and drive shield

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

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

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.



Image 44 – Main power switch on

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.



Image 45 – QuadraTouch™ controller

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 clearance from other structures on side of dryer and 5 feet 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	Concrete Pad Size	Yards of Concrete
16'	12' x 28'	8.9
20'	12' x 32'	10.1
24'	12' x 36'	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.

Foundation

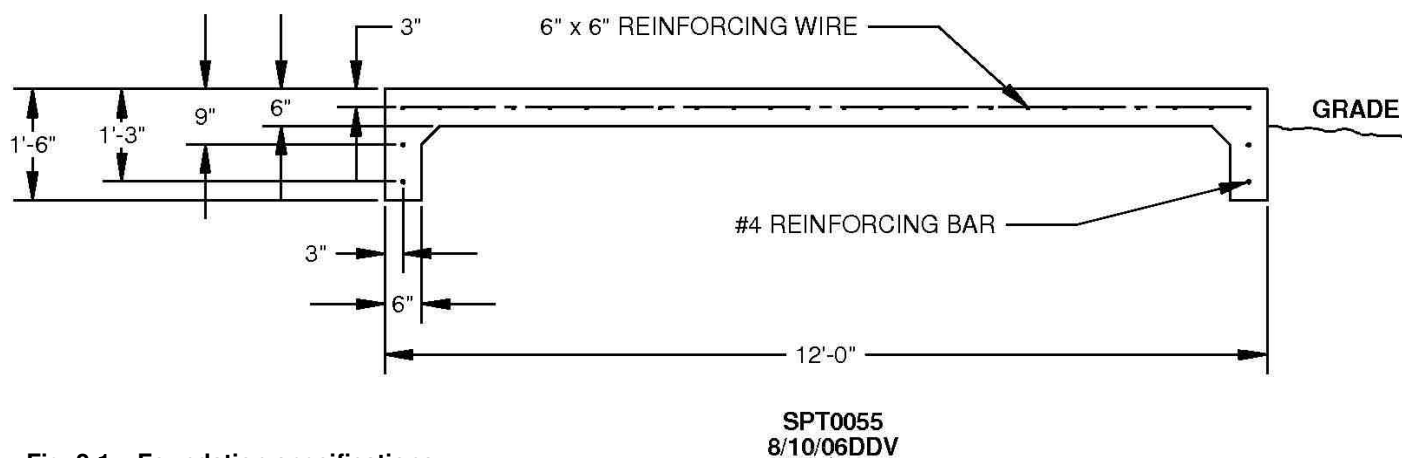


Fig. 2-1 – Foundation specifications

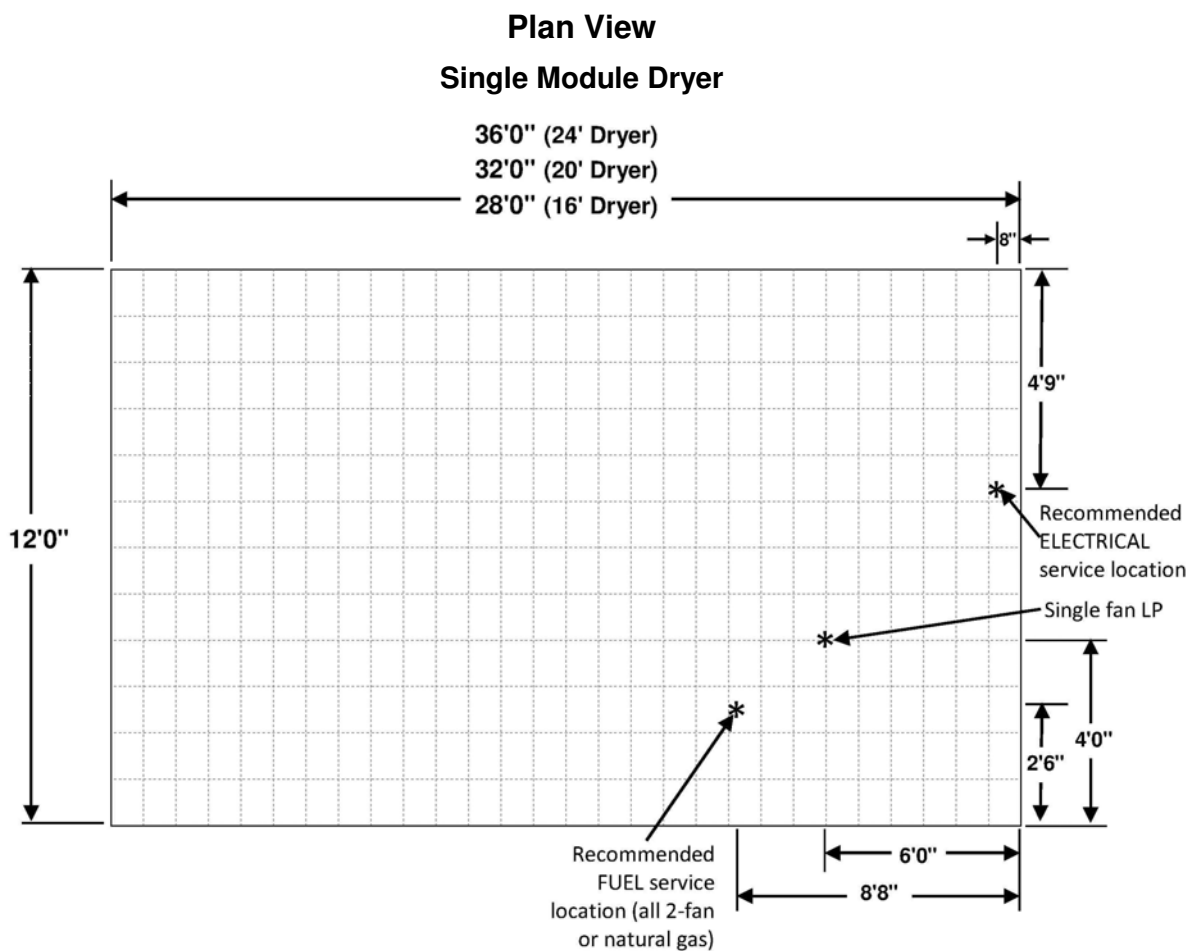


Fig. 2-2 – Recommended fuel and electrical service locations on dryer

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.

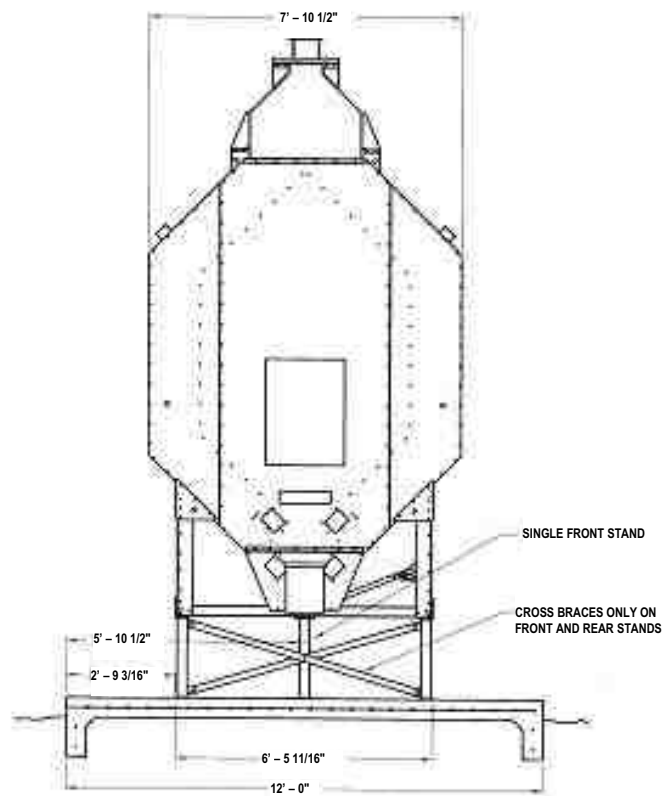


Fig. 2-3 - Cross support braces and rear stand

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).

Optional dryer ladder extensions are available from Sukup Manufacturing Co. in 33-inch (B5083) and 44-inch (B5084) lengths.

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.

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

If dryer is not mounted using Sukup Manufacturing Co. supports, these guidelines must be followed:

- Supports under grain columns must be at least every 6 feet
- Support under front hitch
- Fasten dryer to foundation using brackets or turnbuckles

Support Leg Locations

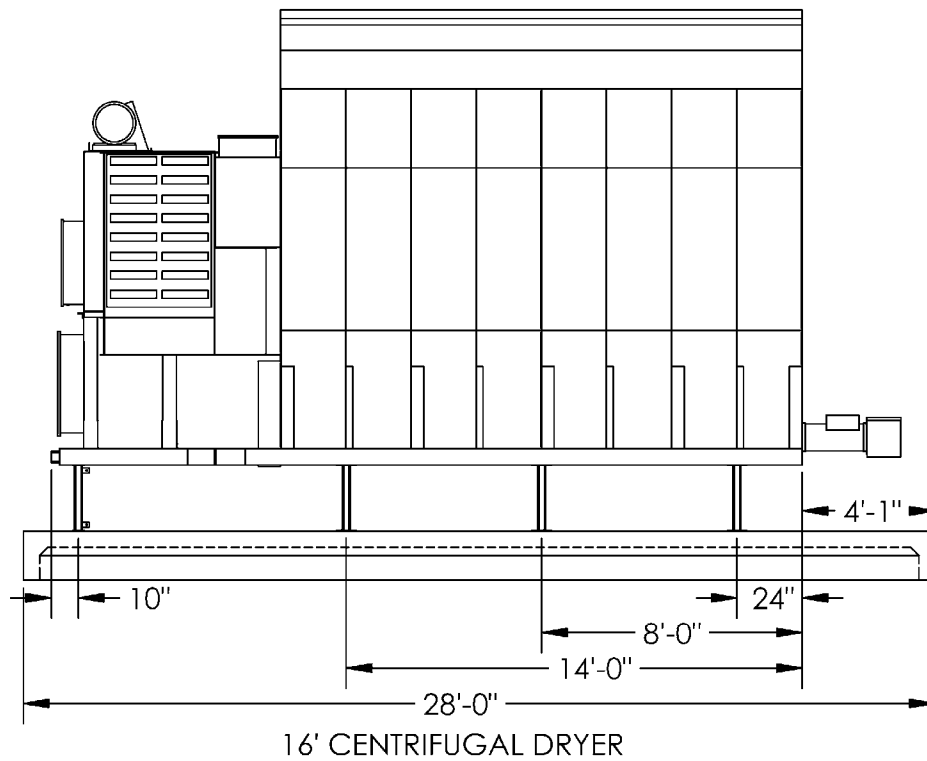


Fig. 2-4 – Support leg locations (16' dryer)

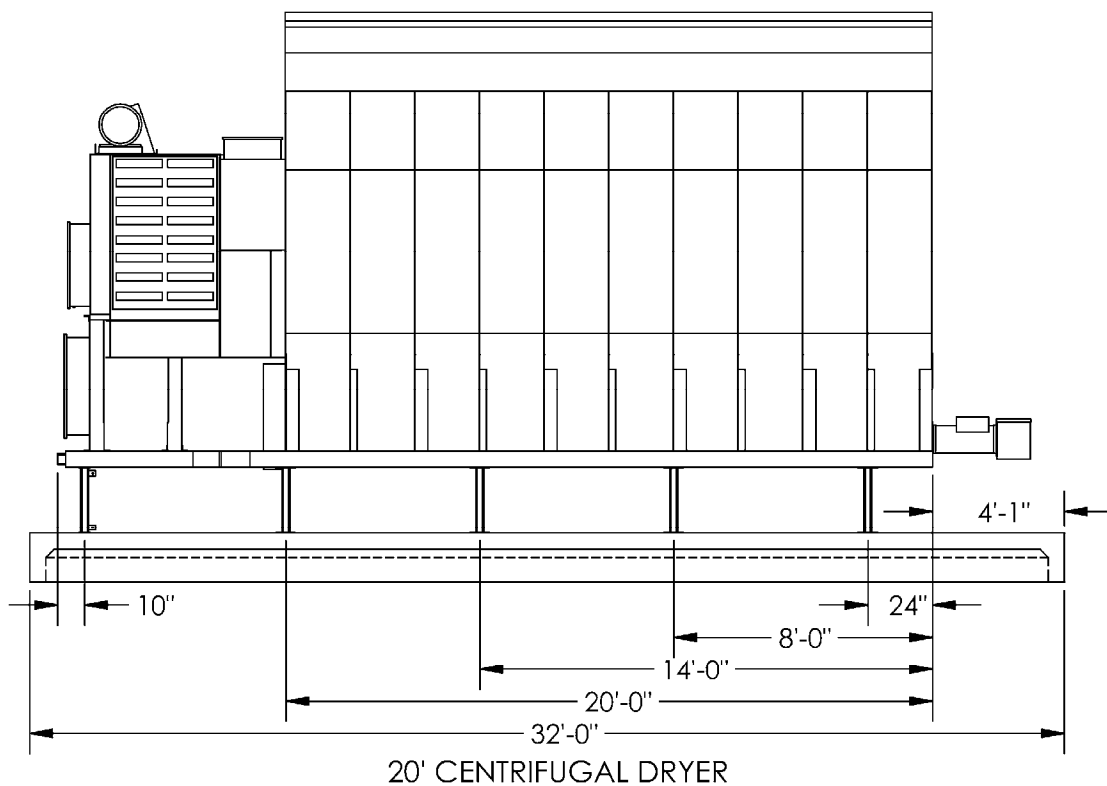


Fig. 2-5 - Support leg locations (20' dryer)

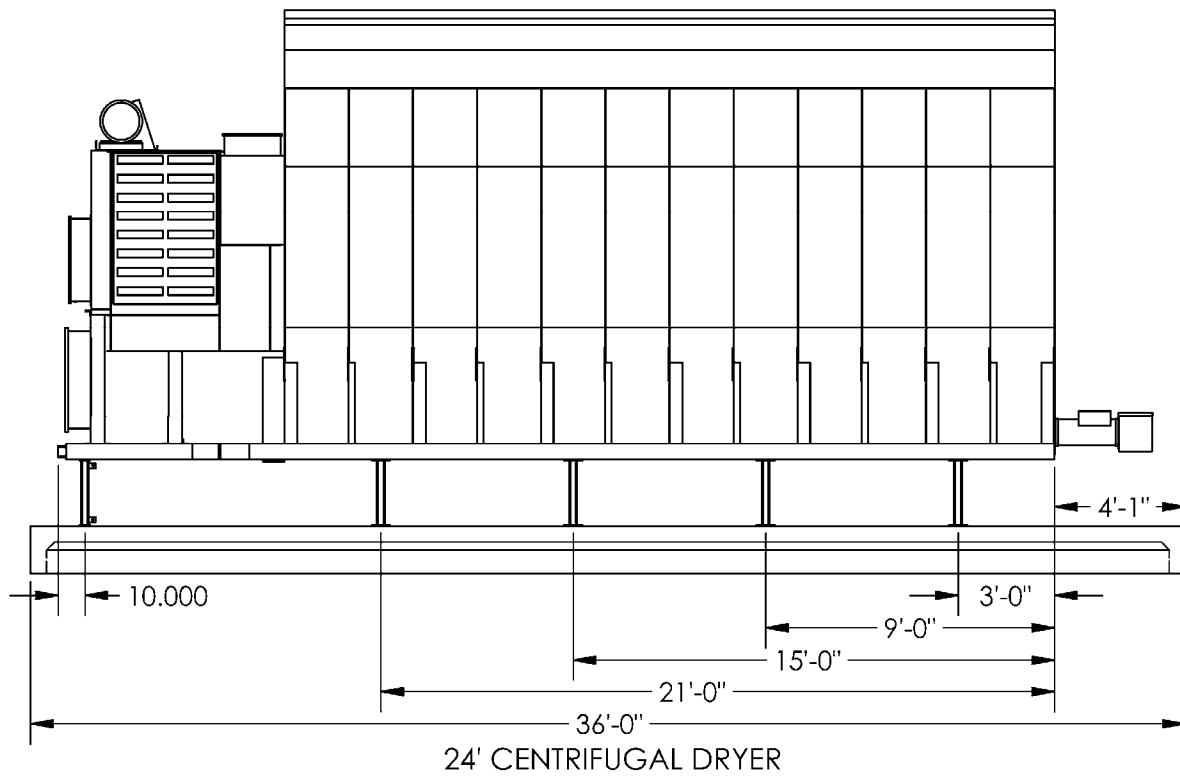


Fig. 2-6 – Support leg locations (24' dryer)

Lift Bracket Locations

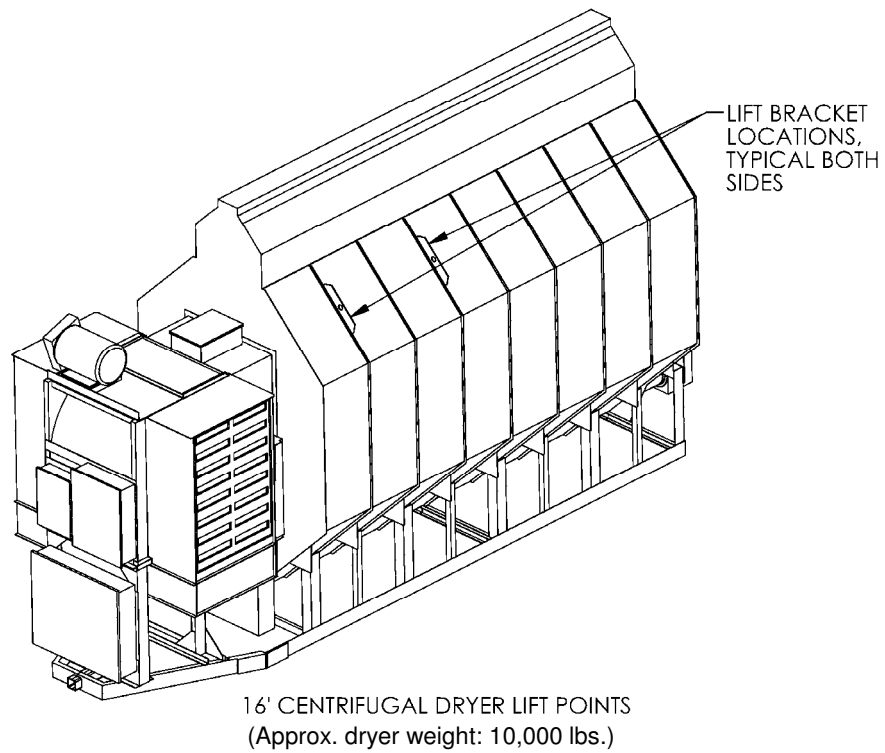


Fig. 2-7 – Lift bracket locations (16' dryer)

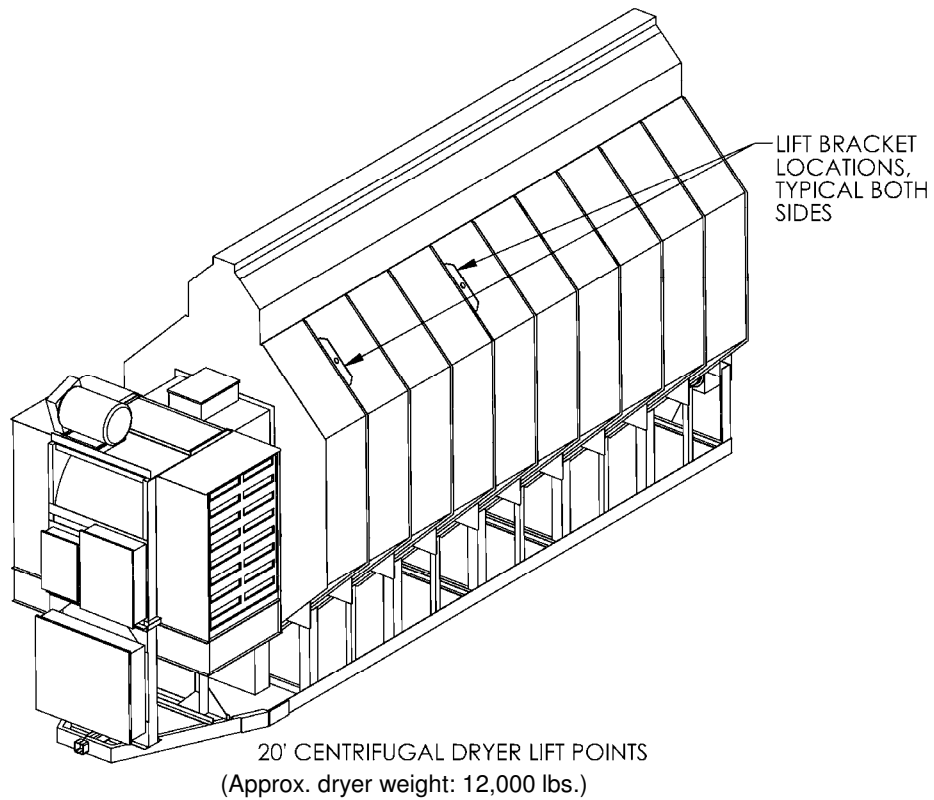


Fig. 2-8 – Lift bracket locations (20' dryer)

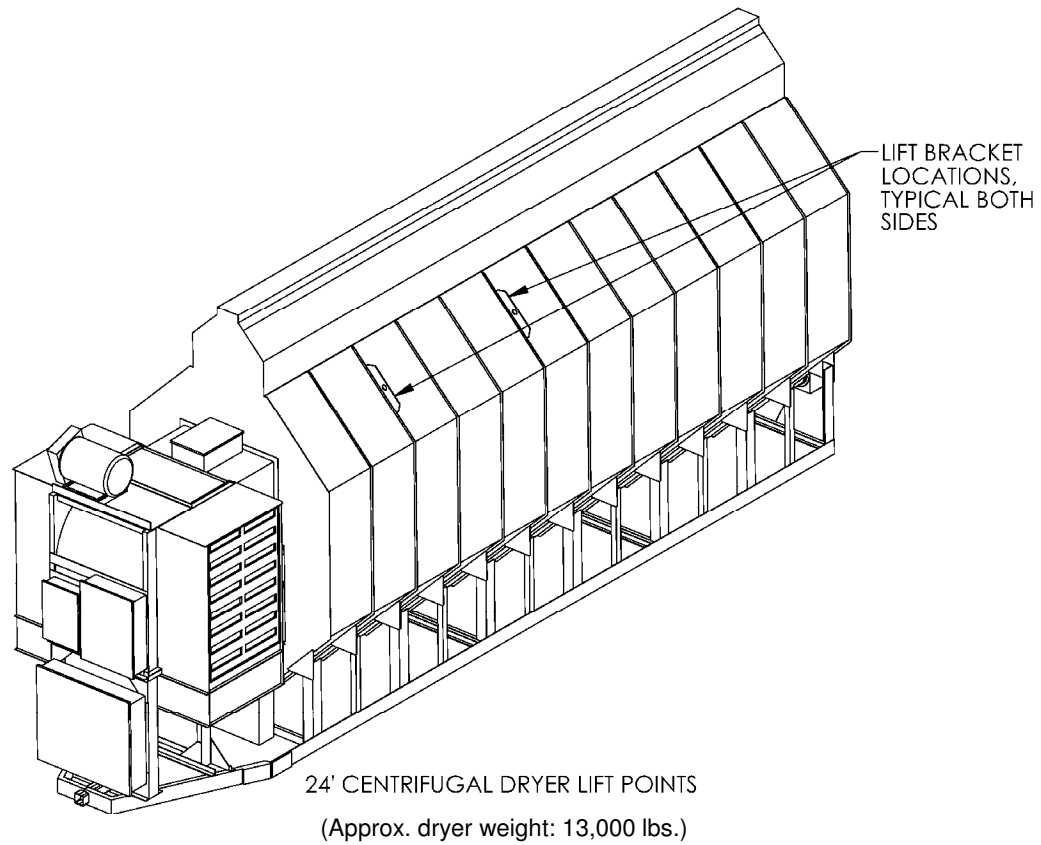


Fig. 2-9 – Lift bracket locations (24' dryer)

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.

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 1,000 gallons or larger and have no regulator mounted to it. Connection to dryer should be with piping designed for LP gas. Have LP gas supplier make proper connections and safety controls to meet local codes and National Fire Protection Association (NFPA) standards.

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 safety controls to meet local codes and NFPA standards.

FUEL SYSTEM RECOMMENDATIONS

LIQUID PROPANE

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW (GAL/HR)	FUEL LINE SIZE (MINIMUM UP TO 100')
16 ft, Single Heater	6,000,000	65	1/2"
16 ft, 2 Module	13,000,000	142	3/4"
16 ft, 3 Module	20,000,000	218	1"
20 ft, Single Heater	7,000,000	76	1/2"
20 ft, 2 Module	16,500,000	180	3/4"
20 ft, 3 Module	25,000,000	272	1"
24 ft, Single Heater	10,000,000	109	3/4"
24 ft, 2 Module	20,000,000	218	1"
24 ft, 3 Module	30,000,000	326	1"

Table 2-2 – Liquid propane specifications



Image 2-1 - LP-fueled centrifugal dryer

1. See fuel specification chart for recommended line size.
2. DO NOT 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 or higher.

Connection to liquid manifold on dryer

NATURAL GAS

Sukup dryers using natural gas are designed to function at a heat value of approximately 1000 BTU per cubic foot. A regulated pressure of 15 PSI must be provided for connection to dryer. Ensure also that sufficient volume is maintained for correct operating pressure.

FUEL SYSTEM RECOMMENDATIONS

NATURAL GAS

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW (CUBIC FEET/HR)	FUEL LINE SIZE (MINIMUM UP TO 100')
16 ft, Single Heater	6,000,000	6000	1-1/2"
16 ft, 2 Module	13,000,000	13,000	2-1/2"
16 ft, 3 Module	20,000,000	20,000	2-1/2"
20 ft, Single Heater	7,000,000	7000	2"
20 ft, 2 Module	16,500,000	16,500	2-1/2"
20 ft, 3 Module	25,000,000	25,000	3"
24 ft, Single Heater	10,000,000	10,000	2"
24 ft, 2 Module	20,000,000	20,000	2-1/2"
24 ft, 3 Module	30,000,000	30,000	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.

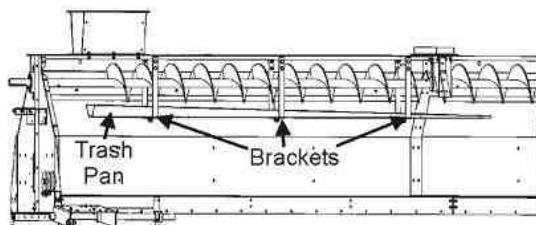


Fig. 2-10 – Trash pan and bracket installation

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.

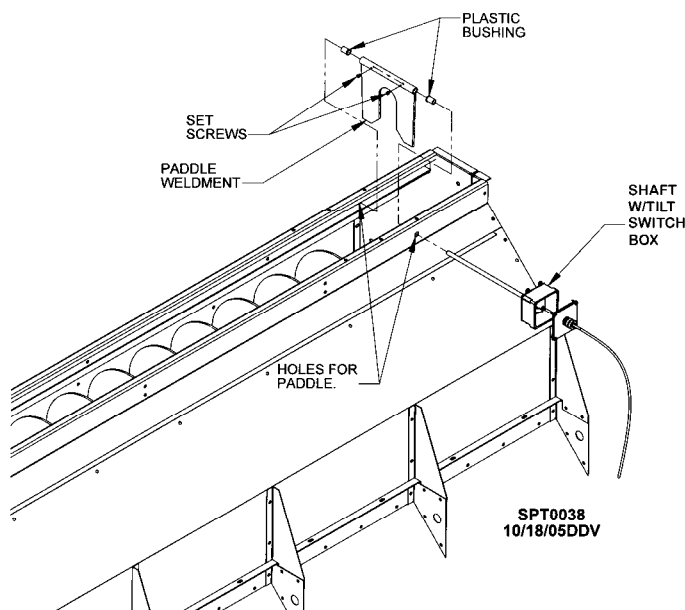


Fig. 2-11 – Paddle switch installation

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)

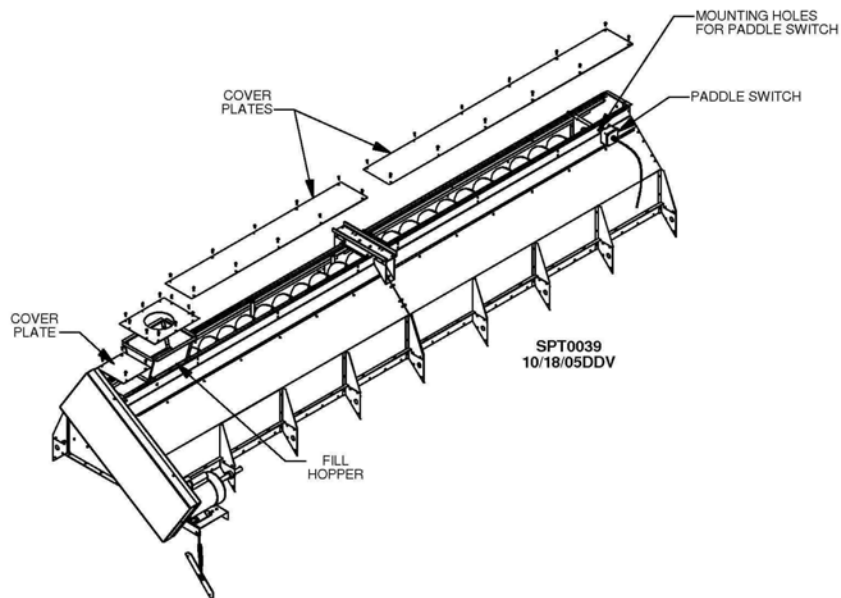


Fig. 2-12 – Fill hopper installation (Front fill)

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).

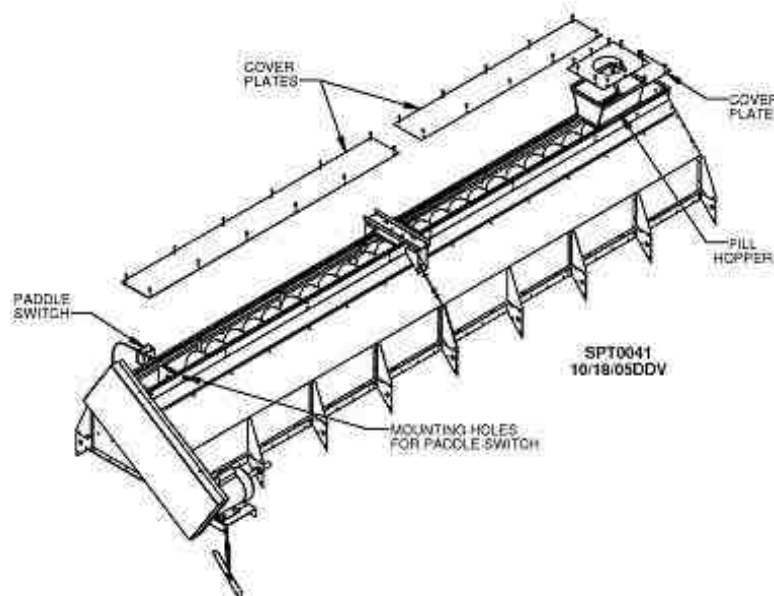


Fig. 2-13 – Fill hopper installation (Rear fill)

Top Load Auger Motor and Shields

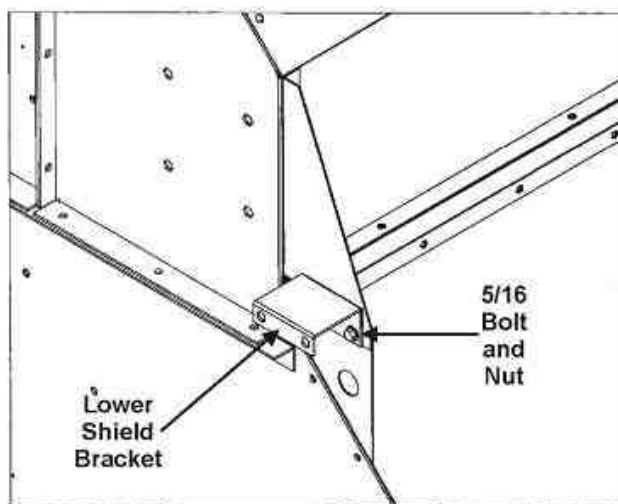


Fig. 2-14 – Lower shield bracket installation

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

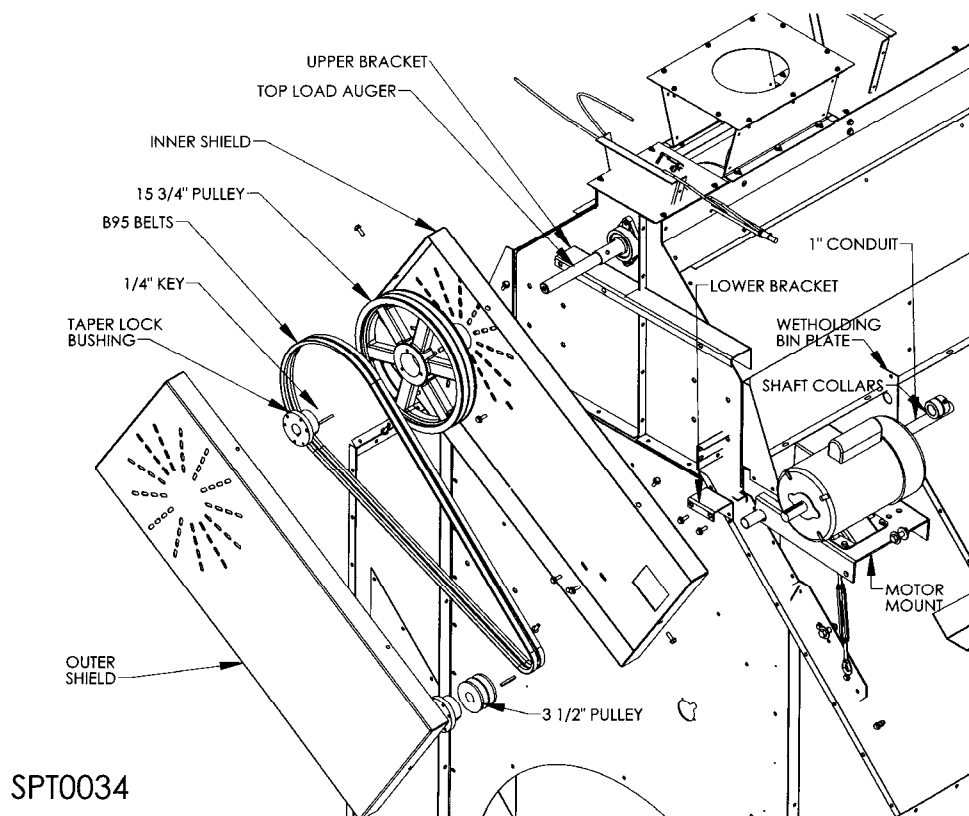


Fig. 2-15 – Top load auger components

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.

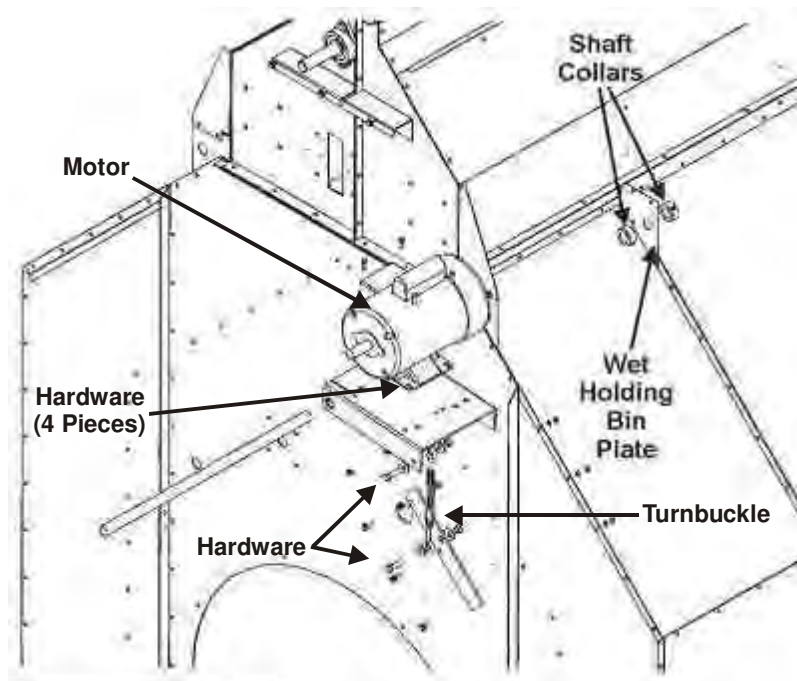


Fig. 2-16 - Motor mount components

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.

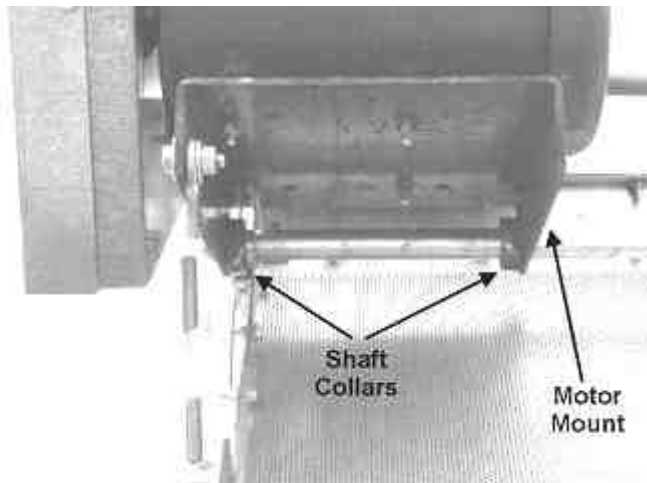


Image 2-3 – Motor mount shaft collars, installed

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 3-1/2" O.D. pulley to motor shaft with a key and attach 15-3/4" O.D. 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).

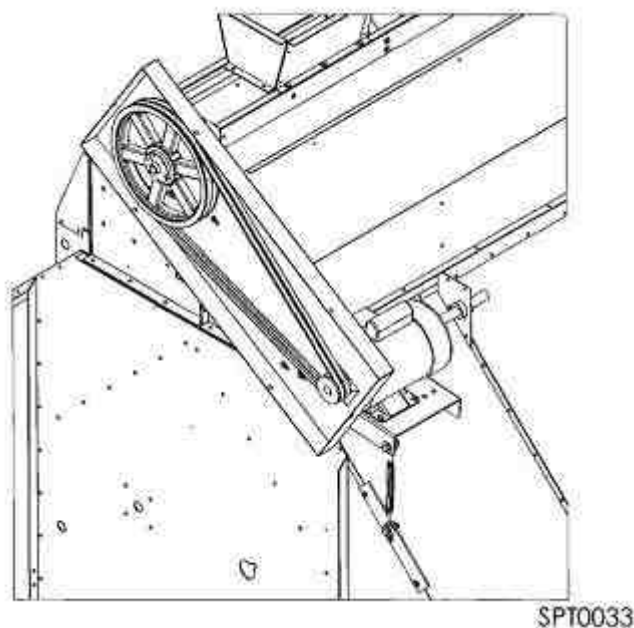
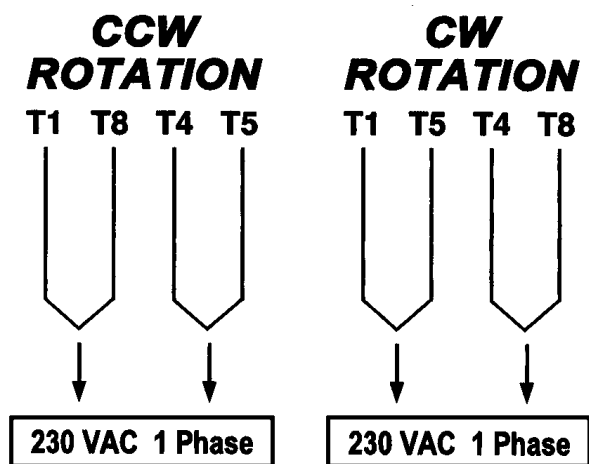


Fig. 2-17 – Final assembly (without front shield)

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



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

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.

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 20VAC, unit pulls less than 1A. Using an appropriate extension cord is acceptable as long as standard 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.

QuadraTouch™ controller has an operating temperature of 10°F to 135°F and a storage temperature of -4°F to 150°F. Therefore, outdoor placement is acceptable in most locations, however, it is recommended that it be placed indoors during 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 long and 1/2-inch diameter.

1. Installation of ground rod and ground wire must conform to National Electrical Code Handbook procedures.
2. Bury ground rod (top of rod should be flush with ground) within 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.

Gas and Electrical installations must be done by qualified personnel to ensure quality operation.

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

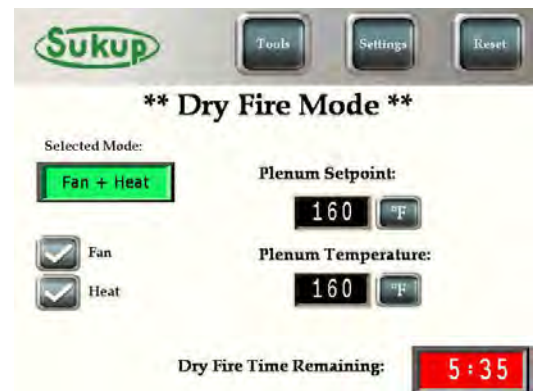
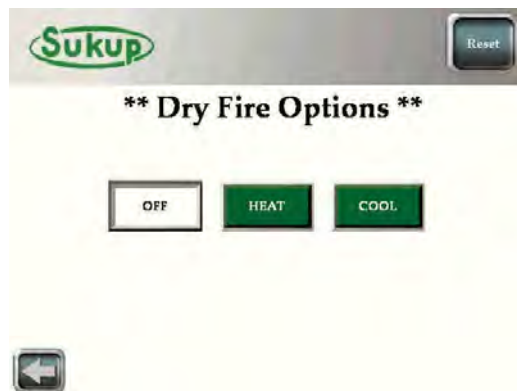
“Dry Fire” mode of operation enables operator a means of running dryer when there is no grain. This provides a great way of testing dryer before seasonal operation. This mode is recommended **EVERY SEASON** before dryer is to be used.

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.

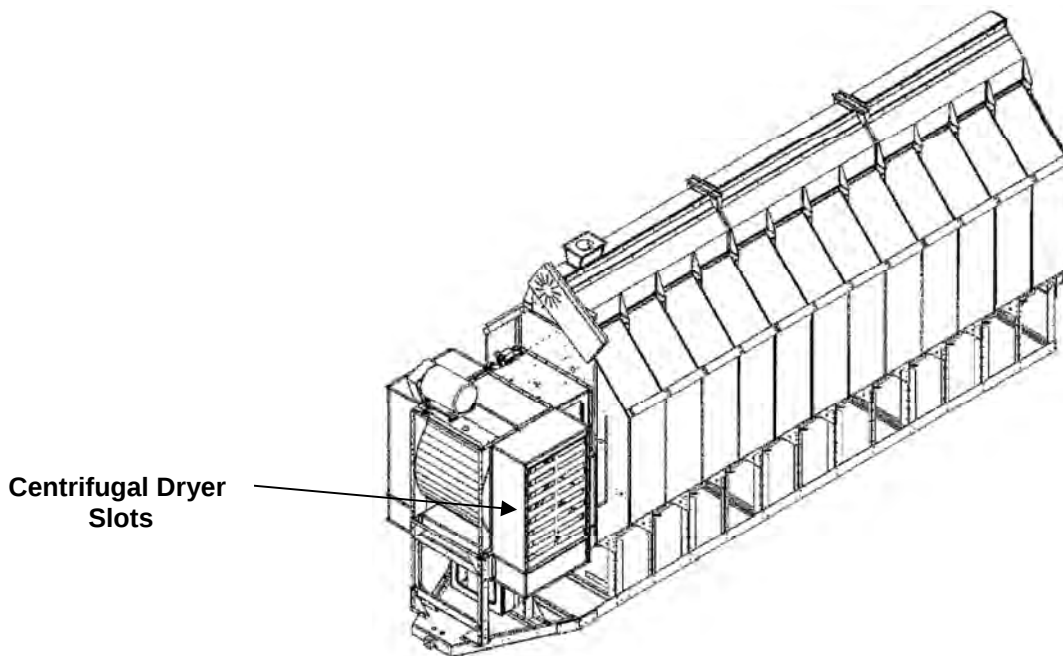
Manual

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.**

Adjusting Slot Openings and Baffles

SLOT OPENINGS ON INTAKE OF SUCTION COOL CENTRIFUGAL DRYERS



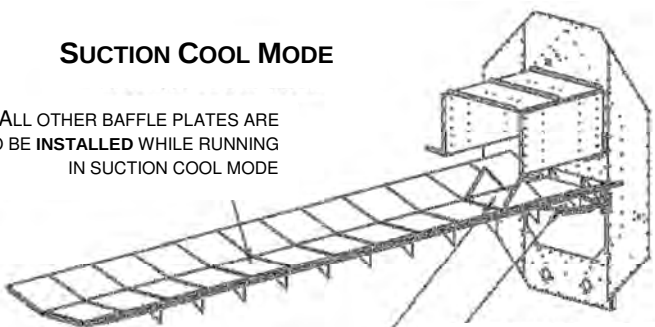
IN SUCTION COOL MODE:

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

Instructions: Start with a $\frac{3}{4}$ " 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.

SUCTION COOL MODE

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



TOP BAFFLE PLATES ARE TO BE BOLTED IN CLOSED POSITION WHILE RUNNING IN SUCTION COOL MODE

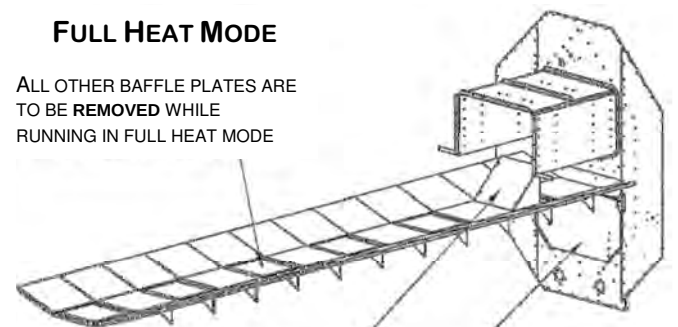
FRONT DOOR COVER IS IN THE OPEN POSITION TO RUN IN SUCTION COOL MODE

IN FULL HEAT MODE:

Slots should be fully opened.

FULL HEAT MODE

ALL OTHER BAFFLE PLATES ARE TO BE **REMOVED** WHILE RUNNING IN FULL HEAT MODE



FRONT BAFFLE PLATE IS TO BE BOLTED IN OPEN POSITION WHILE RUNNING IN FULL HEAT MODE

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)

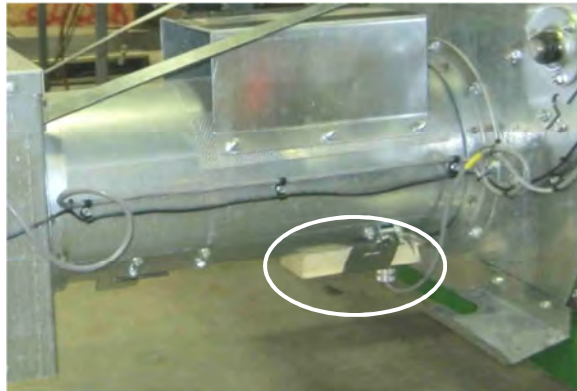


Image 4-1 – Discharge moisture sensor

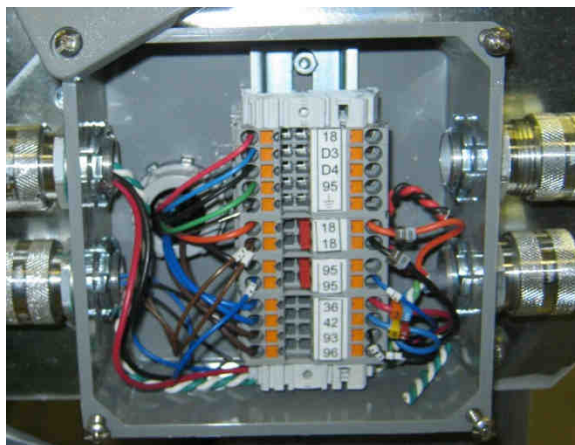


Image 4-2 – Right rear junction box

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

J4440 (Same switch is used for Paddle Switch)

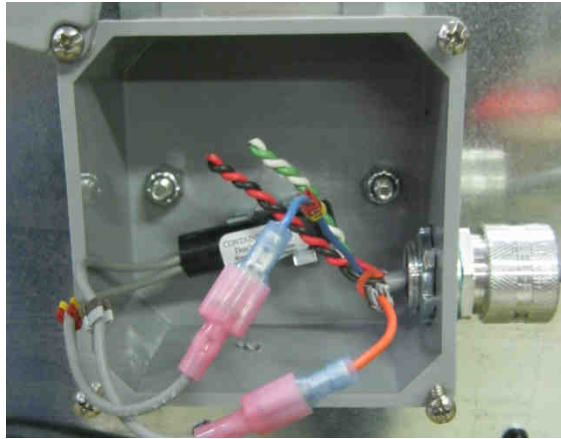


Image 4-3 – Grain discharge chute switch

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 from retaining clip.

Installation:

1. Insert new switch into retaining clip.
2. **IMPORTANT:** Switch must be installed exactly as shown in Image 4-3. Wires coming from switch must be down and to left of retaining clip or dryer will not operate properly.
3. Connect two wires from switch to dryer wiring (wire # 18 and wire # 42).
4. Reinstall cover when finished. See Discharge Chute Switch Adjustment in Component Calibration section to calibrate.

Paddle Switches

J4440 (Same switch is used for Grain Discharge Chute Switch)

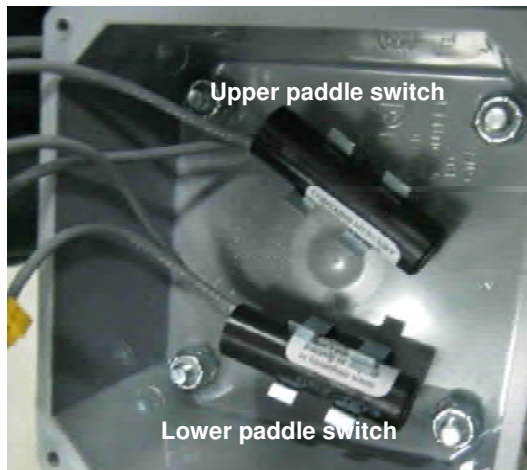


Image 4-4 – Paddle switches

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.

Installation:

1. Insert new switch into retaining clip.
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: All # 18's together; # 44 to # 44; # 53 to # 53.
4. When finished, reinstall junction box cover.

Unload Auger Proximity Switch

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

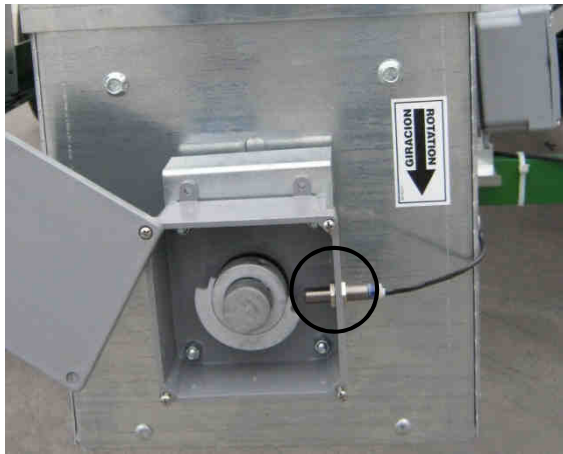


Image 4-5 – Unload auger proximity switch

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 4mm (approximate width of a nickel).
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 LCD screen 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 J5900



Image 4-6 – Vaporizer over-temp switch

This device monitors vapor temperature as it exits vaporizer coil. If temperature exceeds 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 clamp that holds 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.
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 clamp. 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 J44872



Image 4-7 – Rear door interlock switch

If door is opened, a fault will be detected.

Removal:

1. Turn power off on front of power box.
2. Locate rear door at back of dryer.
3. Loosen strain relief using an adjustable wrench.
4. Remove four (4) small screws holding cover plate onto switch. There will be two (2) wires, red and black, on normally open (NO) set of contacts (13 and 14).
5. Loosen and remove two (2) wires.
6. Remove two (2) small bolts and two (2) nuts holding switch in place.
7. Remove switch.

Installation:

1. With strain relief loosened, insert red and black wires into right side of switch.
2. Connect red and black leads to the normally open set of contacts (13 and 14).
3. Put cover plate back on switch.
4. Bolt new switch back onto dryer in same place as old one.
5. Make sure door contacts and depresses metal switch down when door is closed. Adjust if necessary.

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

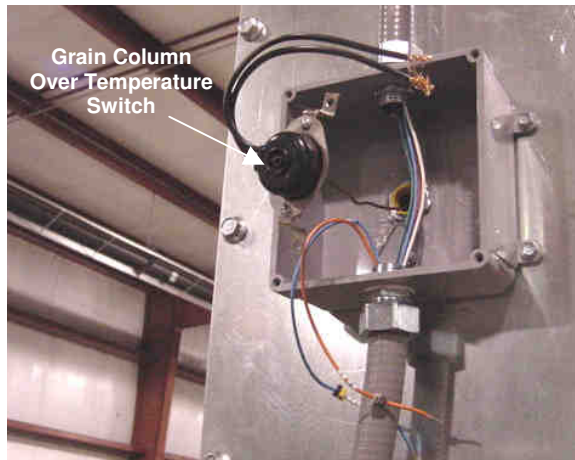


Image 4-8 – Grain column over-temperature switch

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.

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 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'

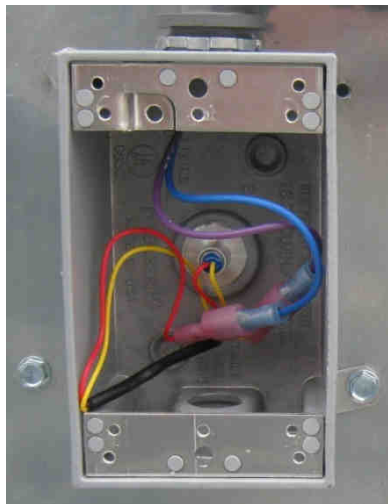


Image 4-10 – Plenum temperature sensor RTD

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)

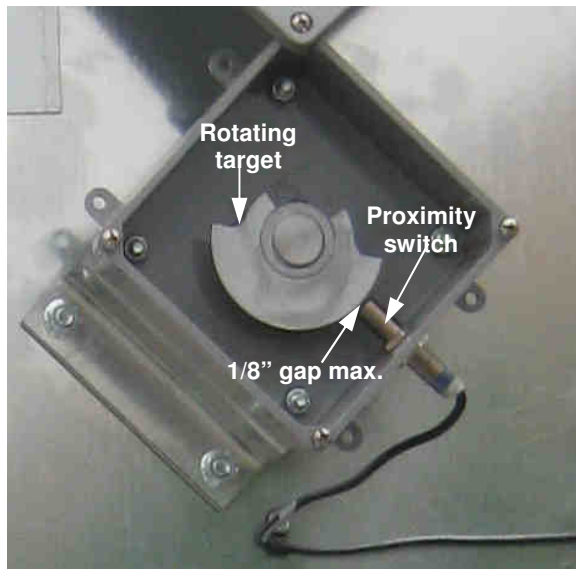


Image 4-12 – Metering roll proximity switch.

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. **CAUTION:** Adjustment of proximity switch is critical. See Proximity Sensor Calibration in Component Calibration section. Gap between tip of switch and rotating target must be as small as possible (no more than 1/8"). 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

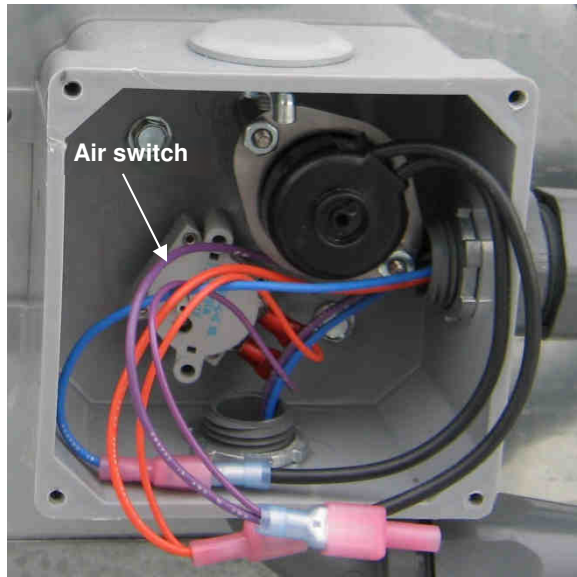


Image 4-13 – Air pressure switch

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'

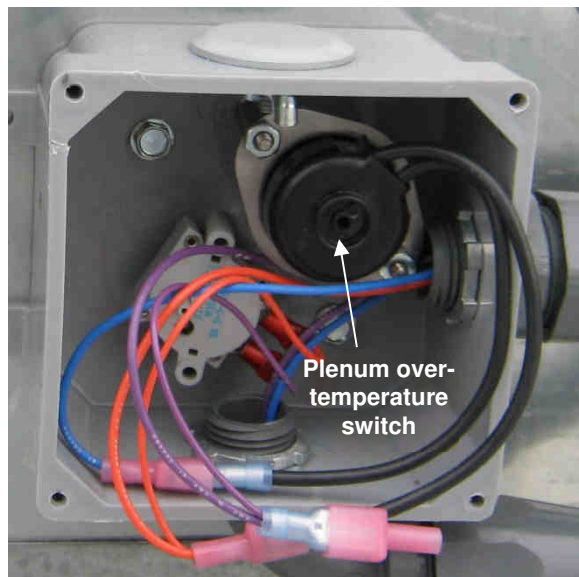


Image 4-14 – Plenum over-temperature switch

Plenum over-temperature switch trips when temperature of plenum area rises above 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

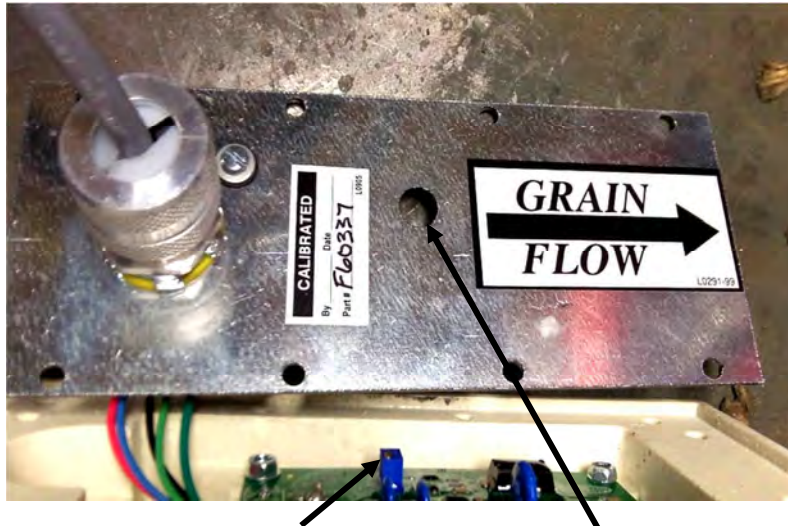


Image 4-15 – Adjustment screw and adjustment screw hole

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

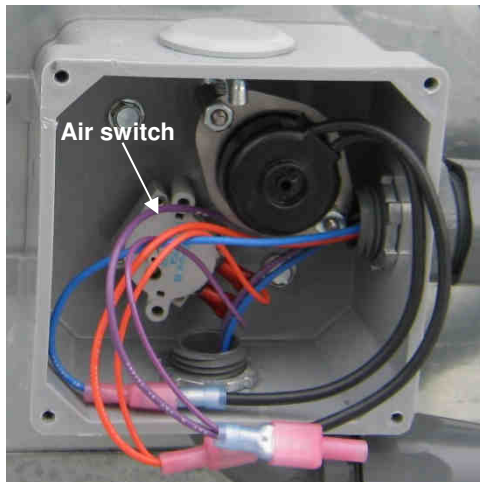


Image 4-16 – Air pressure switch in junction box

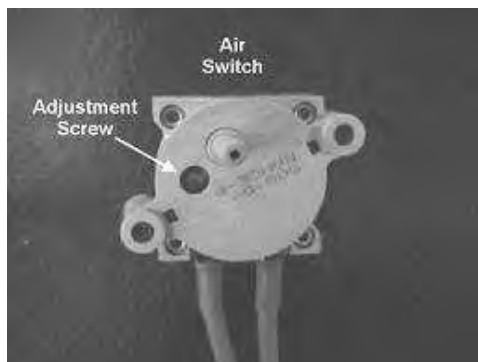


Image 4-17 – Air switch (J5862)

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**.

Meter Roll Proximity Switch Adjustment



Image 4-18 – Meter roll proximity switch box

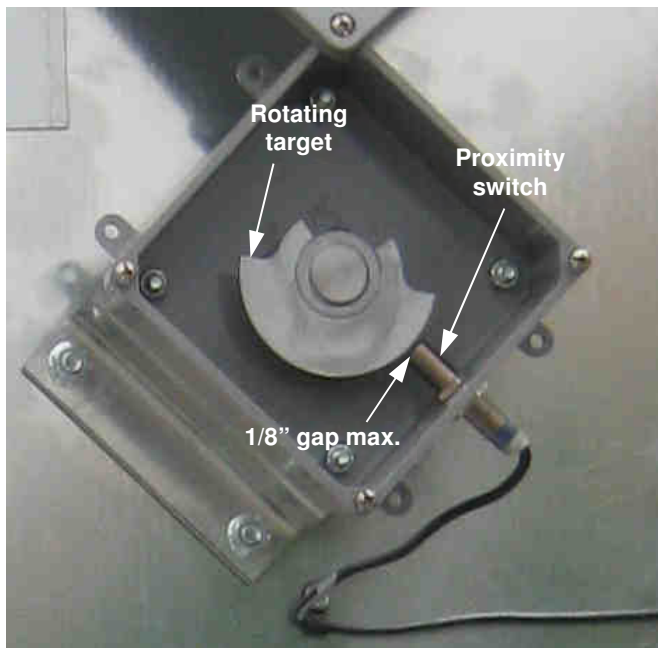


Image 4-19 – Metering roll proximity switch

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 1/8" from target. This distance is important for reliable sensing.
5. After switch is in place, tighten locking nut and replace cover on box. Make sure target will not strike or contact end of proximity sensor during normal operation.

Grain Discharge Chute Switch Adjustment

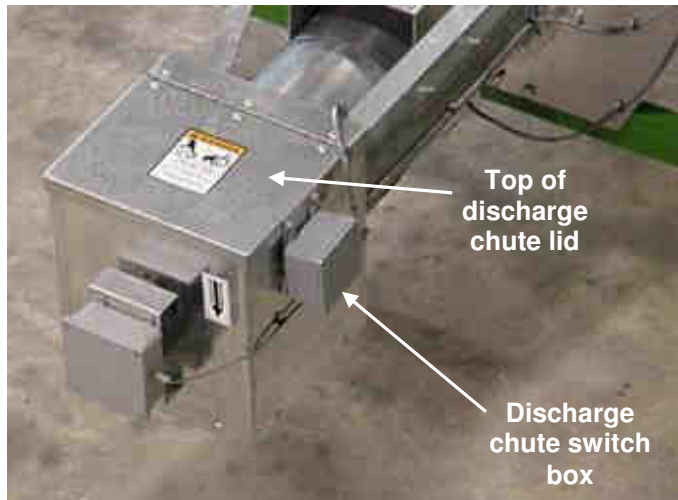


Image 4-20 – Discharge chute switch box

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.

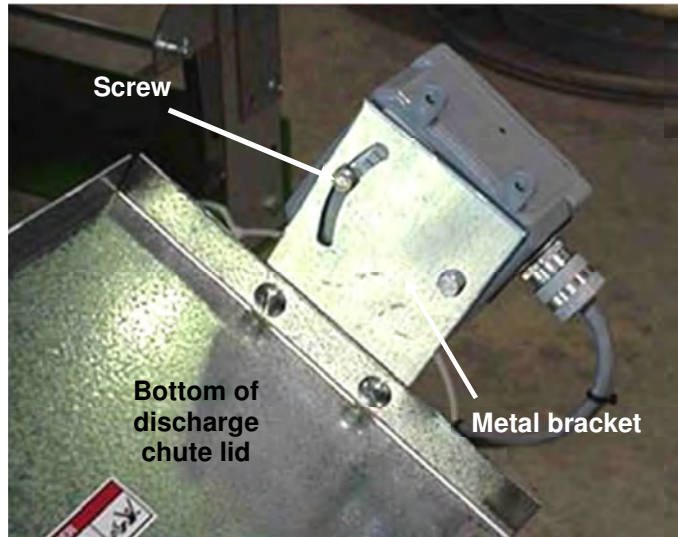


Image 4-21 – Screw and metal bracket

3. Adjust box so that when discharge chute lid is opened 2" to 3", 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.

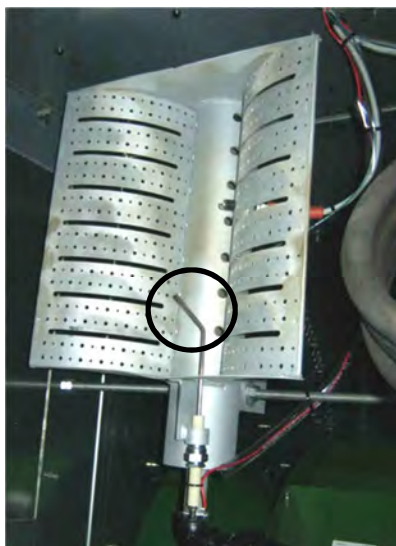


Image 4-22 – Flame rod

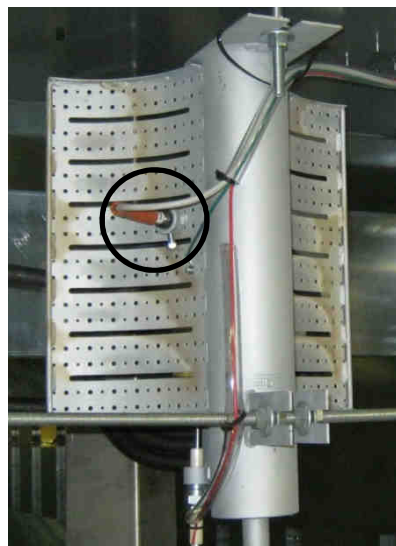


Image 4-23 – Spark plug/igniter

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 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.

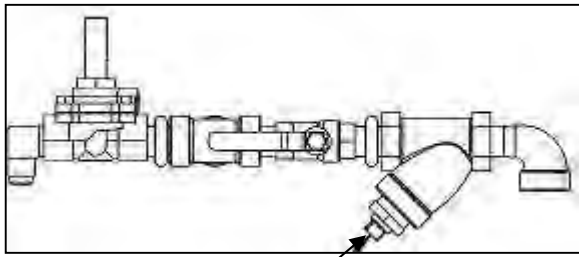


Fig. 4-1 – Remove gas strainer/filter at hex nut

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

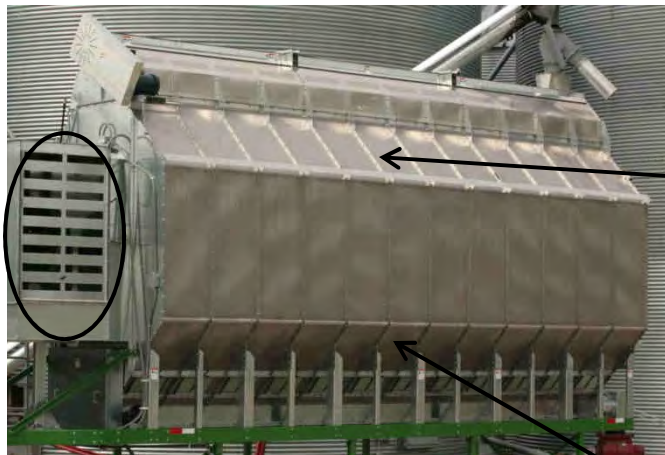


Image 4-24 – Fan inlet, top exhaust slope and lower grain column slope

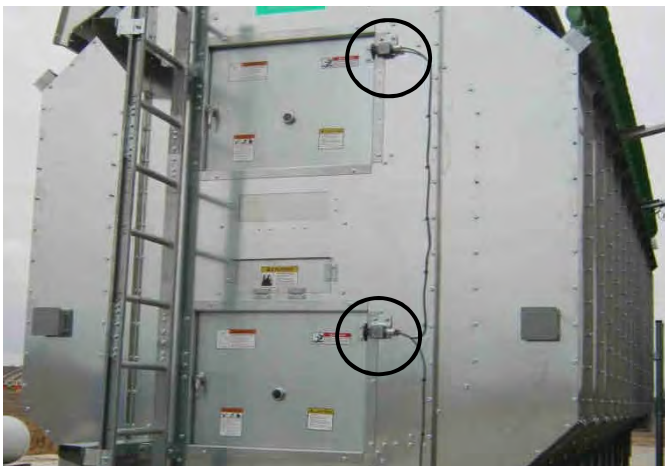


Image 4-25 – Rear access doors, interlock switches

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

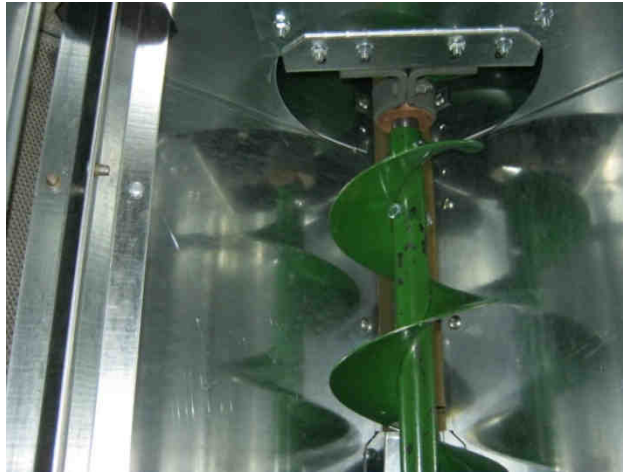


Image 4-31 – Unload auger inside access/cleanout door removed



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

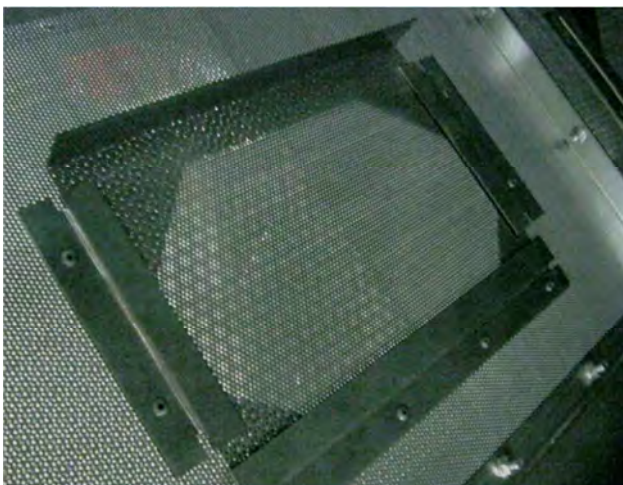


Image 4-33 – Grain column inside cleanout sliding door

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

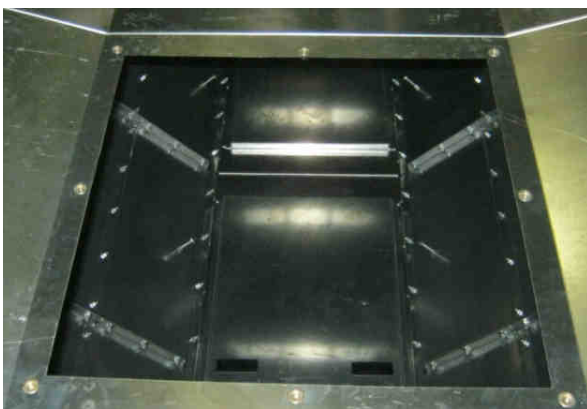


Image 4-35 – Plenum divider door removed

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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Fault Troubleshooting

Grain Discharge Chute Switch



Image 5-1 – Grain discharge chute switch

Sensor in grain discharge chute switch detects discharge chute opening during operation. This fault usually indicates a problem with take-away system.



Fault Condition

Discharge Chute is Open

All dryer models use wire #42

1. Is discharge chute open? Determine cause of door being open and return door to closed position.
2. Is switch out of adjustment?
This can be determined by watching input light on PLC or observing System Diagnostics screen in Tools Menu. Adjust angle of sensor after placing door at desired height for fault to occur. PLC input light turns off when a fault occurs.
3. If unable to adjust sensor and turn on PLC input light, use a voltmeter to determine if sensor is malfunctioning.
4. At discharge chute, find junction box fastened to lid. This box contains the switch. Remove cover and locate the two wires coming from switch. One wire should be labeled # 18. Check for 24VDC from wire # 18 to ground. (On older dryers, a jumper may need to be installed in control box from wire # 95, which is found on PLC, to ground bar at bottom of control box).
5. If 24VDC is found on wire # 18, check for voltage on wire # 42. If 24VDC is not present, it may be necessary to tilt sensor to allow mercury to make contact with switch contacts. If unable to detect 24VDC on wire # 42, switch is bad and must be replaced.
6. If 24VDC is present on wire # 42, but PLC input light is still off, proceed to power box and check terminal # 42 for 24VDC. If unable to detect 24VDC on terminal # 42, check connections between discharge chute sensor and power box.
7. If 24VDC was present on terminal # 42 in power box, check PLC input where # 42 goes into PLC. If 24VDC is present on input on PLC but light is OFF, then PLC is malfunctioning.

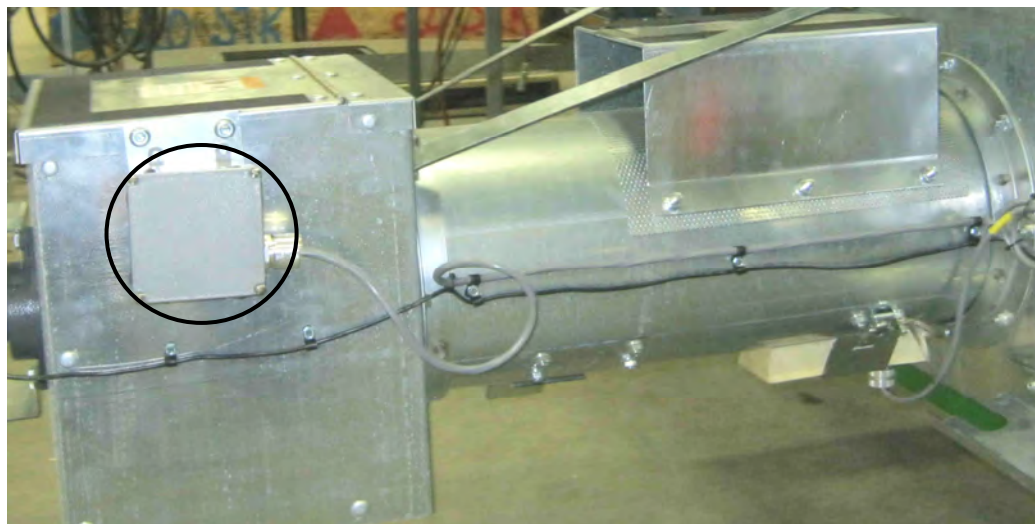


Image 5-2 – Grain discharge chute switch location

Paddle Switches



Image 5-3 – Paddle switches

Paddle switches are located on side of dryer and used to indicate when dryer is running low or is out of grain. A fault will be displayed when this occurs.



Fault Condition

10-Minute Load Attempt Timeout

All dryer models use wire #44

1. Is wet bin out of grain?
If this is last load of season, press Reset and Start → Final Dry.
2. Has an auxiliary load malfunctioned?
Repair cause of load failure and press Reset.
3. If wet grain is available and load auxiliaries are functioning, is paddle switch bound up?
If so, free the paddle switch and repair cause.

4. Are both PLC input lights off? (Both lights should be off when dryer is calling for grain – paddle down.)
Are both PLC input lights on? (Both lights should be on when dryer is full – paddle up.)
If not, remove cover from junction box on paddle switch assembly and visually check sensors for proper placement in their respective holders. See Fig. 5-4.

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

Lower-Input 1.1.1; Upper-Input 1.2.3

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

6. If 24VDC is detected on wire # 18, check for 24VDC on other wire going to sensor.
 - a. With paddle switch in up position, 24VDC should be detected on wire # 44 and # 53.
 - b. If not, replace respective sensor and recheck for voltage.
7. If paddle switch is in up position and 24VDC is present on both sensors, but one or both PLC input lights are off, voltage will need to be measured on respective terminal on power box terminal strip.
If 24VDC is not detected on respective terminal, check wiring connections between paddle switch junction box and power box terminal strip.
8. If 24VDC is detected at power box terminal strip and PLC input lights are not on, PLC may be malfunctioning.

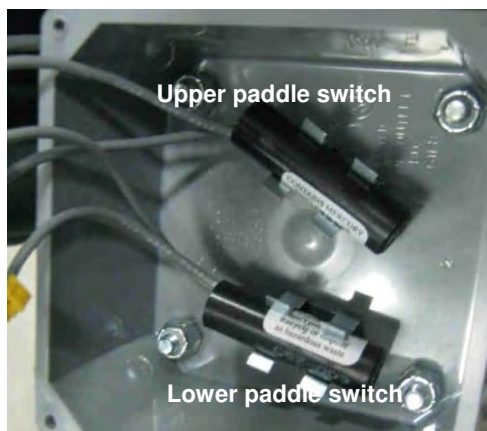


Image 5-4 – Paddle switches



Image 5-5 – Paddle switch box on dryer

Unload Auger Proximity Switch



Image 5-6 – Unload auger proximity switch

Unload auger proximity switch is located on discharge box on end of unload auger. This device monitors unload auger and will give a fault and stop dryer if unload auger stops turning.



Fault Condition

Unload Prox Failure

All dryer models use wire #96

1. Visually inspect auger for problems.
 - a. Are belts tight and in good condition?
 - b. Does motor smell or feel hot?
 - c. Is a Motor Overload fault being displayed along with Unload Auger fault? If so, do not restart unload motor until a definite cause for overload has been determined. After repairing cause of fault, reset motor overload.

Then press RESET on keypad.

2. If no fault is being displayed, go to Manual and turn on Unload and check for rotation.
 - a. While auger is rotating, check PLC input light. It should be flashing at a regular rate, indicating rotation.
 - b. If PLC input light is not flashing, check auger for rotation. If auger is not rotating, find cause and repair it.
3. If rotating, look at back of switch. A small, orange light should be visible and flashing on and off.
4. If light on back of switch is not flashing, find junction box attached to discharge chute and remove cover.
 - a. Locate brown, black and blue wires coming from unload auger switch. Check for 24VDC on wire # 18 (brown), with respect to wire # 95 (blue).
 - b. If 24VDC is not found on wire # 18, go to power box terminal strip and check for 24VDC on bottom terminal strip.
 - c. If 24VDC is not found on wire # 18 in power box, go to control box and check for 24VDC on terminal strip.
 - d. If 24VDC is not found on wire # 18 in control box, check for 24VDC on topside of PLC.

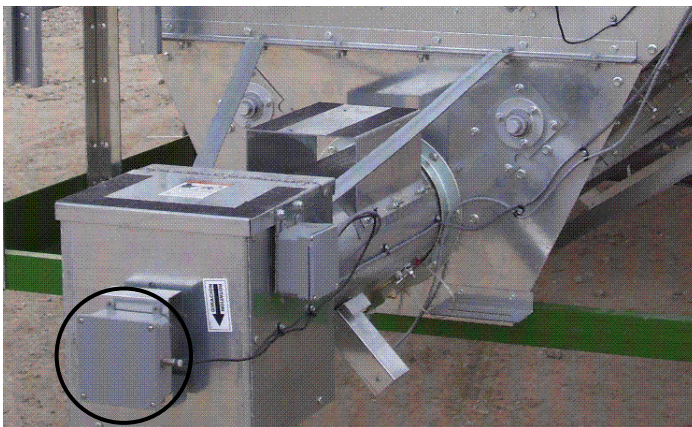


Image 5-7 – Unload auger proximity switch

5. If possible, position target over switch so switch will be in ON position.
 - a. With switch turned ON, light on back of switch should be on. Check for 24VDC on output wire (black). If light is on but 24VDC is not found on output (black) wire, switch is malfunctioning.
 - b. If 24VDC is found on output (black) wire, go to PLC in Power Box and check PLC Input light. This light should be on when sensor is ON.

- c. If 24VDC is found on output (black) wire but PLC input light is not on, check for 24VDC on Power Box terminal strip. If 24VDC is not found, check wiring connections between junction box and power box.

Vapor Over-Temperature Switch



Image 5-8 – Vapor over-temp switch

On an LP dryer, vapor over-temp switch is located on pipe train for heater(s). Its purpose is to detect gas that is overheating and prevent damage to heater components.



Fault Condition

Vapor Over-Temp

- 3rd module uses wire #202
- 2nd module uses wire #102
- 1st module (bottom) uses wire #37

1. This fault indicates when output of vaporizer coil has become too hot (above 140 F).
 - a. Tubing near fault device should be fairly warm to touch, but not hot.
 - b. Check fuel supply. Is tank low on fuel?
 - c. Check for air inlet obstruction. Clean any debris from fan grill.
- d. Check to see if vaporizer coil is too close to flame. Adjust coil as needed.
2. Has vaporizer coil had sufficient time to cool down?
Device will automatically reset when it has cooled down.
3. Is PLC input light on?
 - a. After device has cooled down and reset, PLC input light should be ON.
 - b. If not, follow wiring from coil to heater box and check for 24VDC on wire # 18.
4. If 24VDC is not found on wire # 18, go to power box and check for 24VDC on terminal strip.
If 24VDC is found on wire # 18 on power box terminal strip, check wiring connections from heater box to power box.
5. With 24VDC being found on wire # 18 on one wire of vaporizer O/T switch, and after device has cooled down to ambient temperature, check for 24VDC on other wire (not # 18) coming from O/T switch.
 - a. If 24VDC is NOT found on other wire, O/T switch is bad.
 - b. If 24VDC is found on other wire coming from O/T switch, take note of wire number and go to power box and check for 24VDC on terminal strip.
 - c. If 24VDC is NOT found on power box terminal strip, check wiring connections between power box and heater box.
- d. If 24VDC is found on input terminal, and input light is NOT on, and fault message is still being displayed (after pressing RESET), then PLC is malfunctioning.



Image 5-9 – Vapor over-temp switch on dryer

Rear Door Interlock Switch



Image 5-10 – Rear door interlock switch

Rear door interlock switch is located to right of each rear door on dryer. This switch is used to keep dryer from running when rear door is open and a person may be in plenum of dryer.



Fault Condition

Rear Door is Open

All dryer models use wire #36

1. Check rear doors to be sure no one is inside and doors are closed.
2. If all doors are closed, check that PLC input light is ON.

If light is not ON, go to junction box on back of dryer that contains wire from switches.

Remove cover and check for 24VDC on input wire.

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

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



Image 5-11 – Rear door interlock switches

Grain Column Over-Temperature Switch



Image 5-12 – Grain column over-temp switch

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 210°F. Image 5-13 shows location of junction box for switch on left side of dryer, as referenced from rear (discharge end) of dryer.



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 grain columns for obstructions that would prevent grain from flowing through column. If an obstruction is found, do not restart dryer until it has been cleared.
2. If no obstruction is found and grain is flowing freely through each column, plenum temperature may need to be reduced.

NOTE: To check for an obstruction, go to Manual operation and turn 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.



Image 5-13 – Grain column over-temp switch

3. If column temperature has cooled down and RESET button has been pressed on keypad and fault message is still being displayed, remove junction box cover and check for 24VDC on wire # 18.
4. Allow time for columns to cool down.
5. At this point, 24VDC should be present on wire # 18 at O/T sensor.
Check for 24VDC on other wire (not # 18) coming from sensor.
 - a. If 24VDC is NOT detected, O/T sensor is defective.
 - b. If 24VDC is found on wire coming from O/T sensor but PLC input light is NOT on, note number of wire and go to power box and check for 24VDC on terminal strip.
 - c. If 24VDC is NOT found on terminal strip in power box, check wiring connections between junction box and power box.
 - d. If 24VDC is detected on terminal strip in power box, go to PLC and check for 24VDC on input terminal.
 - e. If 24VDC is detected on PLC input terminal, and input light is not on and fault message is still displayed (after pressing RESET), then PLC is malfunctioning.

Heater Housing High-Limit Switch



Image 5-14 – Heater housing hi-limit switch.
See Image 5-18 (Item 3) for location on dryer.

Heater housing high-limit switch is the reset button located in heater box mounted above heater. This switch trips when heater reaches a temperature considered too high for drying grain.



Fault Condition

Housing Over-Temp

3rd module uses wire #203
2nd module uses wire #103
1st module (bottom) uses wire #38

1. Check for proper fan operation and airflow.
 - a. Check ignition harness for burned wires. Replace as needed.
 - b. Check for plugged fan grill and remove any debris.
 - c. Remove cover from faulted heater box and push RED reset button located at center of heater box.
- d. Go to Manual and turn on fan. Ensure fan is running at proper speed.
- e. Turn burner switch to ON and observe burner for proper operation.
2. After allowing time to cool, RED reset button on high-limit switch should push in and latch.
 - a. If reset button will not latch, high-limit switch is defective.
 - b. If reset button will latch but fault remains after RESET is pressed, check voltage.
3. Locate two wires plugged in to high-limit switch. Check for 24VDC on wire # 18.
 - a. If 24VDC is not present on wire # 18, go to power box and check for 24VDC on terminal strip.
 - b. If 24VDC is present on terminal strip, check wiring connections between heater box and power box.
4. At this point, 24VDC should be present on wire # 18 at high-limit switch in heater box.
 - a. Check for 24VDC on other wire connected to high-limit switch. With RED reset button latched in, 24VDC should be present.
 - b. If 24VDC is NOT found, high-limit switch is defective.
 - c. If 24VDC is found but PLC input light is not ON, take note of wire number and go to power box and check for 24VDC on terminal strip.
 - d. If 24VDC is NOT found on terminal strip, check wiring connections between heater box and power box.
 - e. If 24VDC is found on power box terminal strip, go to PLC input terminal and check for 24VDC.
 - f. If 24VDC is NOT found on PLC input terminal, check wiring connections from PLC input terminal to power box terminal strip.
 - g. If 24VDC is found on PLC input terminal but input light is NOT on, and fault message is still displayed after pressing RESET on keypad, PLC is malfunctioning.

Metering Roll Proximity Switch



Image 5-15 – Metering roll proximity switch

Metering roll proximity switch is located in junction box at back of dryer. This device is used to monitor metering rolls for rotation. If rolls stop turning, fault will be displayed and dryer will shut down.



Fault Condition

Metering Roll Prox Failure

All dryer models use wire #93

1. Go to Tools → Manual Operation.
2. Turn manual Meter Roll Speed control to 15%.
3. Press and hold Unload OFF button until it turns bright green and unload starts.
4. Observe chain on meter rolls DC motor for movement.
 - a. If chain is moving, check to see if meter rolls are turning.
 - b. If meter rolls are not turning, check for a broken chain.
5. If meter rolls are turning, go to back of dryer and look at back of meter roll sensor for light turning on and off.
 - a. Check PLC input for light turning on and off.
 - b. After determining which meter roll input signal is missing, go to meter roll box housing proximity switch and remove cover. See Image 5-16. Make sure rotating target is within 1/8" of sensor head when passing over sensor. If not, adjust before proceeding. Turn unload OFF when meter roll target is positioned above proximity sensor. Orange light on back of proximity sensor should now be on.
 - c. If orange light is not on, follow wire from proximity sensor to junction box. Remove junction box cover.
 - d. Check for 24VDC on wire # 18.
 - e. If 24VDC is not found on wire # 18, go to power box and check for 24VDC on terminal strip.
 - f. If 24VDC is found on power box terminal strip, check wiring connections between junction box and power box.
6. At this point, 24VDC should be present on wire # 18 in junction box on back of dryer (brown sensor wire). This voltage is referenced to ground (blue sensor wire).
7. Make sure target is over proximity switch head and adjusted to 1/8" or less.
8. Light on back of proximity sensor should be on and 24VDC should be present on output (black sensor wire). If not, sensor is defective.
9. If 24VDC is found on output (black) wire, go to power box and check PLC input light. It should be ON when sensor is in ON condition.
 - a. If 24VDC is found on black sensor wire but PLC input light is not ON, take note of wire number and go to power box terminal strip and check for 24VDC.
 - b. If 24VDC is NOT found on power box terminal strip, check wiring connections between junction box and power box.
 - c. If 24VDC is found on power box terminal strip, go to PLC and check for 24VDC on PLC input terminal.
 - d. If 24VDC is found on PLC input terminal but light is not ON, PLC is malfunctioning.



Image 5-16 – Metering roll proximity switch

Static Air Pressure Switch



Image 5-17 – Static air pressure switch disassembled.
See Image 5-18 (Item 2) for location of air switch.

Sensor in static air pressure switch monitors static pressure in plenum. Device will shut down dryer if there is not enough air pressure. **Dryer must be full of grain to satisfy this sensor.**



Fault Condition

No Static Air Pressure

3rd module uses wire #205

2nd module uses wire #105

1st module (bottom) uses wire #43

1. For adequate static air pressure in plenum, dryer must be full of grain. Check grain level in columns.
If columns are not full, check cause and correct.
2. Using Tools → Manual Operation, turn fan ON.
Check it for proper operation and airflow.
3. If a fault message is displayed, air switch may not be adjusted correctly.
 - a. Remove junction box cover housing air switch.
 - b. With dryer full of grain and fan switch turned to ON, check PLC input light. It should be ON.
 - c. If input light is NOT on, use a small straight screwdriver to turn adjustment screw counter-clockwise until input light turns on.
 - d. Once input light is on, turn fan off and observe PLC input light. Light should turn OFF as fan slows down.
 - e. If light remains ON after fan slows, turn adjustment screw clockwise slowly until input light turns off.
 - f. While watching PLC input, turn fan ON and then OFF, ensuring input light is turning on and off with fan.
4. If, after going through above procedure, PLC input light remains in either ON or OFF position without changing, voltage measurements will be necessary.
 - a. Locate wire # 18 in junction box and check for 24VDC.
 - b. If 24VDC is NOT found, go to power box and check for 24VDC on terminal strip.
 - c. If 24VDC is found on terminal strip, go to PLC and check for 24VDC.
 - d. If 24VDC is found on this wire, use a small screwdriver and turn screw clockwise until 24VDC is not present.
 - e. If turning adjustment screw clockwise fails to turn air switch OFF, then switch is defective.
 - f. If 24VDC is NOT found on wire coming from air switch, use a small screwdriver to turn screw counterclockwise until 24VDC is detected.
 - g. If turning adjustment screw counterclockwise fails to turn air switch ON, then switch is defective.
5. After replacing air switch, follow previous instructions on switch adjustment for proper operation.
 - a. If PLC input light is not turning on when air switch is on, check voltage.
 - b. Adjust air switch to ON position. Check for 24VDC on wire coming from air switch.
 - c. Take note of wire number and go to power box. Check for 24VDC on terminal strip.
 - d. If 24VDC is NOT found on terminal strip, check wiring connections between junction box and power box terminal strip.
 - e. If 24VDC is found on terminal strip, go to PLC input terminal and check for 24VDC.
 - f. If 24VDC is NOT found on input terminal, check wiring connections between terminal strip and PLC.
 - g. If 24VDC is found on PLC input terminal but input light is not on and fault message is still being displayed after pressing RESET, PLC is malfunctioning.

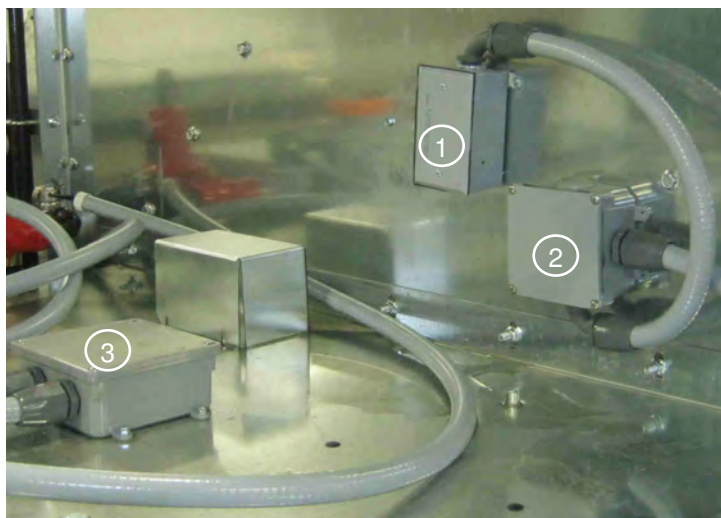


Image 5-18 shows locations of boxes housing:

1. Plenum RTD junction box.
2. Air switch and plenum over-temp switch.
3. Heater housing high-limit switch.

Image 5-18 – Location of items in Image 5-19



Image 5-19 – General location of items in Image 5-18

Plenum Over-Temperature Switch



Image 5-20 – Plenum over-temp switch. See Image 5-18 (Item 2) for location of plenum over-temp switch

Plenum over-temp switch is located inside plenum of dryer. It is provided to protect plenum from over-heating.



Fault Condition

Plenum Over-Temp

3rd module uses wire #204

2nd module uses wire #104

1st module (bottom) uses wire #39

1. Check fan for obstruction and remove any accumulated debris.
 2. With dryer shut down, open door and inspect plenum for any problems.
 3. After plenum has cooled down, press RESET and fault should be cleared. **NOTE:** Switch will reset automatically when temperature drops to an acceptable level.
-
4. If fault has not cleared, remove cover from junction box containing plenum O/T sensor and check for 24VDC on wire # 18.
 5. If 24VDC is NOT detected, check connection with terminal 18 in power box.
 6. Check for 24VDC on other side of switch.
 - a. If O/T switch has cooled down and 24VDC is NOT found on other wire, then switch is defective.
 - b. If 24VDC is found on other wire coming from switch, go to PLC and check input light. If input light is ON, press RESET and fault should clear.
 - c. If input light is not ON, take note of number of wire coming out of O/T switch. Go to power box and check for 24VDC on terminal strip.
 - d. If 24VDC is NOT found on power box terminal strip, check wiring connections between junction box and power box.
 - e. If 24VDC is found on power box terminal strip, check for 24VDC on PLC input terminal.
 - f. If 24VDC is found on PLC terminal and input light is OFF and fault message is still displayed, PLC is malfunctioning.

Device Troubleshooting

Discharge Moisture Sensor



Image 5-21 – Discharge moisture sensor in transport location

Discharge moisture sensor is found under discharge chute at rear of dryer. It senses moisture and temperature of grain as it is discharged from dryer.



Fault Condition **Input Sensor Not Found**

1. If red "Input Sensor Not Found" screen appears, it means that at least one analog input sensor is missing from PLC. Follow steps below if, for example, "Moisture Sensor Not Found" error message appears.

- a. Using a screwdriver, remove cover on junction box at rear of dryer.
- b. Find the four (4) wires used by moisture sensor. They are red, blue, black, green + shield.
- c. Using a voltmeter, check for 24VDC voltage between red and green + shield. If 0VDC is found, check connection between power box and junction box.
- d. Assuming red wire has 24VDC, check for DC voltage between black and green + shield wires. Something between 1 and 10VDC should be detected. If so, check connection between junction box and power box. Black wire is labeled D4 on power box terminal strip. If 0VDC is found, sensor is malfunctioning and must be replaced.
- e. If same voltage is found on D4 terminal in power box as back in junction box, check between D4 terminal on PLC and 95. If 0VDC is found, there is a connection problem between power box terminal strip and PLC. If same voltage (1-10VDC) is present on PLC D4 input as junction box at rear of dryer, the green analog input PLC card may be malfunctioning.

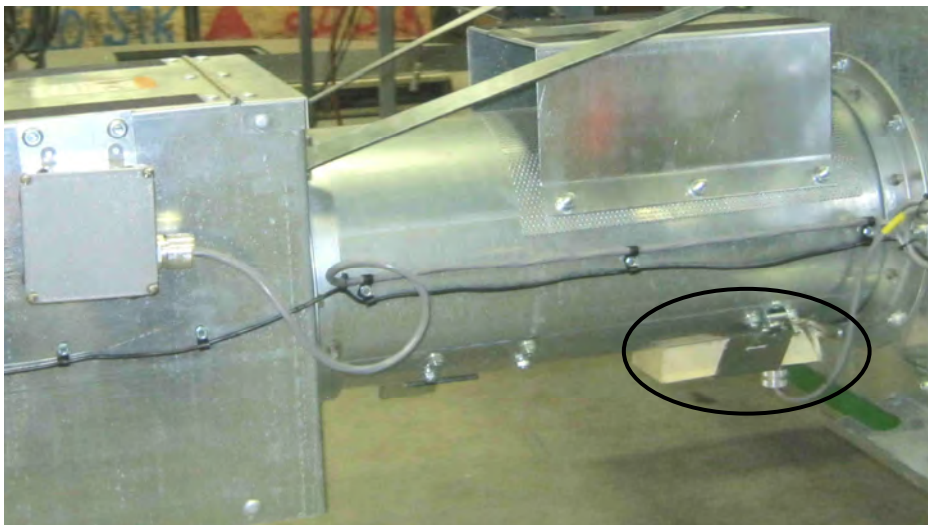
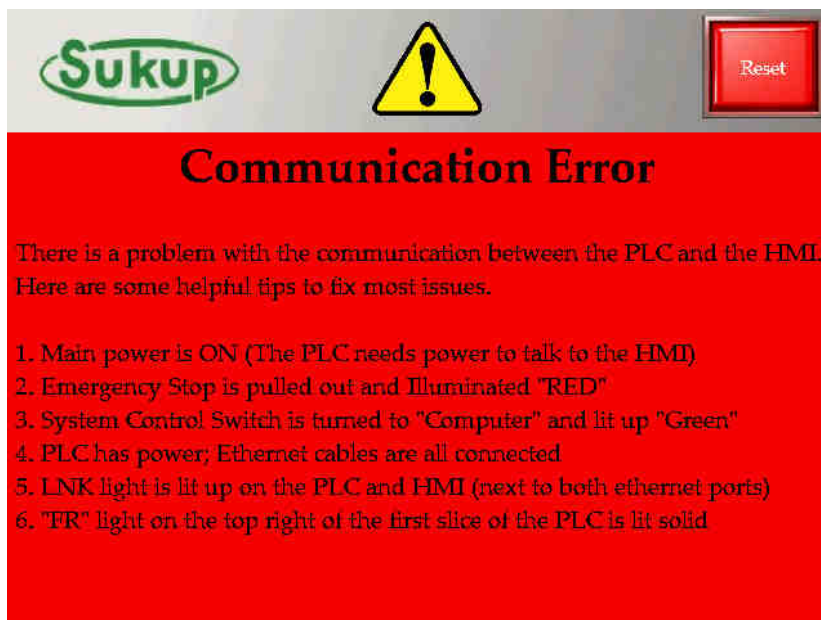


Image 5-22 – Discharge moisture sensor installed

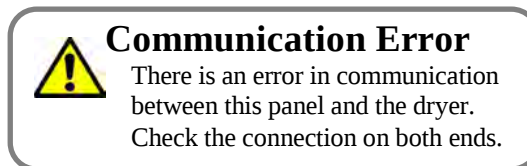
QuadraTouch™ Controller

If connection between QuadraTouch™ panel and PLC is lost, Communication Error screen shown below will appear. Screen may include a gray, horizontal error bar on bottom.



Fixing a Communication Error

1. Make sure power to both the QuadraTouch™ and PLC are ON. Ensure Emergency Stop switch is pulled out to its normal operating position and that system control switch is in "COMPUTER" position. Also, green rocker switch on QuadraTouch™ controller needs to be ON.
 - a. When both devices are turned on, QuadraTouch™ will boot up slightly faster than PLC. Main screen with gray, horizontal error bar on bottom of screen will most likely appear. It will take up to 15-20 seconds before both devices realize they are linked. Gray, horizontal error bar will disappear when communication error has cleared.
 - b. When gray, horizontal error bar disappears, press reset. System will go to main screen.
2. If both devices have power, and communication error still exists, there are a few things that need to be checked.
 - a. Make sure Ethernet cable is securely fastened into side of QuadraTouch™ controller → Ethernet coupler in box → Ethernet coupler in Power Box → PLC. Ethernet port of PLC should have LNK light lit up when both devices are turned on and cables are connected.
 - b. If LNK light is not lit up, connect Ethernet cable directly between QuadraTouch™ controller and PLC, thus eliminating couplers
 - c. If LNK light still does not come on, there is most likely a problem with Ethernet port on touch panel or with PLC.
 - d. Assuming LNK light is now lit up, make sure FR light on top right of first slice of PLC (black power slice) is lit solidly. If light is blinking after more than 1 minute of boot time, it may be necessary to reload software and/or call your local dealer.



Plenum Temperature Sensor RTD and Transmitter

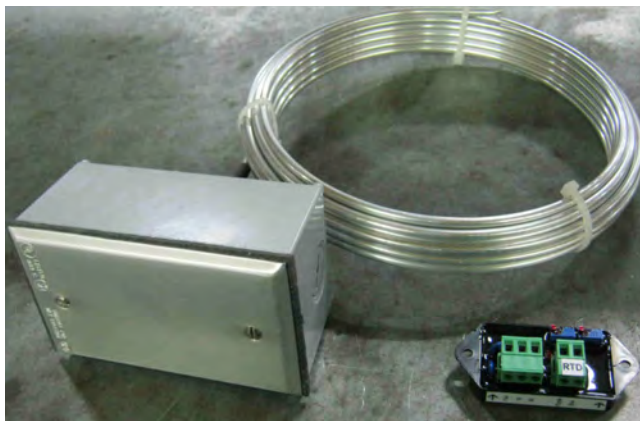


Image 5-23 – Plenum temperature sensor RTD and transmitter. See Image 5-24 for location of RTD.

Plenum temperature sensor consists of RTD (Resistance Temperature Detector) and transmitter.

RTD measures average resistance over length of tube. Dryer commonly uses 16' or 24' tube lengths.

RTD is used with a transmitter that converts resistance into a 1 to 5 VDC signal. This voltage is then fed into PLC and displayed on QuadraTouch™ screen.

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

1. Begin by locating RTD transmitter. It is either in a rectangular box approximately 4 x 2-1/2" or, as of 2012, is mounted in power box. See Item 16 of Image 6 in Component Identification section of this manual.
2. A white label should be attached to transmitter. Also, two terminal strips, each with three terminals, are located on top of transmitter.
3. Next to terminal strips are two small adjustment screws. NEVER adjust either of these screws. They are calibration adjustments and once moved, transmitter will not work correctly until a factory calibration is performed.
4. Locate terminal strip with output, +, and – connections. Check for 24VDC on terminal # 2 and # 3.
5. If 24VDC is not present, note wire numbers and go to power box and check for voltage on terminal strip.
6. With 24VDC present at transmitter, check output voltage (# 1 and # 3). Voltage between 1.0VDC and 5.0VDC should be found.



Image 5-24 – Plenum temperature sensor

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

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

Plenum Temperature Sensor RTD and Transmitter (continued)

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

Temperature	Resistance	Voltage
10	952	1.16
15	963	1.24
20	974	1.32
25	984	1.40
30	995	1.48
35	1006	1.56
40	1017	1.64
45	1028	1.72
50	1039	1.80
55	1049	1.88
60	1060	1.96
65	1071	2.04
70	1082	2.12
75	1093	2.20
80	1103	2.28
85	1114	2.36
90	1125	2.44
95	1136	2.52
100	1146	2.60
105	1157	2.68
110	1168	2.76
115	1178	2.84
120	1189	2.92
125	1200	3.00
130	1211	3.08
135	1221	3.16
140	1232	3.24
145	1243	3.32
150	1253	3.40
155	1264	3.48
160	1275	3.56
165	1285	3.64
170	1296	3.72
175	1306	3.80
180	1317	3.88
185	1328	3.96
190	1338	4.04
195	1349	4.12
200	1359	4.20
205	1370	4.28
210	1380	4.36
215	1391	4.44
220	1402	4.52
225	1412	4.60
230	1422	4.68
235	1433	4.76
240	1443	4.84
245	1454	4.92
250	1464	5.00

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

Heater Box

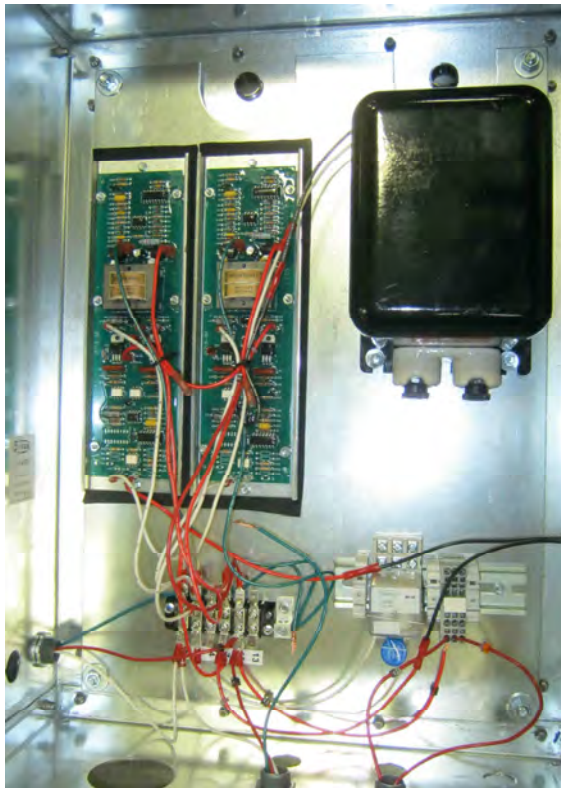


Image 5-25 – Heater box

Heater Ignition Sequence

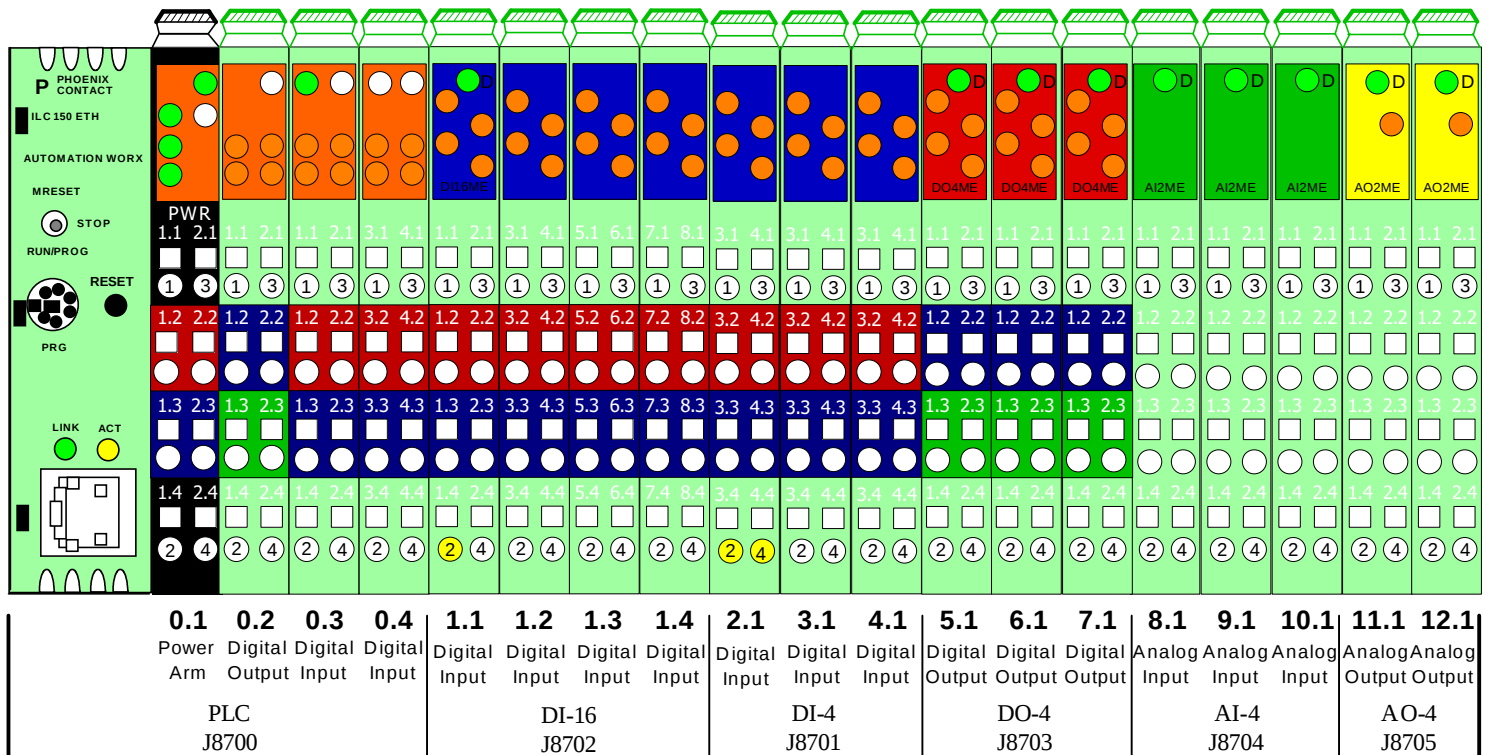
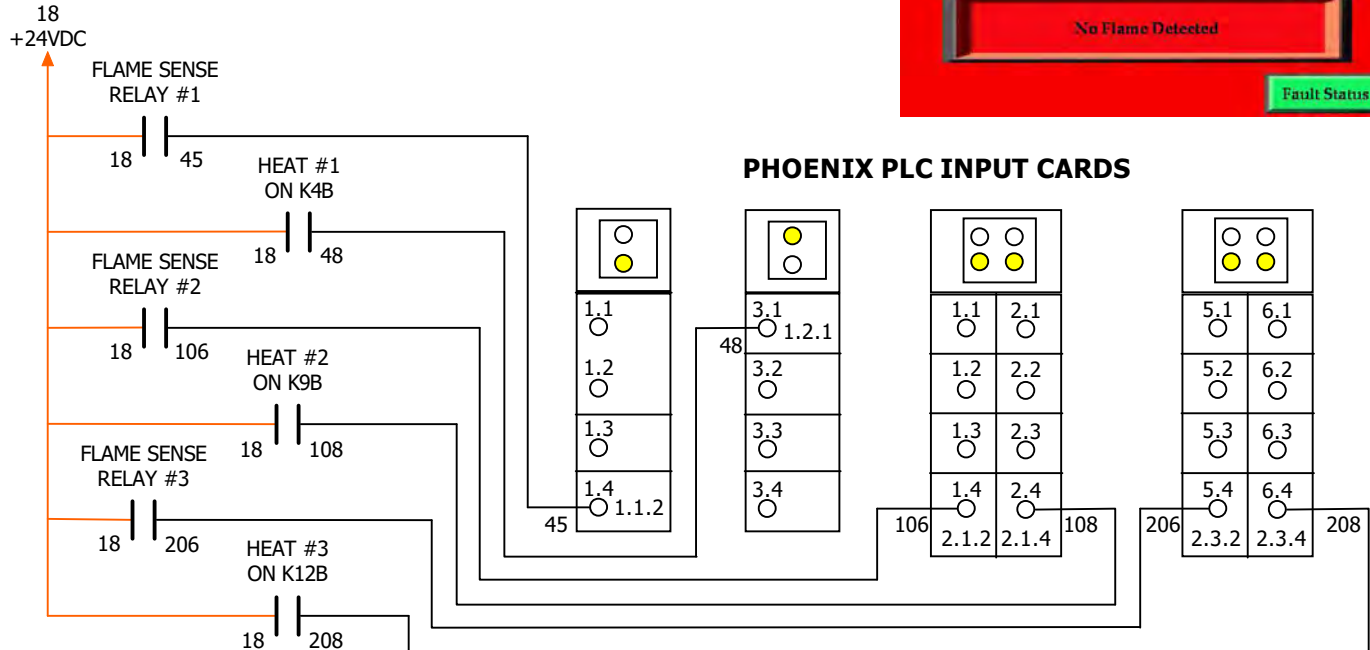
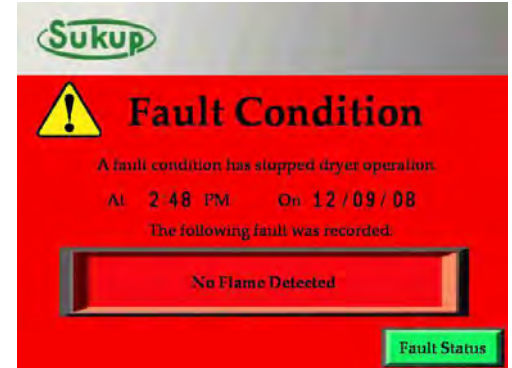
1. When heat is called for, 24VDC output(s) on PLC is/are energized.
2. That 24VDC signal is sent to 24VDC PLC relays.
K4A – Heater #1 (lowest heater)
K9A – Heater #2
K12A- Heater #3
3. This relay sends 120VAC to respective heater box and 24VDC to PLC indicating heat is on.
4. 120VAC must go through B9 for heater #1, B10 for heater #2, and B11 for heater #3. This 120VAC, which is sent to each respective heater board, is sent through wire # 4 for heater #1, wire #112 for heater #2, and #212 for heater #3.
5. Once 120VAC is present at heater board, a 20- to 30-second purge time begins.
6. After purge cycle is complete, 120VAC is sent out on wire #10 to liquid solenoid and first vapor solenoid. External purge relay is also energized at this time.
7. External purge relay (located in heater box) has a timing of 60 seconds (red wire # 21).
8. When purge relay is energized, ignition transformer is energized for 10 seconds.
9. At this point, ignition transformer is energized and first vapor solenoid is energized. Gas flows through this solenoid and through drilled orifice in second vapor solenoid. Second vapor solenoid is closed at this time.
10. After ignition transformer has shut off, gas remains on for an extra 5 seconds. If a flame has not been detected by this time, heater board shuts gas off and goes into a lockout condition.
11. During ignition attempt, flame relay in heater box is energized, sending a 24VDC signal to PLC
12. Input to PLC is # 45 for heater #1, #106 for heater #2, and #206 for heater #3.
13. Second vapor solenoid is energized and burner is now operational.

NOTE: RED light on heater box is on during ignition sequence.

45 SECOND HEATER TIME OUT FAULT

The PLC 45 second time-out occurs when the HEAT-ON relay is energized, but the FLAME SENSE relay is not energized. The HEAT-ON relay is located in the power box and when energized, power is sent to the heater control box. The FLAME SENSE relay is located in the heater control box on top of the fan barrel, and is energized when the solid state heater board applies power to the gas solenoid valves. The coil of the FLAME SENSE relay is connected to terminal # 10 of the heater board.

1-3 FAN DRYERS



The yellow circles indicate the connection points for the heat on and flame sense relays.

Title: 1 - 3 FAN DRYER: FLAME SENSE WIRING & TIMEOUT FAULT.

Author: SUKUP MFG CO

Date: 4/11 - 12/12

Sheet:

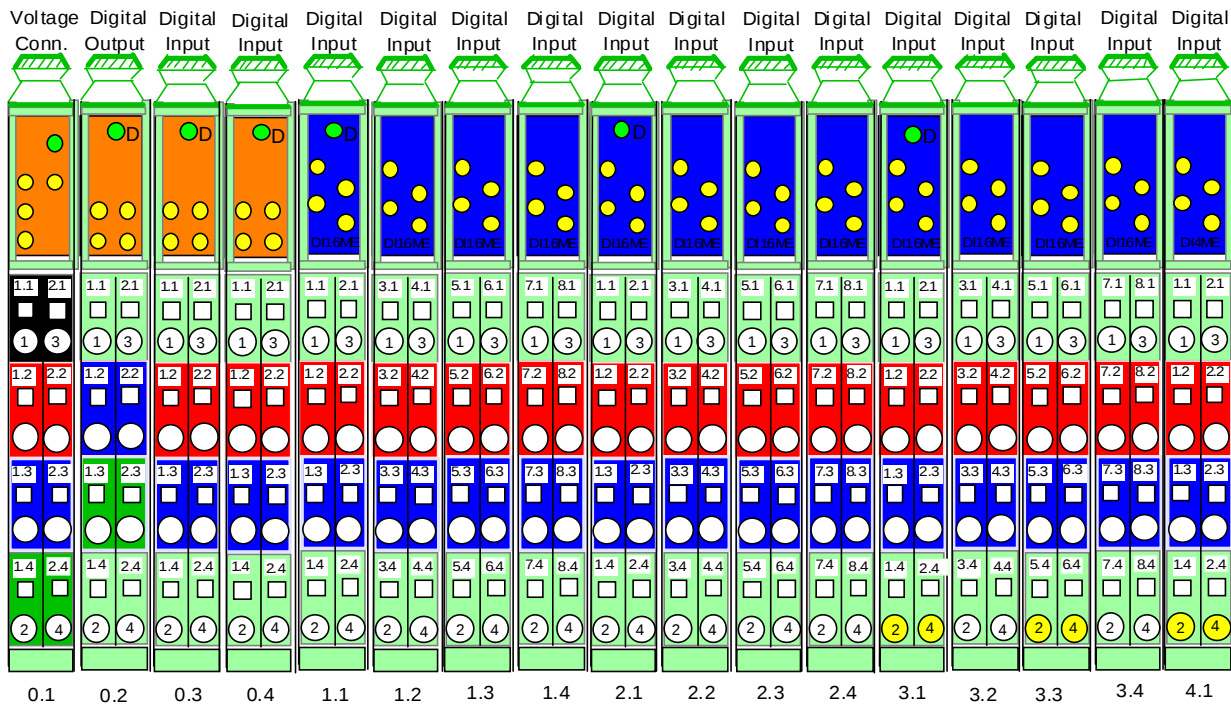
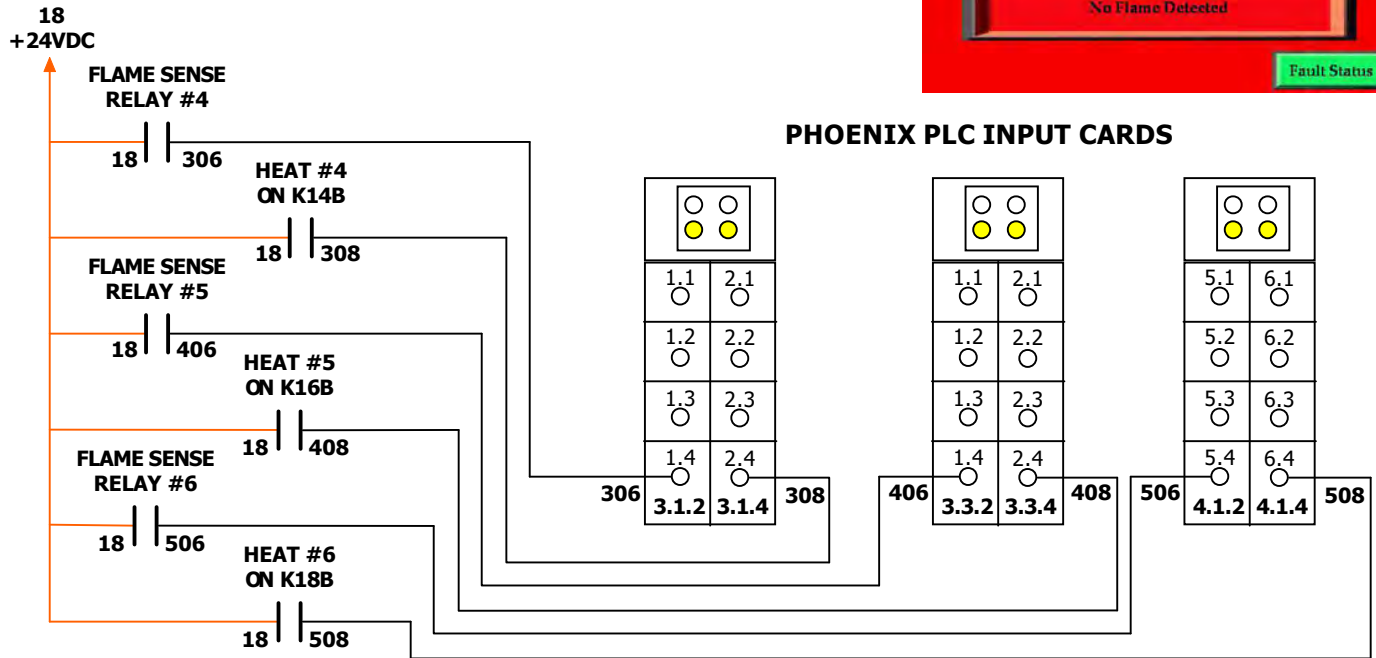
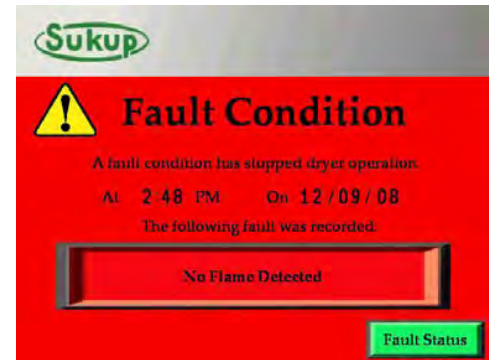
Revision: 4/9/13

QUADRA TOUCH

45 SECOND HEATER TIME OUT FAULT

4-6 FAN DRYERS

The PLC 45 second timeout fault occurs when the heat-on relay is energized, but the flame sense relay is not energized. The heat-on relay is located in the power box and energizes when it is time for power to be sent to the heater control box. The flame sense relay is located in the heater control box on top of the fan barrel, and is energized when power is applied to the solenoid valves by the solid state heater board.



The yellow circles indicate the connection points for the heat on relay and the flame sense relay.

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

Author: SUKUP MFG CO

Date: 4/11

Sheet:

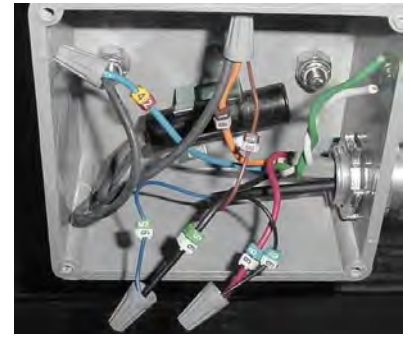
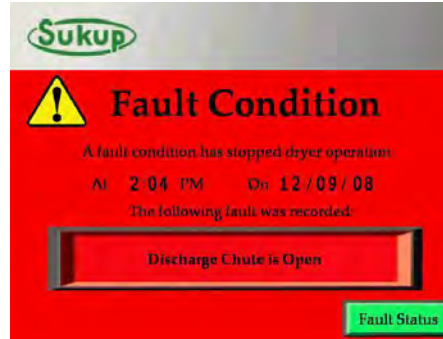
Revision: 4/9/13

QUADRA TOUCH

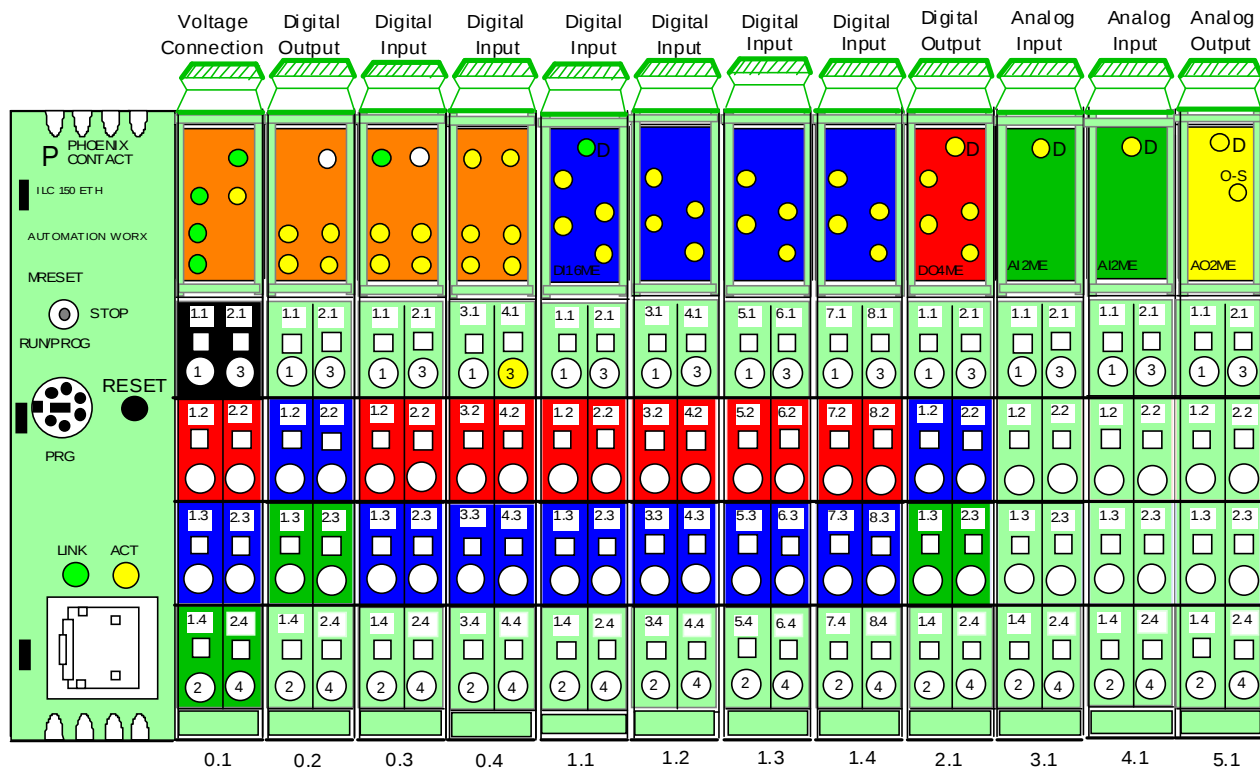
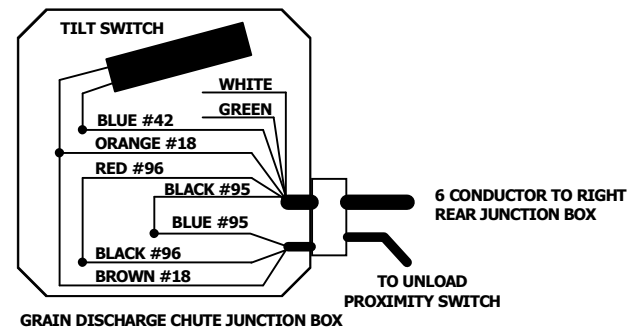
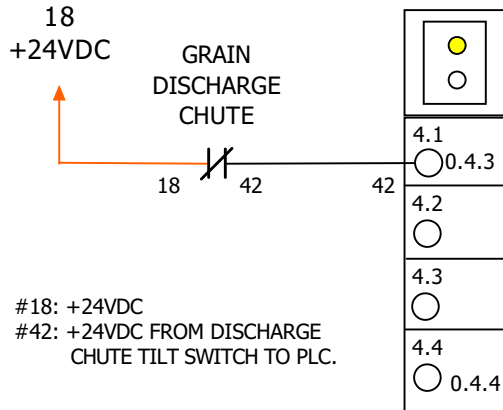
DISCHARGE CHUTE SWITCH

Inside a 4 x 4 box which is mounted to the lid of the discharge chute, is a tilt switch with a set of contacts which open when the top door of the discharge chute box opens. This will cause a grain discharge chute fault to occur. This box is also used as a junction box for the unload proximity switch wiring.

1-6 FAN DRYERS



PHOENIX PLC INPUT CARD



The yellow circle indicates the connection point for the grain discharge chute tilt switch.

Title: 1 - 6 FAN: GRAIN DISCHARGE CHUTE FAULT & WIRING

Author: SUKUP MFG CO

Date: 4/11

Sheet:

Revision: 4/9/13

QUADRA TOUCH

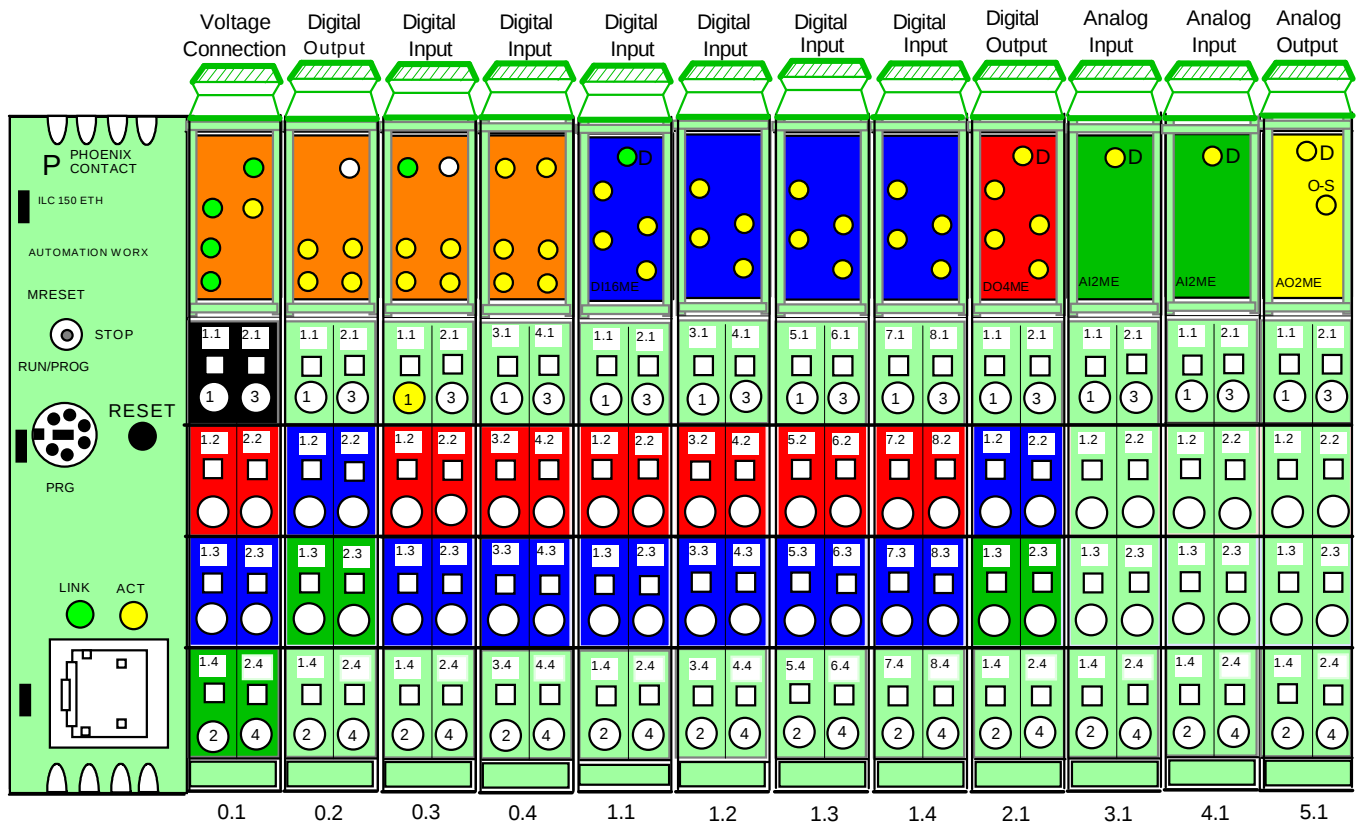
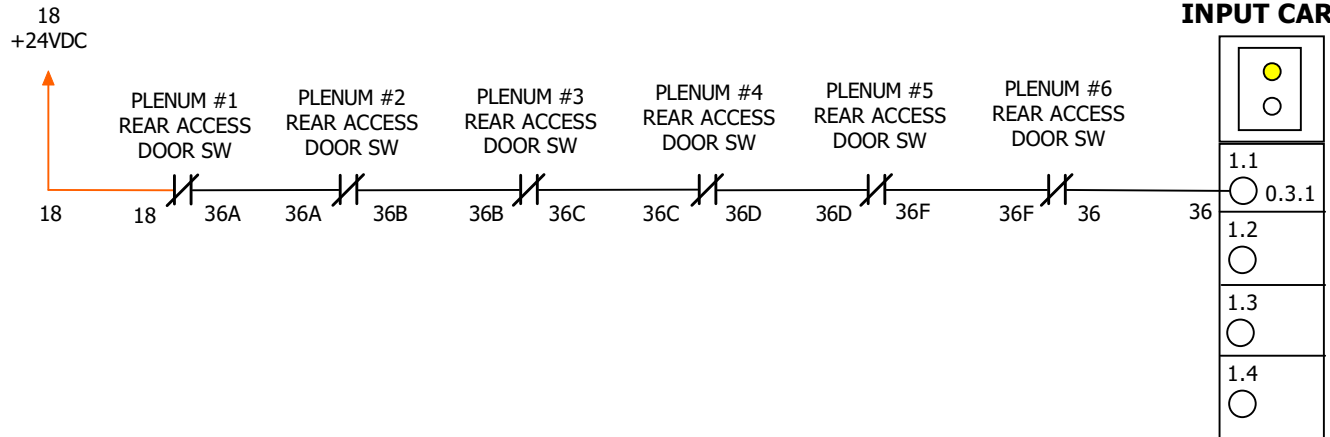
REAR ACCESS DOORS

1-6 FAN DRYERS

The rear access door switch is located on the back plate of the dryer, next to the rear 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, the switches are wired in series. In 2008, the plunger style limit switch replaced the red switch and key. (see picture)



PHOENIX PLC INPUT CARD



The yellow circle indicates the connection point for the door switches.

Title: 1 - 6 FAN: REAR ACCESS DOOR SWITCH WIRING

Author: SUKUP MFG CO

Date: 4/11

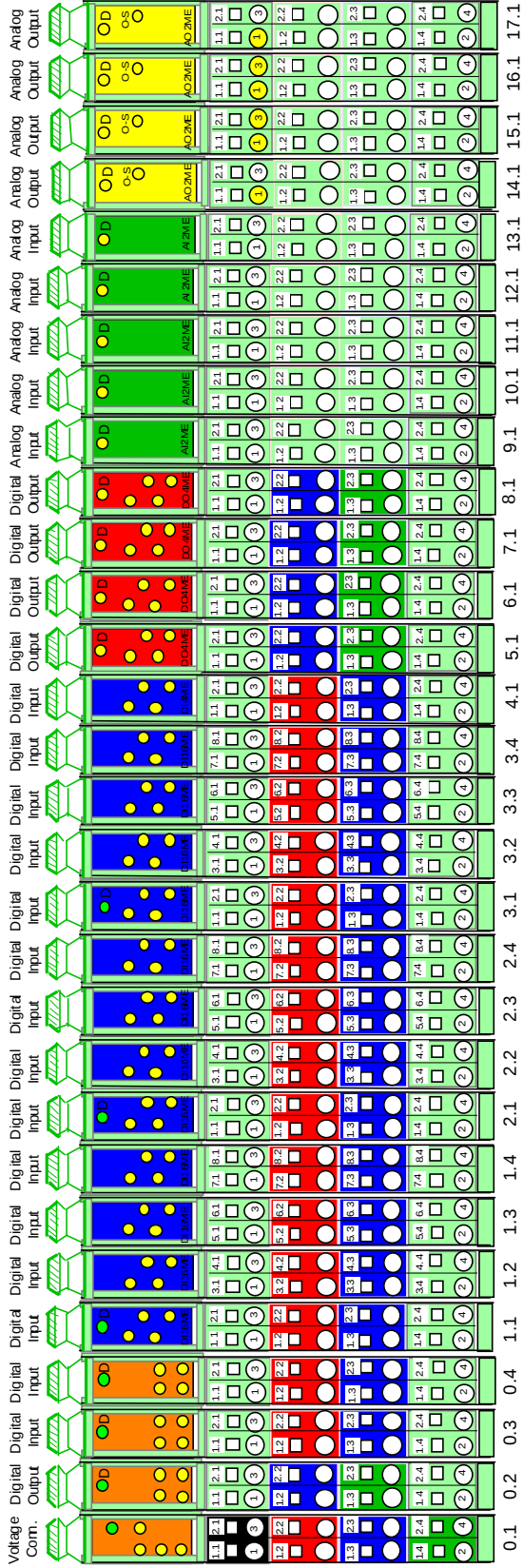
Sheet:

Revision: 4/9/13

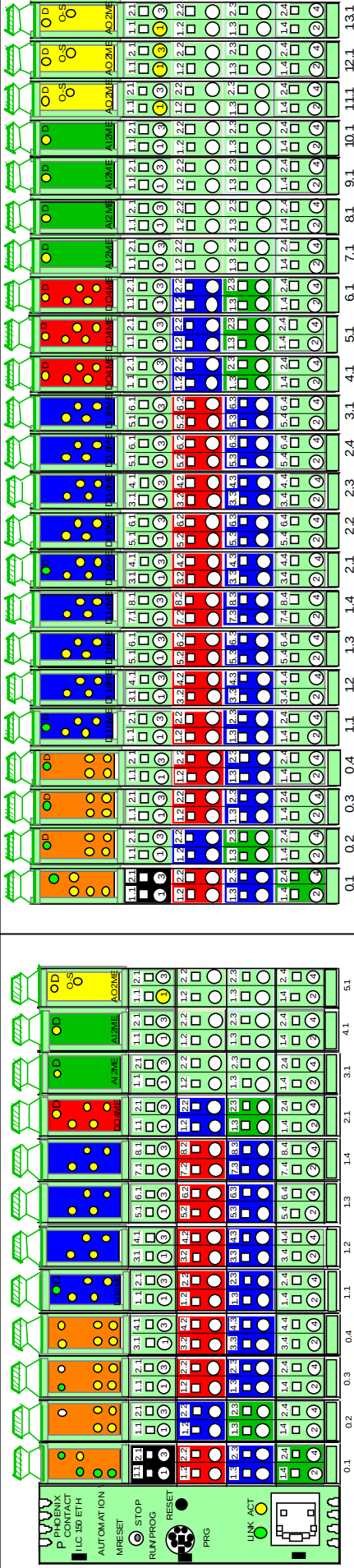
QUADRA TOUCH

1 - 6 FAN DRYERS

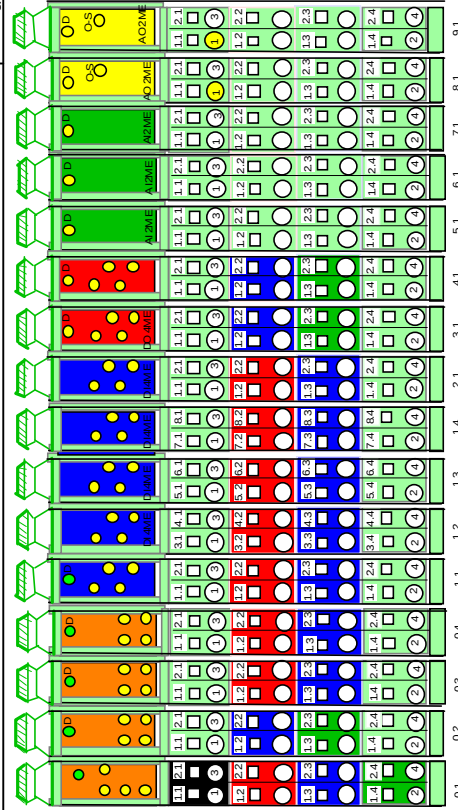
5 / 6 FAN
PLC



1 FAN
PLC



2 FAN
PLC



3 / 4 FAN
PLC

The yellow or shaded circles indicate the connection points for the temperature and moisture inputs.

Title: 1-6 FAN DRYERS: ELECTRONIC MOD
VALVE CONNECTION POINTS - CONT.

Author: SUKUP MFG

Date: 4/11

Revision: 4/9/13

Sheet: 2 OF 2

QUADRA TOUCH

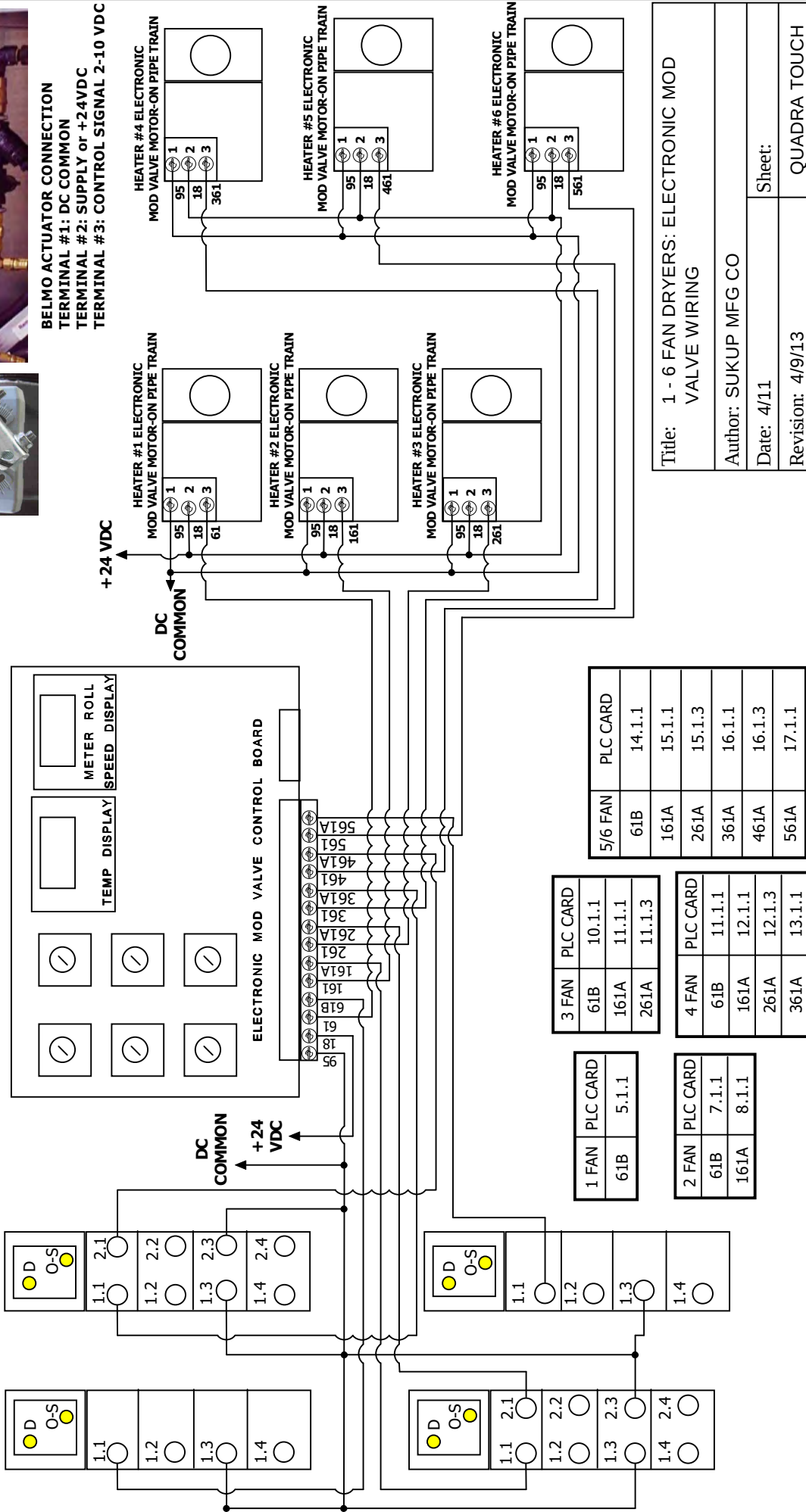
ELECTRONIC MODULATING VALVE

The 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 set point. The plenum temperature RTD signal voltage is connected to a PLC analog input card, and compares this signal with the plenum temperature set point. The PLC will change the voltage sent to the actuator to either open or close the valve. The actuator reference voltage is 2 - 10 VDC. The actuator also requires a 24 VDC supply voltage to operate.



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

PHOENIX PLC ANALOG OUTPUT CARDS



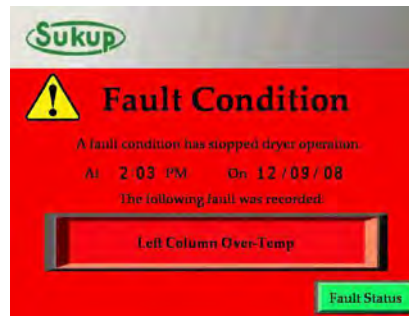
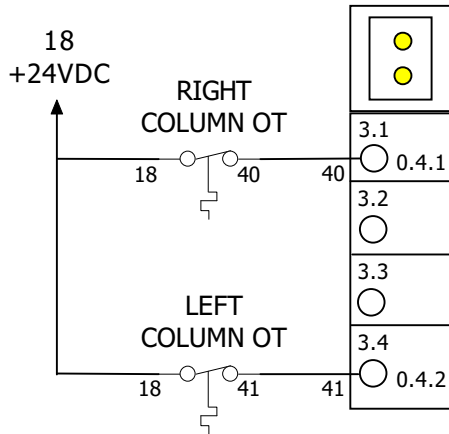
Title: 1 - 6 FAN DRYERS: ELECTRONIC MOD VALVE WIRING	
Author: SUKUP MFG CO	
Date: 4/11	Sheet:
Revision: 4/9/13	QUADRA TOUCH

GRAIN COLUMN OVER TEMPERATURE SENSOR

1-6 FAN DRYERS

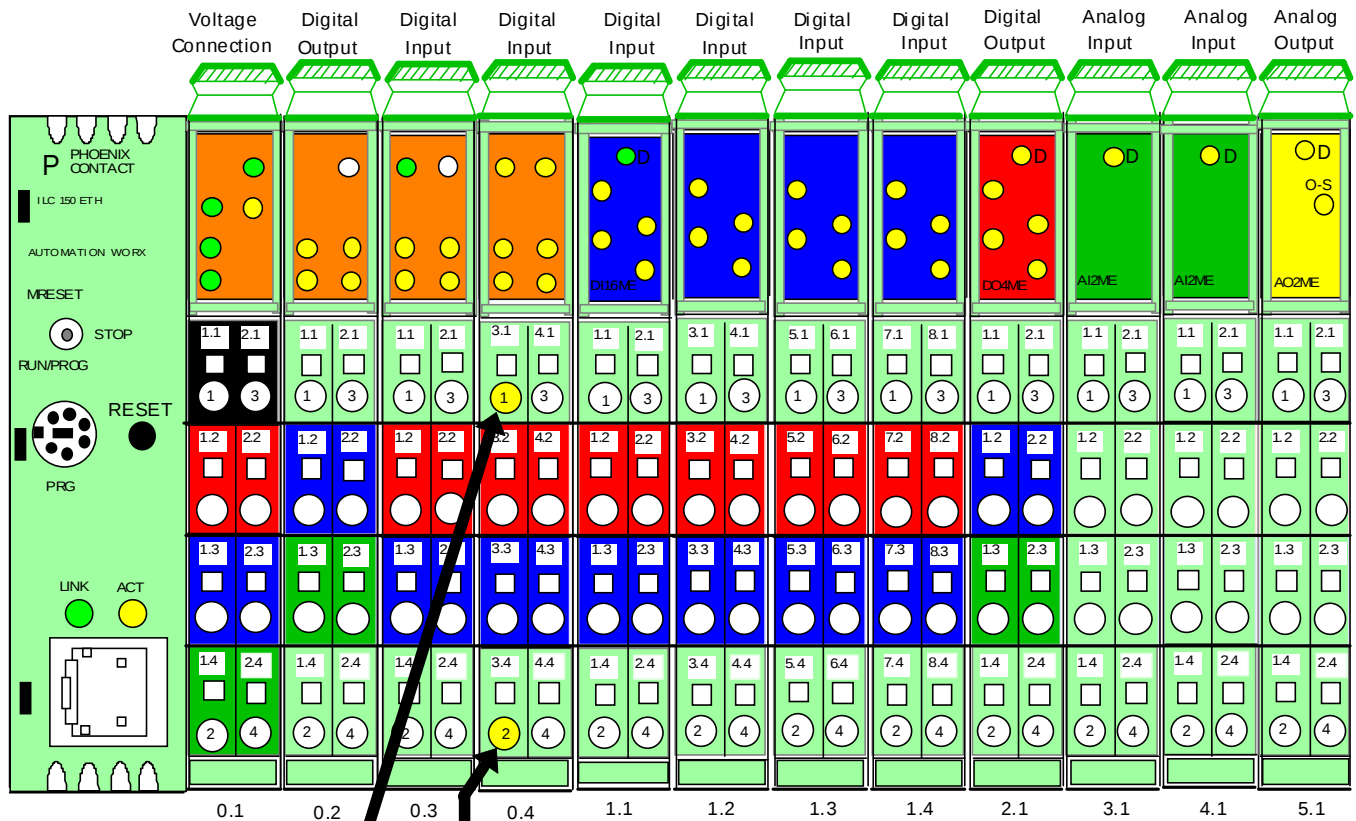
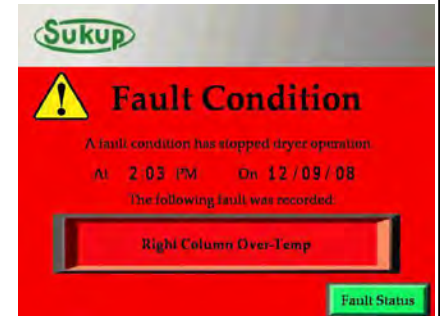
The grain column O/T sensor is located in a conduit that runs the length of the dryer inside the grain column. The sensor monitors grain temperature. The contact will open if the temperature exceeds 210 F. The connection box for the sensors are located on the end plate of the front, or fan end.

PHOENIX PLC INPUT CARD



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

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



The yellow circles indicate the connection points for the left and right column O/T switches.

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

Author: SUKUP MFG CO

Date: 4/11

Sheet:

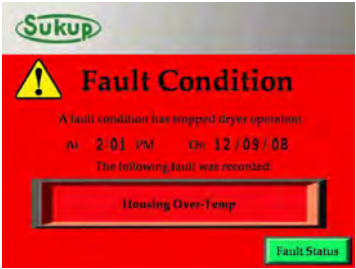
Revision: 4/9/13

QUADRA TOUCH

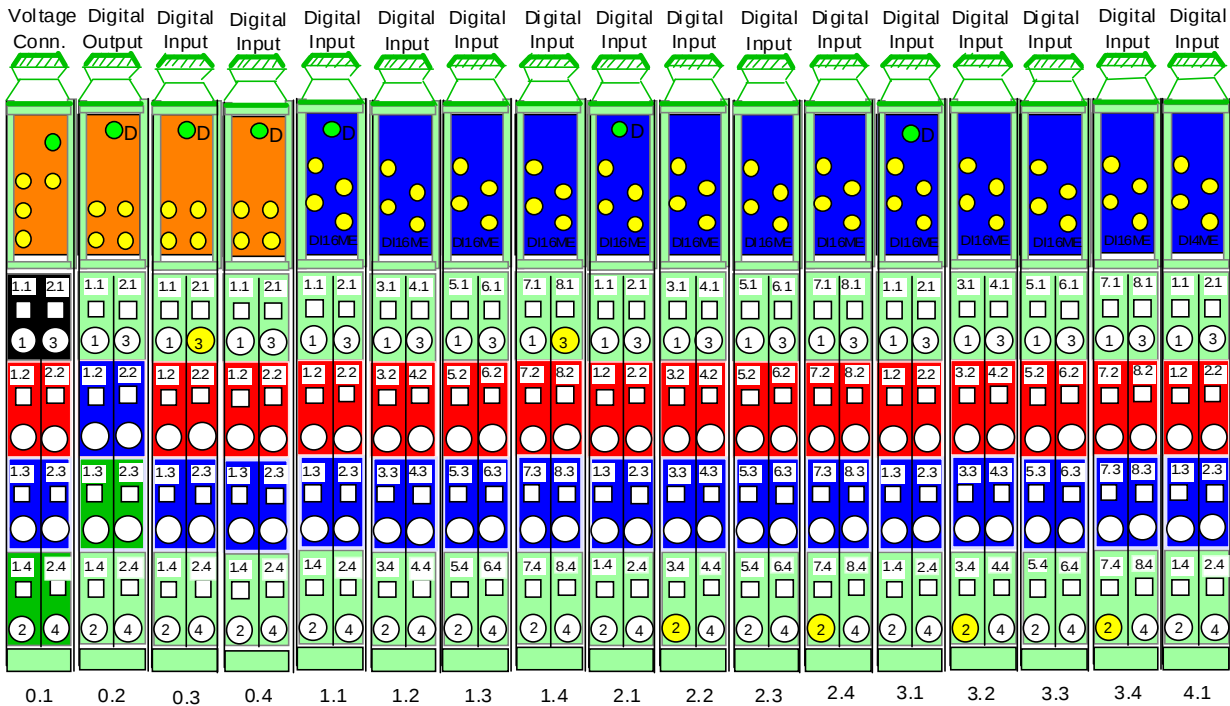
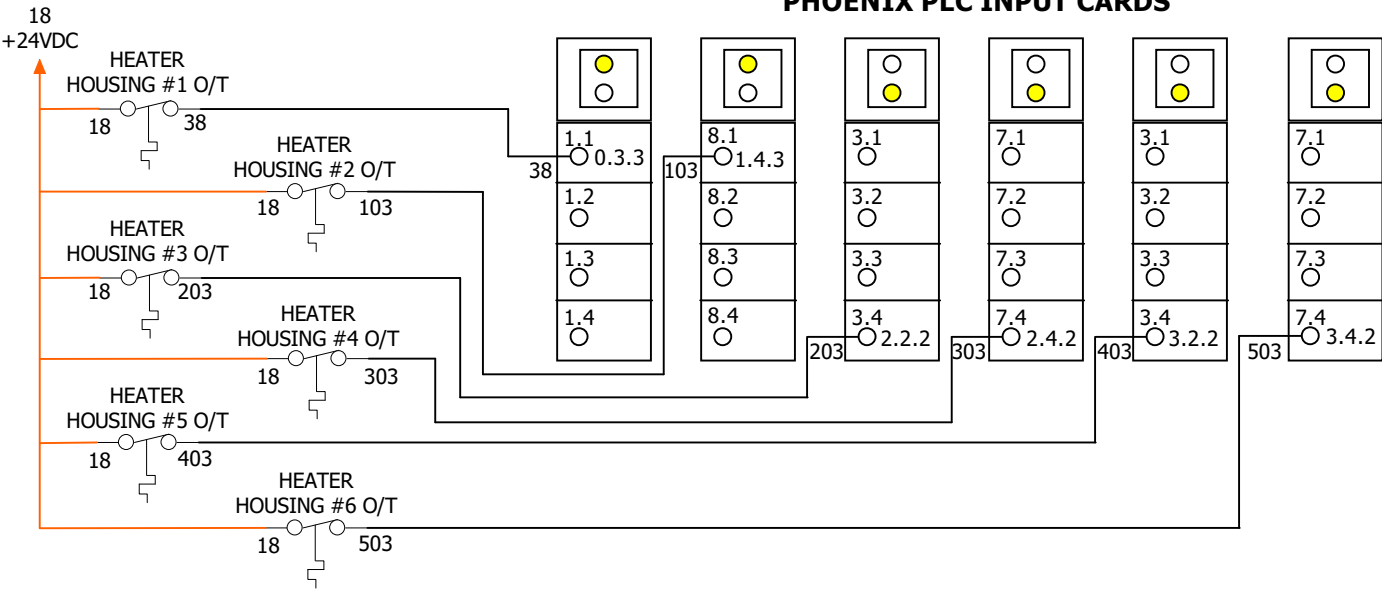
HEATER HOUSING OVER TEMPERATURE SENSOR

1-6 FAN DRYERS

The heater housing O/T switch is used to monitor the temperature of the air inside the heater housing, or the area between the burner and the fan. The switch is mounted inside the heater box on the top side of the heater housing. If the temperature exceeds 200 F. the switch will open and a fault will occur. This switch has a manual reset button. This switch will NOT reset automatically.



PHOENIX PLC INPUT CARDS



The yellow circle indicates the connection points for the plenum O/T switches.

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

Author: SUKUP MFG CO

Date: 4/11

Sheet:

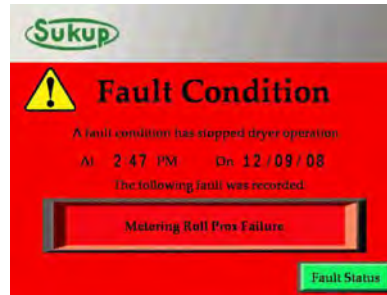
Revision: 4/9/13

QUADRA TOUCH

METER ROLL PROXIMITY SWITCH

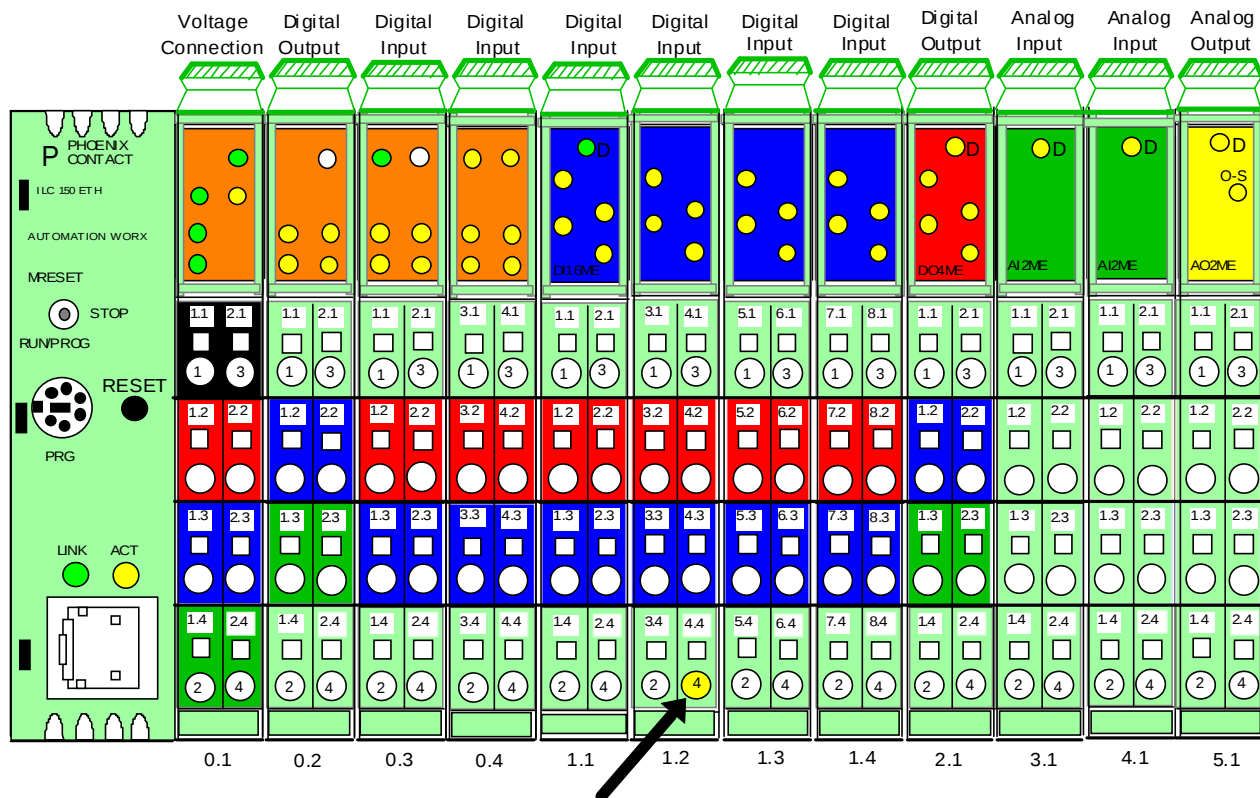
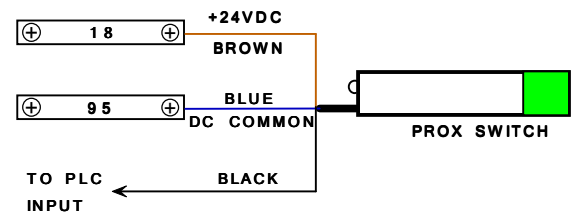
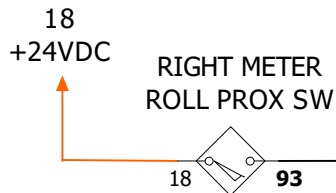
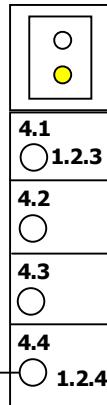
A proximity switch is used to monitor rotation of the meter rolls. The proximity switch signal wire is connected to input 1.2.4 of the PLC. A 2 minute timer in the PLC will time out if a pulse is not detected. One sensor is used to monitor rotation of the right meter roll. On the Quadratouch control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

1-6 FAN DRYERS



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

PHOENIX PLC INPUT CARD



The yellow circle indicates the connection point for the meter roll proximity switch.

Title: 1 - 6 FAN: METER ROLL PROXIMITY SWITCH WIRING

Author: SUKUP MFG CO

Date: 4/11

Sheet:

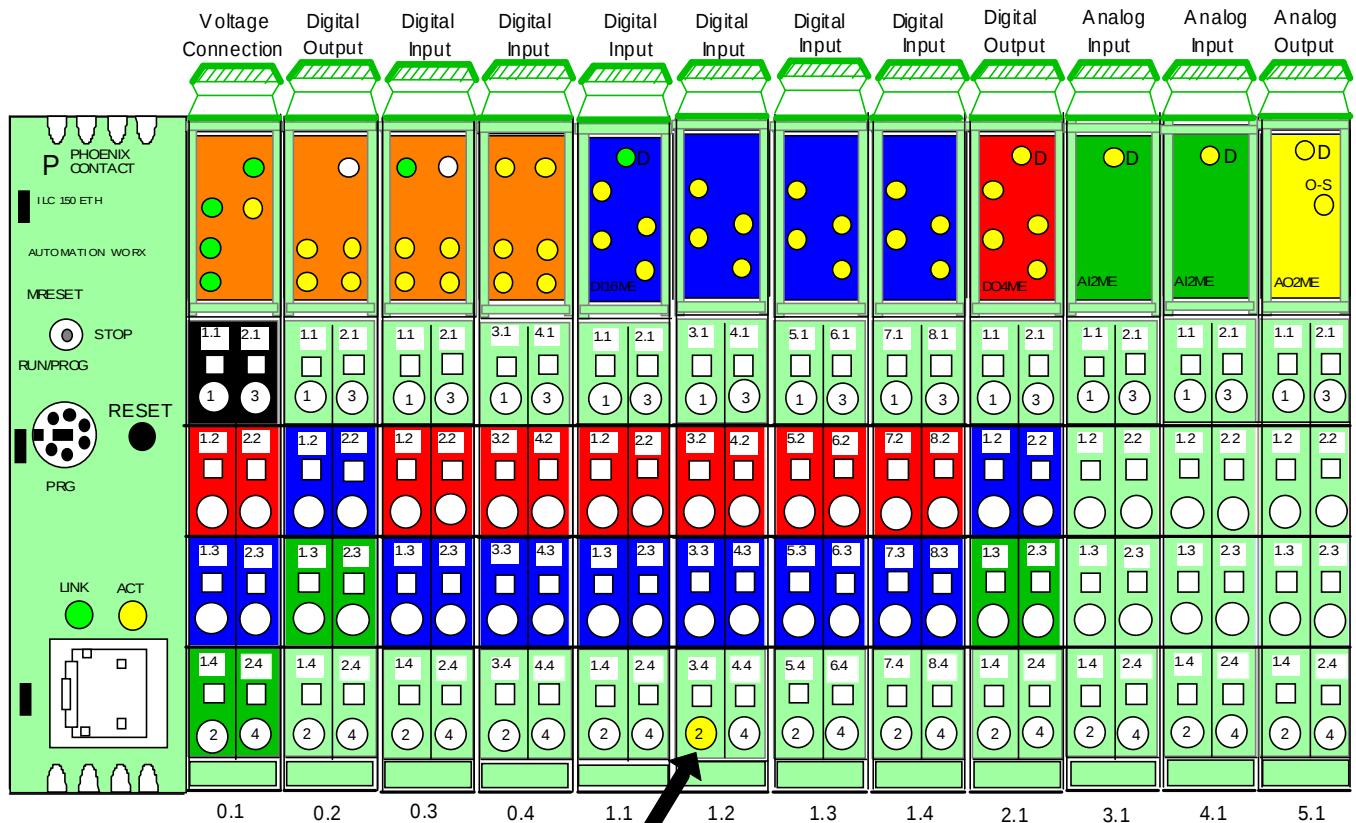
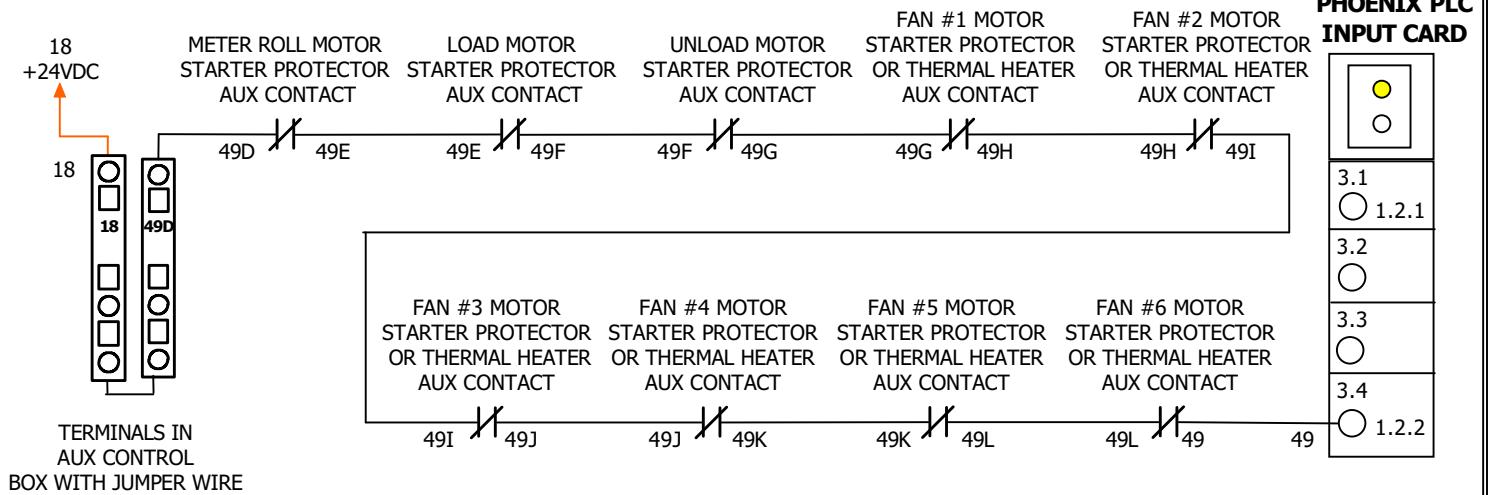
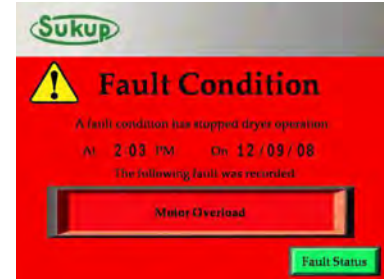
Revision: 4/9/13

QUADRA TOUCH

MOTOR OVERLOAD FAULT AND WIRING

1-6 FAN DRYERS

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



The yellow circle indicates the connection point for the door switches.

Title: 1 - 6 FAN: MOTOR OVERLOAD FAULT & WIRING

Author: SUKUP MFG CO

Date: 4/11

Sheet:

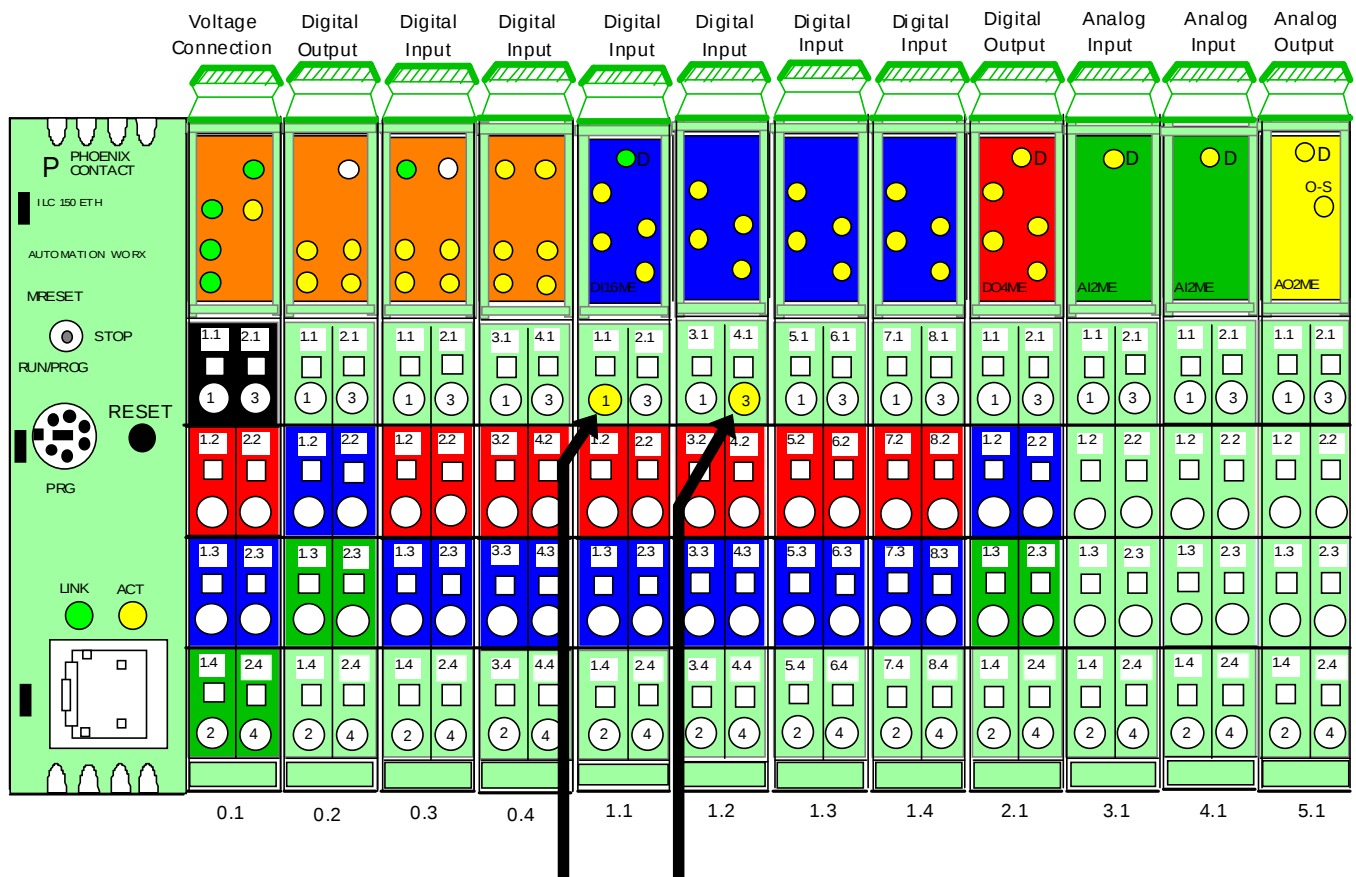
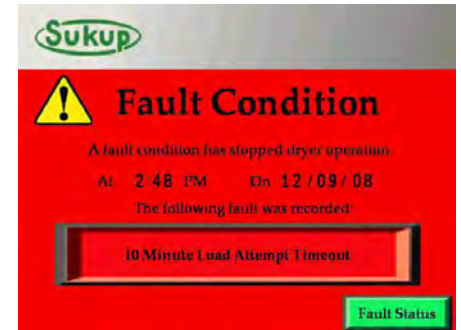
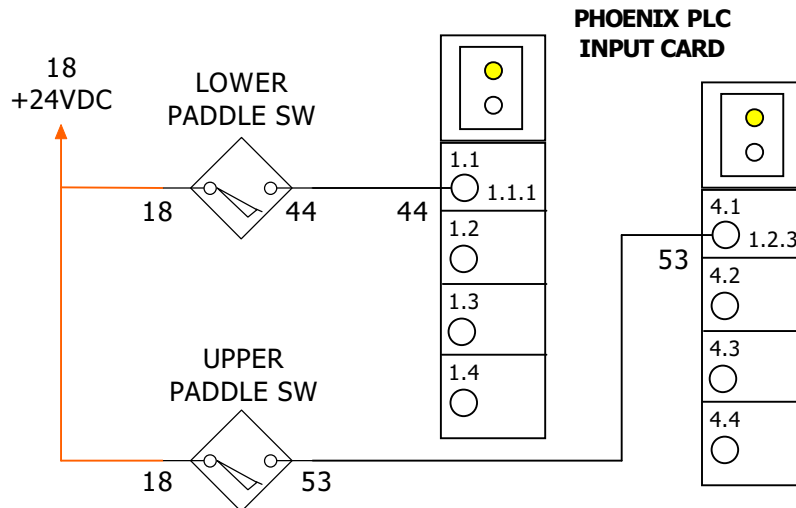
Revision: 4/9/13

QUADRA TOUCH

PADDLE SWITCH WIRING & 10 MIN OUT OF WET GRAIN FAULT.

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

1-6 FAN DRYERS



The yellow circles indicate the connection points for the lower and upper paddle switches.

Title: 1 - 6 FAN: PADDLE SWITCH WIRING & 10 MIN OUT OF WET GRAIN FAULT

Author: SUKUP MFG CO

Date: 4/11

Sheet:

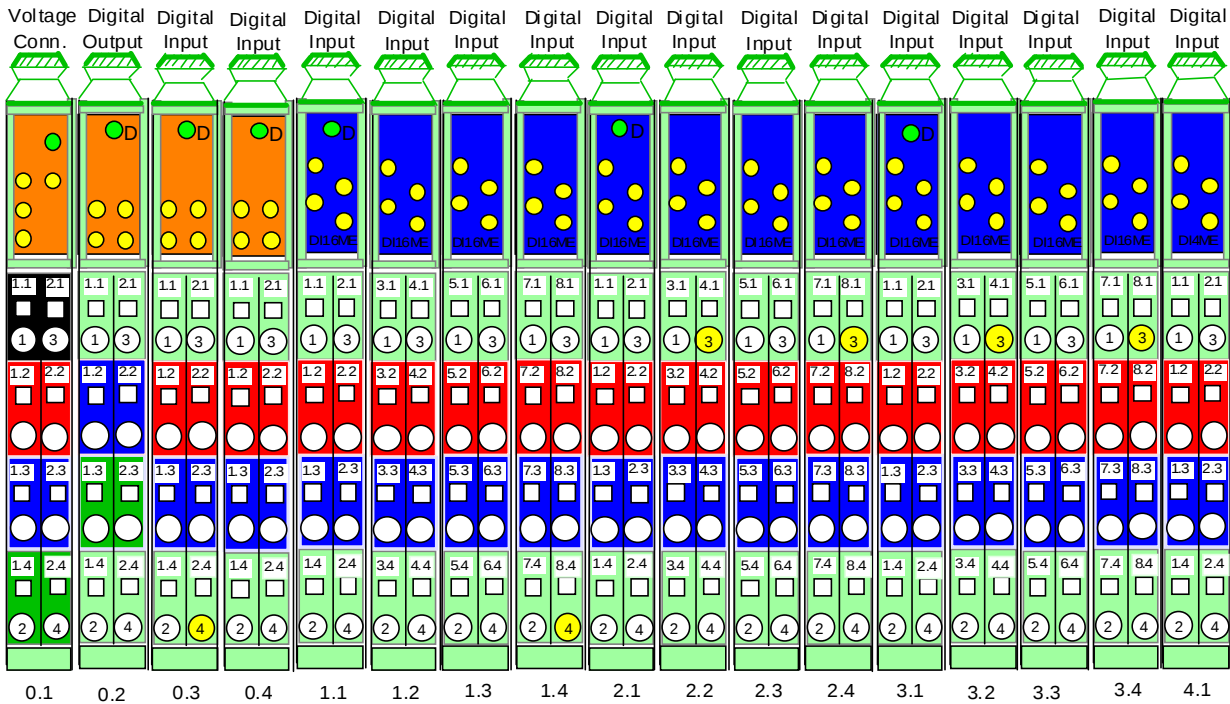
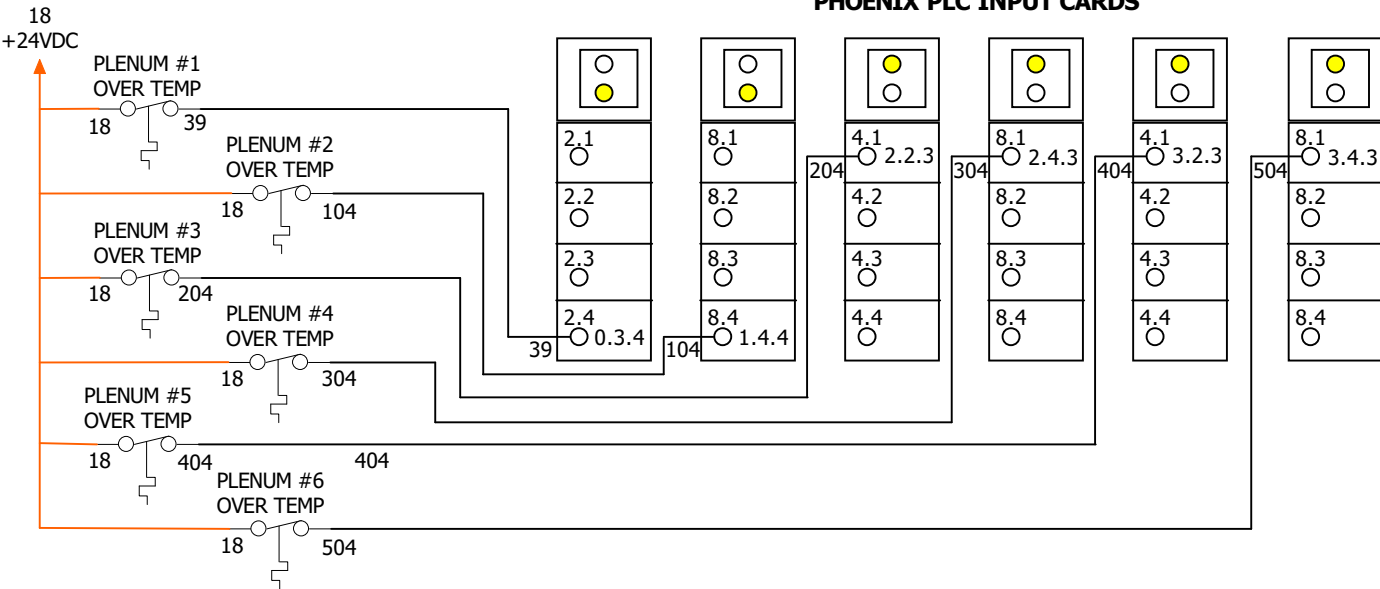
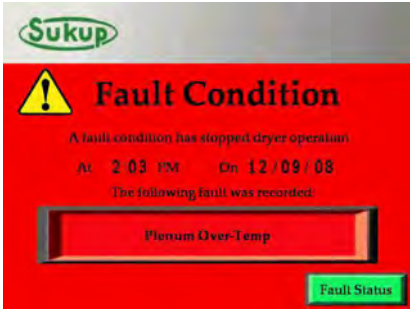
Revision: 4/9/13

QUADRA TOUCH

PLENUM OVER TEMPERATURE SENSOR

1-6 FAN DRYERS

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



The yellow circles indicate the connection points for the plenum O/T switches.

Title: 1 - 6 FAN: PLENUM O/T FAULT & WIRING	
Author: SUKUP MFG CO	
Date: 4/11	Sheet:
Revision: 4/9/13	QUADRA TOUCH

RTD SENSOR & TRANSMITTER WIRING

The RTD sensor and transmitter are used to sense plenum and grain column temperature. Grain column temperature is used in conjunction with the Autobatch option. The transmitter is installed in the RTD junction box on dryers built before May 2011. The transmitter is now installed in the 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

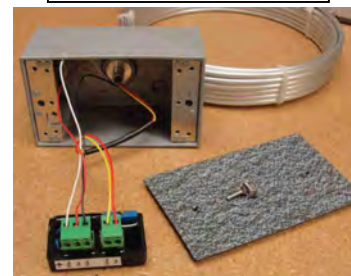
WHITE: 1-5VDC - SIGNAL VOLTAGE FROM RTD TRANSMITTER

WIRE NUMBER DEPENDS ON IT LOCATION

SHIELD: GND - SHOULD BE CONNECTED TO GROUND BAR IN POWER BOX

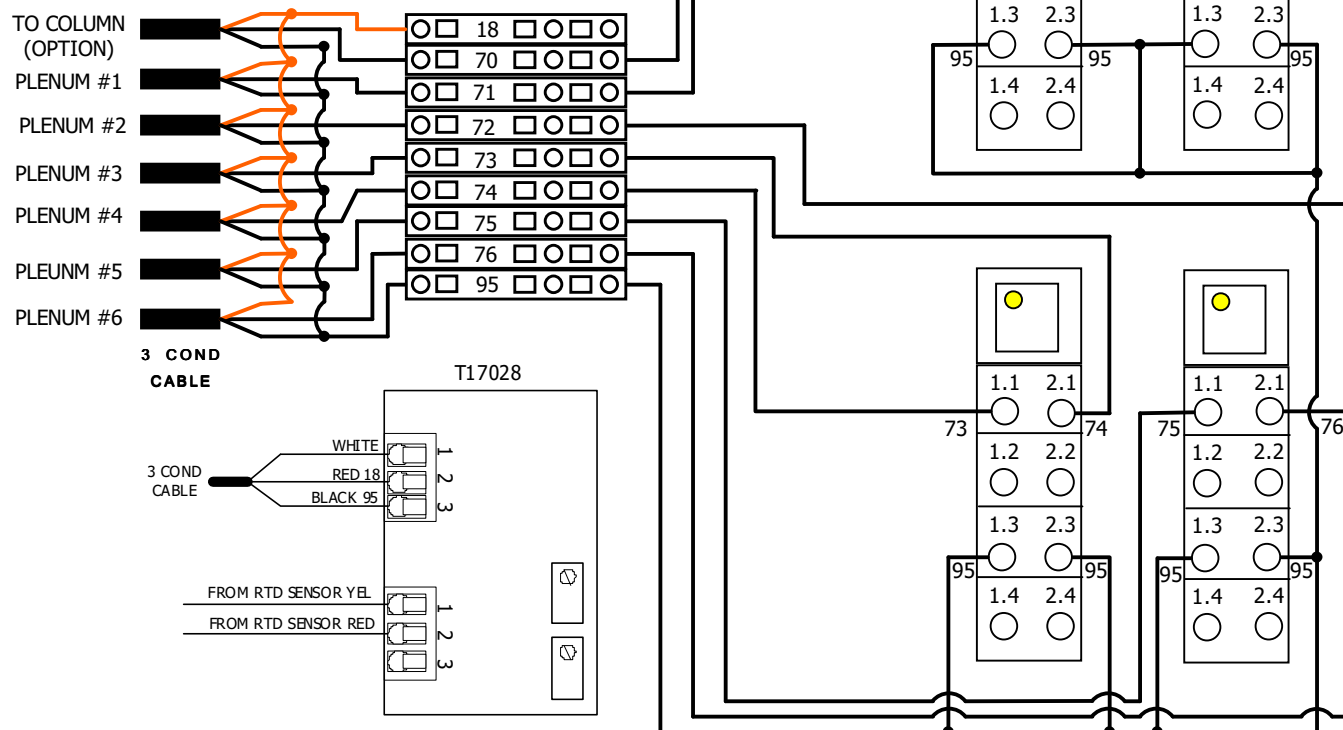
WIRE NUMBERS AND VOLTAGES:

1 - 6 FAN DRYERS



PHOENIX PLC
ANLOG INPUT CARDS

#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:	
70	4.1.3
71	3.1.1

# OF FANS	PLC INPUT #
2 FAN	
70	7.1.1
71	5.1.1
72	6.1.3

# OF FANS	PLC INPUT #
3/4 FAN:	
71	7.1.1
72	8.1.3
73	9.1.1
74	9.1.3

# OF FANS	PLC INPUT #
5/6 FAN	
71	9.1.1
72	10.1.3
73	11.1.1
74	11.1.3
75	12.1.1
76	12.1.3

REFER TO THE PAGE 2 FOR PLC
LAYOUT / CONNECTION POINTS

Title: 1 - 6 FAN: RTD & TRANSMITTER WIRING

Author: SUKUP MFG CO

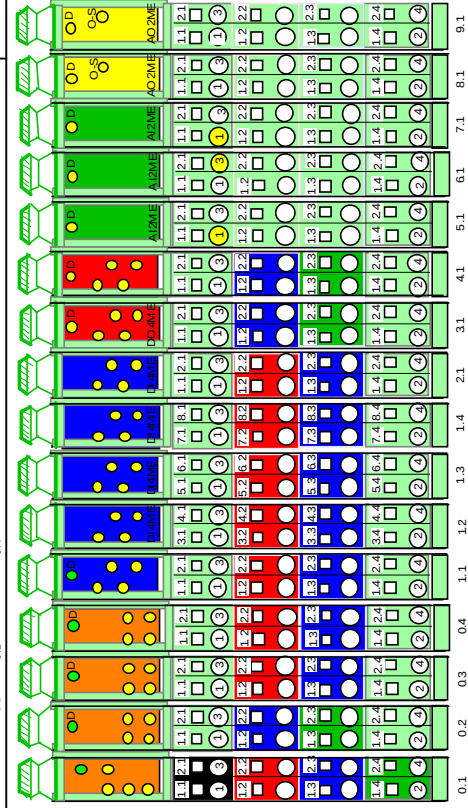
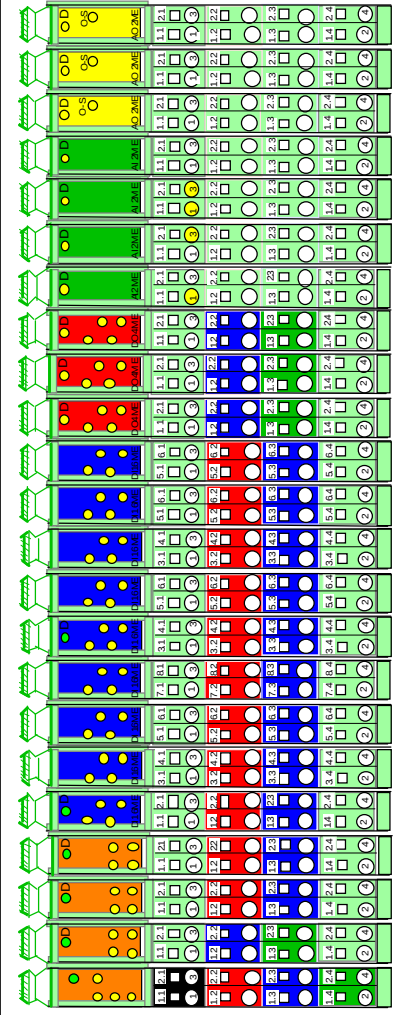
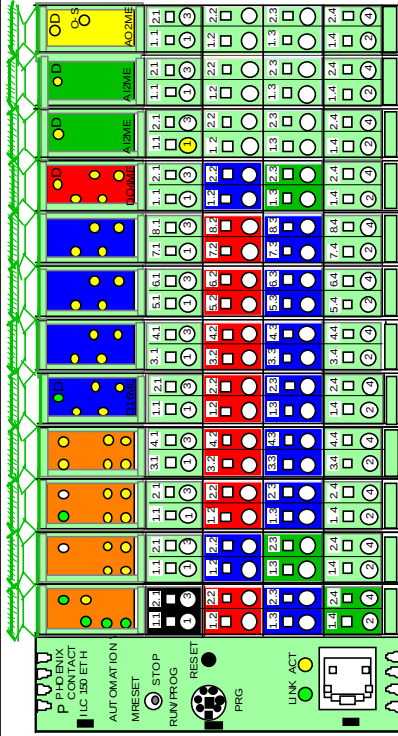
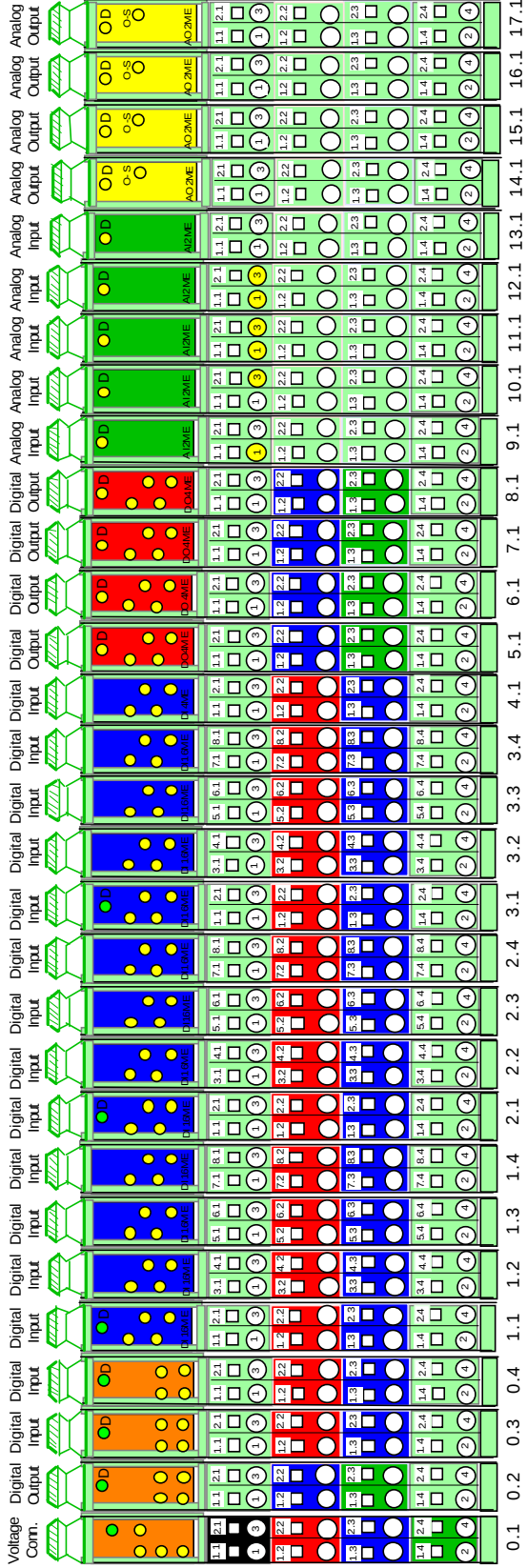
Date: 4/11

Sheet: 1 OF 2

Revision: 4/9/13

QUADRA TOUCH

1 - 6 FAN DRYERS



The yellow circles indicate the connection points for the moisture sensor temperature and moisture inputs.

Title: 1-6 FAN DRYERS: RTD & TRANSMITTER
PLC CONNECTION POINTS - CONT.

Author: SUKUP MFG

Date: 4/11

Sheet: 2 OF 2

Revision: 4/9/13

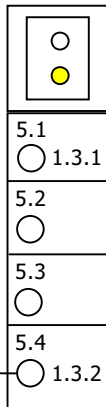
QUADRA TOUCH

UNLOAD PROXIMITY SWITCH

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

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

PHOENIX PLC INPUT CARD

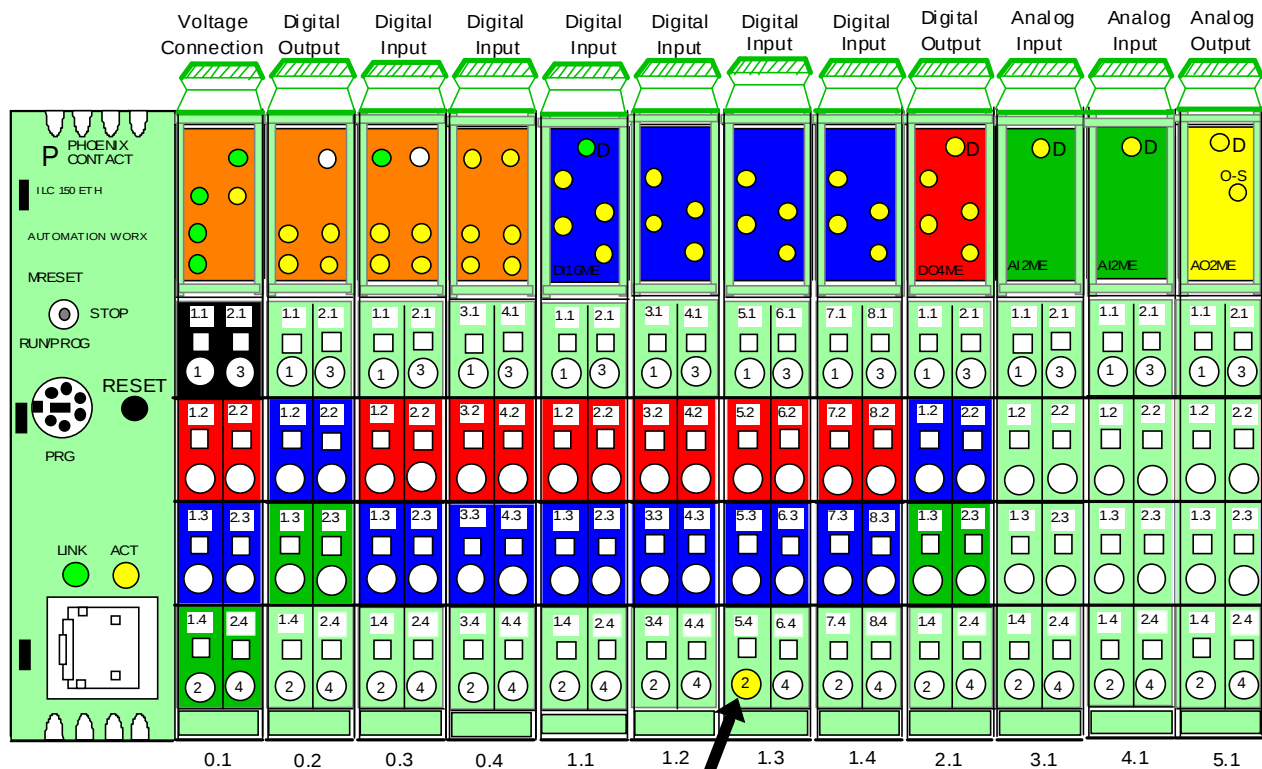
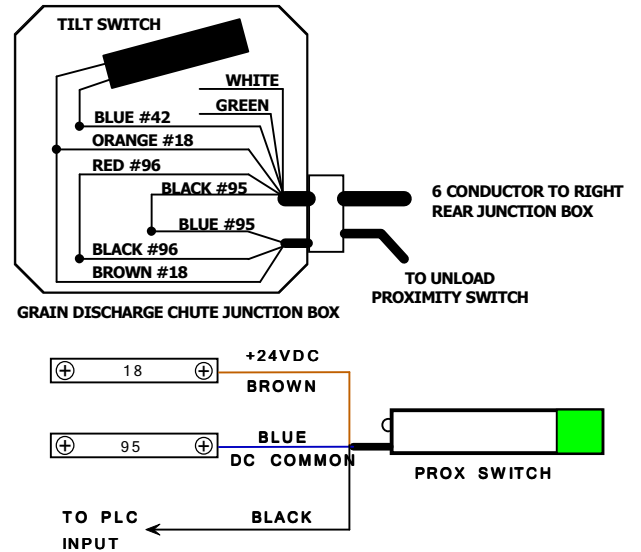
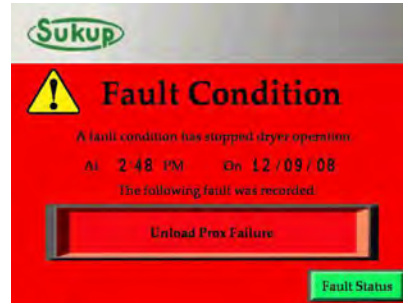


18
+24VDC

UNLOAD PROX SWITCH

18 96 96

1-6 FAN DRYERS



The yellow circle indicates the connection point for the unload auger proximity switch.

Title: 1 - 6 FAN: UNLOAD PROXIMITY SWITCH FAULT & WIRING

Author: SUKUP MFG CO

Date: 4/11

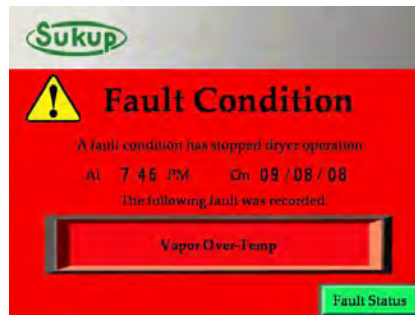
Sheet:

Revision: 4/9/13

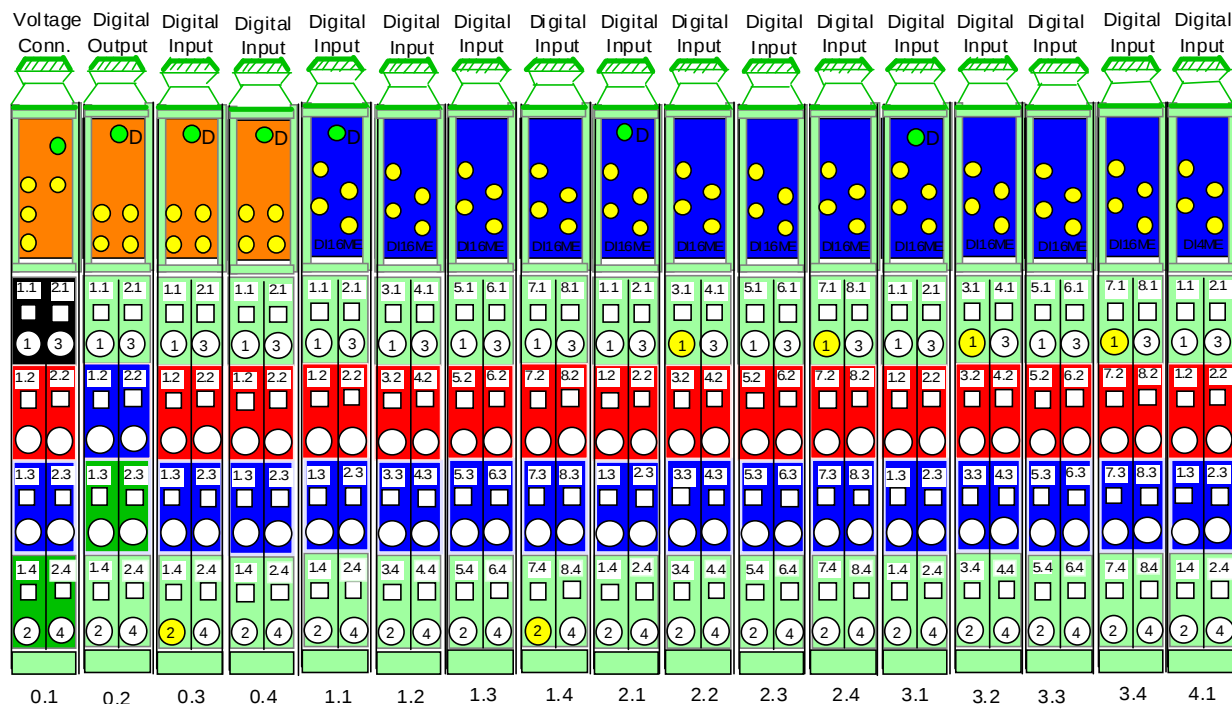
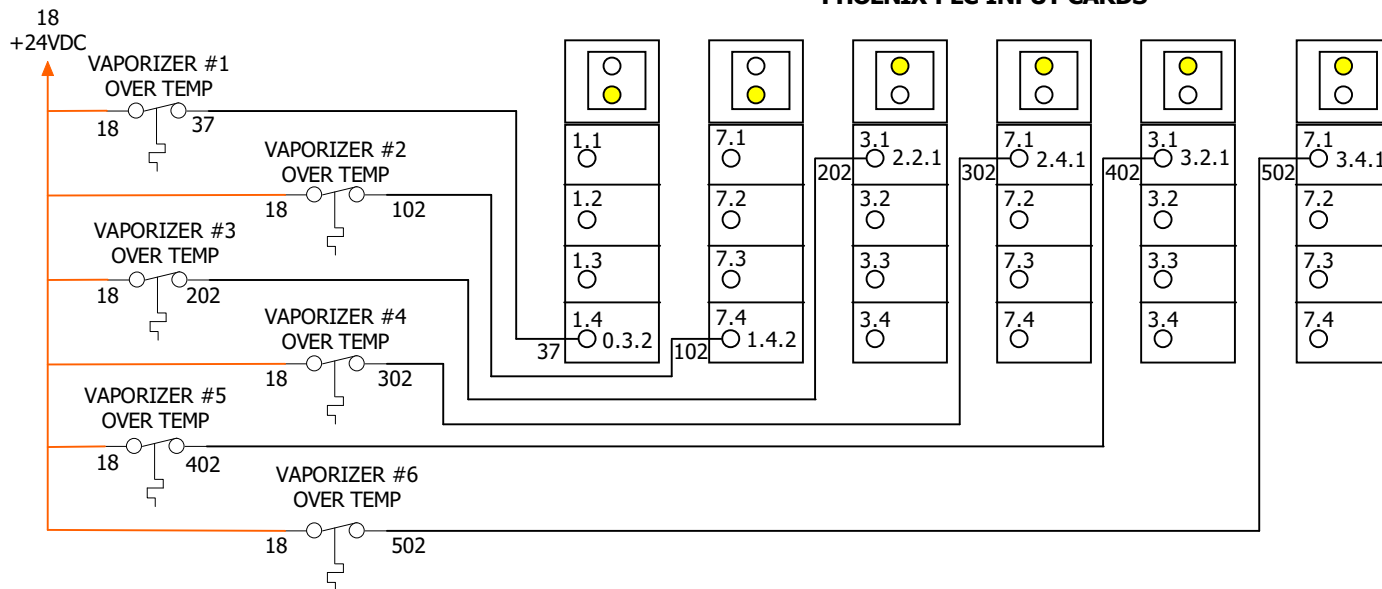
QUADRA TOUCH

VAPORIZER OVER TEMPERATURE SENSOR

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



PHOENIX PLC INPUT CARDS



The yellow circles indicate the connection points for vaporizer O/T switches.

Title: 1 - 6 FAN: VAPORIZER O/T FAULT & WIRING

Author: SUKUP MFG CO

Date: 4/11

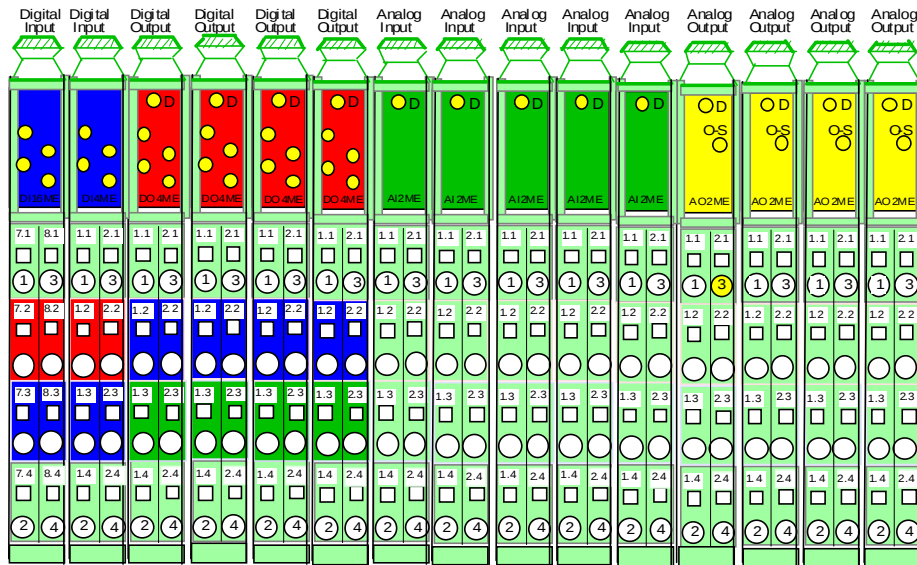
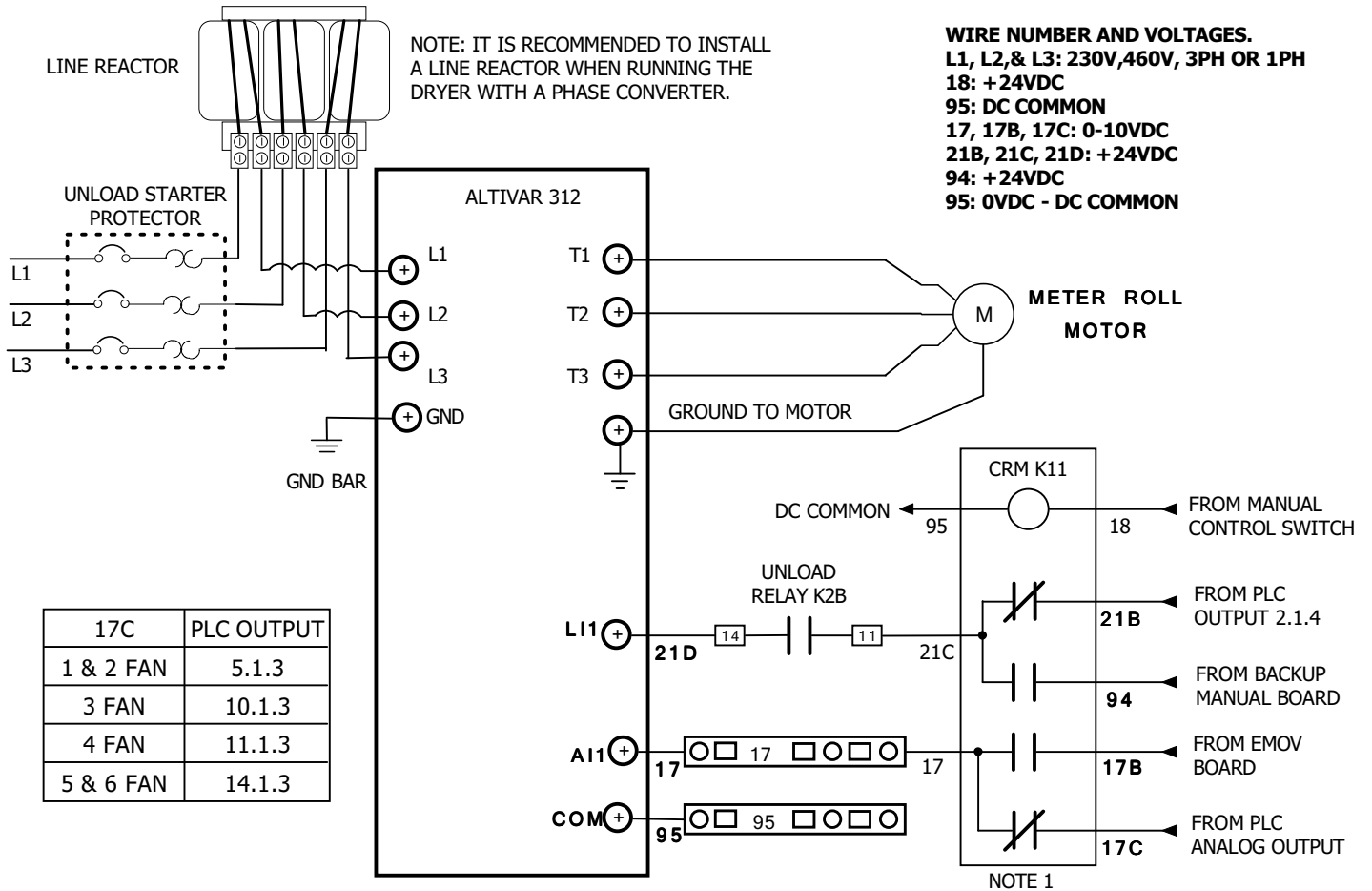
Sheet:

Revision: 4/9/13

QUADRA TOUCH

METER ROLL MOTOR VARIABLE AC DRIVE

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



The yellow circle indicates the connection point for 17C. The connection point is always on the first analog output card. The card will have a different location number depending on the number of fans.

□ - INDICATES RELAY SOCKET TERMINAL

NOTE: RELAY K11 IS LOCATED IN THE MANUAL BOX

Title: 1 - 6 FAN DRYERS: AC FREQ DRIVE WIRING

Author: SUKUP MFG CO

Date: 4/11

Sheet:

Revision: 4/9/13

QUADRA TOUCH

DISCHARGE MOISTURE SENSOR: YELLOW IDENTIFIER, USED FROM 2009 - PRESENT

The moisture sensor is located at the bottom of the discharge tube at the rear of the dryer. It will read the discharge moisture and temperature and send a voltage to the PLC. Adjustments to the meter roll speed will be made after comparing this information to the set point.

WIRE NUMBERS AND VOLTAGES:

#18: +24VDC

#95: 0VDC - DC COMMON

MOISTURE SENSOR CABLE VOLTAGES

RED: +24VDC - MAY ALSO BE LABELED 18

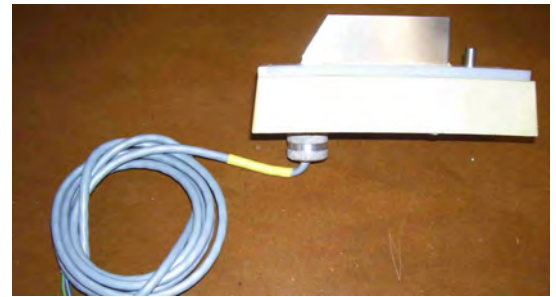
BLUE: 0-2VDC - VARIABLE: DEPENDS ON GRAIN TEMPERATURE
MAY ALSO BE LABELED D3

BLACK: 1-9.97VDC - VARIABLE: DEPENDS ON GRAIN MOISTURE.
MAY ALSO BE LABELED D4

GREEN & SHIELD: 0VDC - DC COMMON MAY BE LABELED 95

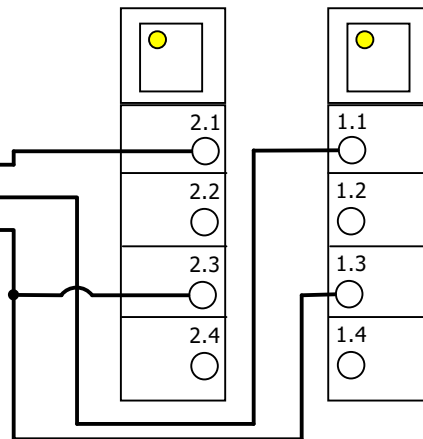
4 CONDUCTOR
SHIELDED CABLE TO
MOISTURE SENSOR

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



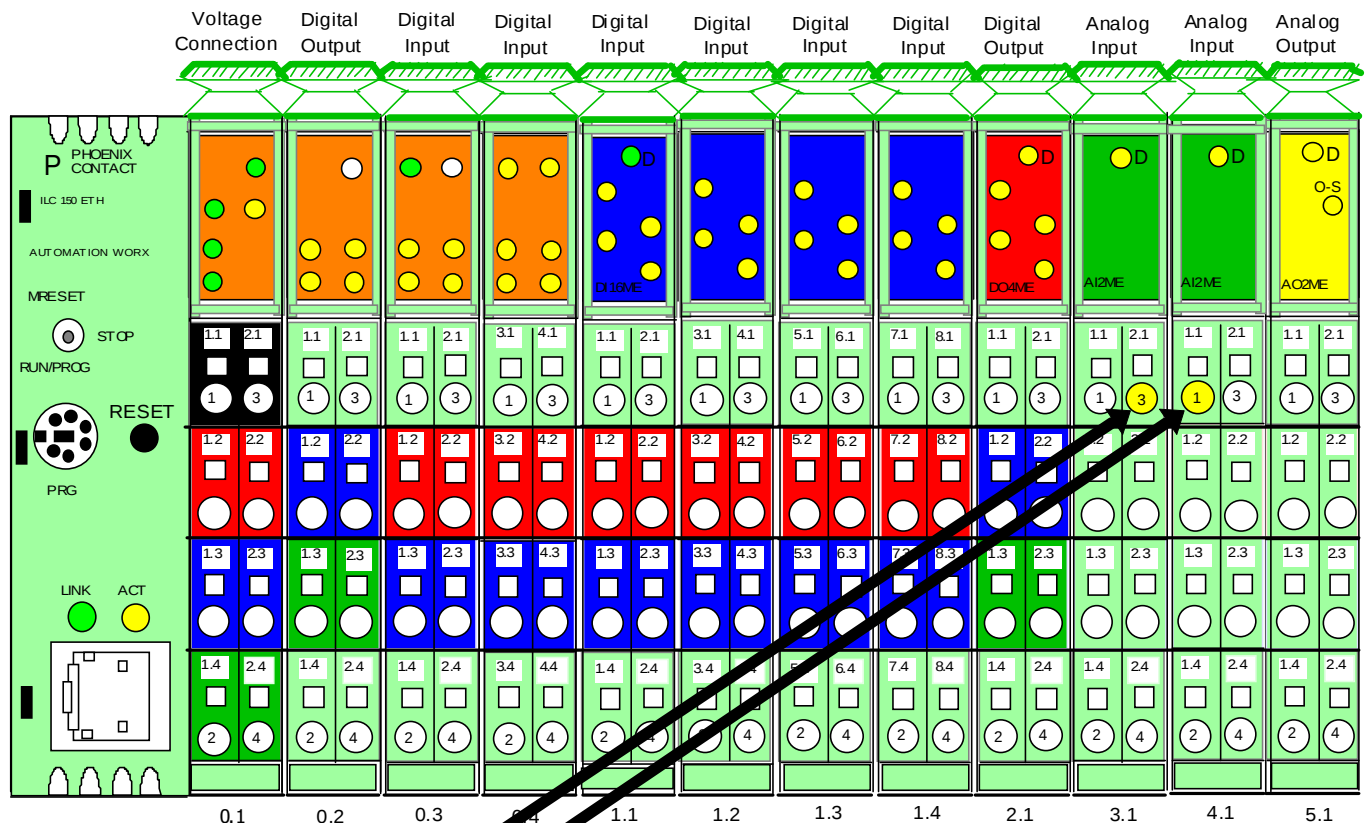
1 - 6 FAN DRYERS

PHOENIX PLC ANLOG 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



The yellow, or shaded circles indicate the connection points for the temperature & moisture inputs.

Title: 1 - 6 FAN YELLOW - DISCHARGE
MOISTURE SENSOR

Author: SUKUP MFG CO

Date: 4/11

Sheet:

Revision: 4/9/13

QUADRA TOUCH



Automatic Centrifugal Grain Dryer

QuadraTouch™ Dryer Control System

Appendices

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Appendix A

Specifications

Estimated bushels per hour

Unload time

Dryer holding capacities

Bushels Per Hour Information

		APPROXIMATE BUSHEL PER HOUR FOR EACH MODULE							
		Dryer Length and Number of Modules							
		16 Foot 1 Mod.	20 Foot 1 Mod.	24 Foot 1 Mod.	16 Foot 2 Mod.	20 Foot 2 Mod.	24 Foot 2 Mod.	20 Foot 3 Mod.	24 Foot 3 Mod.
M E T E R R O L L	10%	160	200	240	240	300	360	300	360
	20%	320	400	480	480	600	720	600	720
	30%	480	600	720	720	900	1,080	900	1,080
	40%	640	800	960	960	1,200	1,440	1,200	1,440
	50%	800	1,000	1,200	1,200	1,500	1,800	1,500	1,800
	60%	960	1,200	1,440	1,440	1,800	2,160	1,800	2,160
	70%	1,120	1,400	1,680	1,680	2,100	2,520	2,100	2,520
	80%	1,280	1,600	1,920	1,920	2,400	2,880	2,400	2,880
	90%	1,440	1,800	2,160	2,160	2,700	3,240	2,700	3,240
	100%	1,600	2,000	2,400	2,400	3,000	3,600	3,000	3,600

BPH 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.

		DETERMINING METER ROLL SPEED PERCENTAGE						
Desired Points of Moisture Removed		Plenum Temperature						
		160 °F	170 °F	180 °F	190 °F	200 °F	210 °F	220 °F
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 Size	Holding Capacity
16 ft.	440 bu.
20 ft.	550 bu.
24 ft.	660 bu.
28 ft.	770 bu.

Appendix B

Electrical Requirements

Single-phase dryers

Single plenum

Two plenum

Three plenum

Three-phase dryers

Single plenum

Two plenum

Three plenum

Electrical Load Requirements, SINGLE-PHASE Centrifugal Dryers

NOTE: A Service-Rated Fused Disconnect needs to be installed ahead of dryer power distribution box. This disconnect is not included with dryer and should be installed by a qualified electrician.



CAUTION: Grain dryer should be only device connected to this disconnect.

NOTE: All current specifications include the Service Factor.

The following tables 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 dryer.

Standard electrical safety practices and codes should be used. Refer to the National Electrical Code Standard Handbook by the National Fire Protection Association.

All electrical work should be completed by a qualified electrician.

SINGLE-PHASE SINGLE PLENUM MODELS

**TC1611B or TC1612B – 16 Foot Dryer, Single Fan/Heater, LP or NG, 230 Volt, 1 Phase
Main Switch = 400 Amps**

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP / #10 19 FLA	3 HP / #10 19 FLA	30 HP / #4 165.6 FLA	203.6 Amps	400 Amps

**TC2011B or TC2012B – 20 Foot Dryer, Single Fan/Heater, LP or NG, 230 Volt, 1 Phase
Main Switch = 400 Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP / #10 20.5 FLA	5 HP / #10 20.5 FLA	40 HP / #2 240 FLA	281 Amps	400 Amps

**TC2411B or TC2412B – 24 Foot Dryer, Single Fan/Heater, LP or NG, 317 Volt, 1 Phase
Main Switch = 400 Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP / #10 20.5 FLA	5 HP / #10 20.5 FLA	50 HP / 1/0 276 FLA	317 Amps	600 Amps

NOTE: Fan motor is 3 phase, but the above chart indicates the single-phase current requirement.

NOTE: Auxiliary Load and Unload Kits are available. See Appendix C for correct kit number.

SINGLE-PHASE TWO PLENUM MODELS

TC1631B or TC1632B – 16 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, LP or NG, 230Volt, 1 Phase, Main Switch = 400Amps

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP/ #10 19 FLA	3 HP/ #10 19 FLA	30 HP/ #4 165.6 FLA	203.6 Amps	400 Amps

TC2031B or TC2032B – 20 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, LP or NG, 230Volt, 1 Phase, Main Switch = 400 Amps

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 20.5 FLA	5 HP/ #10 20.5 FLA	40 HP/ #2 240 FLA	281 Amps	400 Amps

TC2431B or TC2432B – 24 Foot Dryer, 1 Fan/Heater, 2/3 – 1/3 Plenum, LP or NG, 230Volt, 1 Phase, Main Switch = 600Amps

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 20.5 FLA	5 HP/ #10 20.5 FLA	50 HP/ 1/0 276 FLA	317 Amps	600 Amps

SINGLE-PHASE THREE PLENUM MODELS – TWO MODULE STACKED

TC1651B or TC1652B – 16 Foot Dryer – 2 Fan / 2 Heater, LP or NG, 230 Volt – 1 Phase
Main Switch = 600 Amps

	Top Auger H3345	Bottom Auger H3345	Upper Fan H7125	Lower Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP/ #10 19 FLA	3 HP/ #10 19 FLA	30 HP/ #4 165.6 FLA	30 HP/ #4 165.6 FLA	369.2 Amps	600 Amps

TC2051B OR TC2052C – 20 Foot Dryer – 2 Fan / 2 Heater, LP OR NG 230 Volt – 1 Phase
Main Switch = 800 Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7175	Lower Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 20.5 FLA	5 HP/ #10 20.5 FLA	40 HP/ #2 240 FLA	40 HP/ #2 240 FLA	521 Amps	800 Amps

TC2451B or TC2452B – 24 Foot Dryer – 2 Fan / Heater, LP or NG, 230V – 1 Phase
Main Switch = 800 Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7205	Lower Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 20.5 FLA	5 HP/ #10 20.5 FLA	50 HP/ 1/0 276 FLA	50 HP/ 1/0 276 FLA	593 Amps	800 Amps

NOTE: Fan motor is 3 phase, but the above chart indicates the single-phase current requirement.

NOTE: Auxiliary Load and Unload Kits are available. See Appendix C for correct kit number.

Electrical Load Requirements, THREE-PHASE Centrifugal Dryers

NOTE: A Service-Rated Fused Disconnect needs to be installed ahead of dryer power distribution box. This disconnect is not included with dryer and should be installed by a qualified electrician.



CAUTION: Grain dryer should be only device connected to this disconnect.

NOTE: All current specifications include the Service Factor.

The following tables 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 dryer.

Standard electrical safety practices and codes should be used. Refer to the National Electrical Code Standard Handbook by the National Fire Protection Association.

All electrical work should be completed by a qualified electrician.

THREE-PHASE SINGLE PLENUM MODELS

TC1611B or TC1612B – 16 Foot Dryer, Single Fan/Heater, LP or NG, 230 Volt, 3 Phase
Main Switch = 250 Amps

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP / #10 8.2 FLA	3 HP / #10 8.2 FLA	30 HP / #4 72 FLA	88.4 Amps	250 Amps

TC1611C or TC1612C – 16 Foot Dryer, Single Fan/Heater, LP or NG, 460 Volt, 3 Phase
Main Switch = 250 Amps

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP / #10 4.1 FLA	3 HP / #10 4.1 FLA	30 HP / #6 36 FLA	44.2 Amps	250 Amps

TC2011B or TC2012B – 20 Foot Dryer, Single Fan/Heater, LP or NG, 230 Volt, 3 Phase
Main Switch = 250 Amps

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP / #10 13 FLA	5 HP / #10 13 FLA	40 HP / #2 96FLA	122 Amps	250 Amps

TC2011C or TC2012C – 20 Foot Dryer, Single Fan/Heater, LP or NG, 460 Volt, 3 Phase
Main Switch = 250 Amps

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP / #10 6.5 FLA	5 HP / #10 6.5 FLA	40 HP / #6 48 FLA	61 Amps	250 Amps

TC2411B or TC2412B – 24 Foot Dryer, Single Fan/Heater, LP or NG, 230 Volt, 3 Phase
Main Switch = 400 Amps

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP / #10 13 FLA	5 HP / #10 13 FLA	50 HP / 1/0 120 FLA	146 Amps	400 Amps

NOTE: Auxiliary Load and Unload Kits are available. See Appendix C for correct kit number.

THREE-PHASE SINGLE PLENUM MODELS (continued)**TC2411C or TC2412C – 24 Foot Dryer, Single Fan/Heater, LP or NG, 460 Volt, 3 Phase****Main Switch = 250 Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 6.5 FLA	5 HP/ #10 6.5 FLA	50HP/ #4 60 FLA	73 Amps	250 Amps

THREE-PHASE TWO PLENUM MODELS**TC1631B or TC1632B – 16 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 230 Volt, 3 Phase,****Main Switch = 250Amps**

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP/ #10 8.2 FLA	3 HP/ #10 8.2 FLA	30 HP/ #4 72 FLA	88.4 Amps	250 Amps

TC1631C or TC1632C – 16 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 460Volt, 3 Phase,**Main Switch = 250 Amps**

	Top Auger H3345	Bottom Auger H3345	Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	3 HP/ #10 4.1 FLA	3 HP/ #10 4.1 FLA	30 HP/ #6 36 FLA	44.2 Amps	250 Amps

TC2031B or TC2032B – 20 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 230Volt, 3 Phase,**Main Switch = 250 Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 13 FLA	5 HP/ #10 13 FLA	40 HP/ #2 96 FLA	122 Amps	250 Amps

TC2031C or TC2032C – 20 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 460Volt, 3 Phase,**Main Switch = 250Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 6.5 FLA	5 HP/ #10 6.5 FLA	40 HP/ #6 48 FLA	61 Amps	250 Amps

TC2431B or TC2432B – 24 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 230Volt, 3 Phase,**Main Switch = 400Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 13 FLA	5 HP/ #10 13 FLA	50 HP/ 1/0 120 FLA	146 Amps	400 Amps

TC2431C or TC2432C – 24 Foot Dryer, 1 Fan/Heater, 2/3 - 1/3 Plenum, LP or NG, 460Volt, 3 Phase,**Main Switch = 250 Amps**

	Top Auger H4190	Bottom Auger H4190	Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 6.5 FLA	5 HP/ #10 6.5 FLA	50 HP/ #4 60 FLA	73 Amps	250 Amps

NOTE: Auxiliary Load and Unload Kits are available. See Appendix C for correct kit number.

THREE-PHASE THREE PLENUM MODELS – TWO MODULE STACKED

TC1651B or TC1652B – 16 Foot Dryer – 2 Fan / 2 Heater, LP or NG, 230 Volt – 3 Phase
Main Switch = 400 Amps

	Top Auger H3345	Bottom Auger H3345	Upper Fan H7125	Lower Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire /Amps	3 HP/ #10 8.2 FLA	3 HP/ #10 8.2 FLA	30 HP/ #4 72 FLA	30 HP/ #4 72 FLA	160.4 Amps	400 Amps

TC1651C or TC1652C – 16 Foot Dryer – 2 Fan / 2 Heater, LP or NG, 460 Volt – 3 Phase
Main Switch = 250 Amps

	Top Auger H3345	Bottom Auger H3345	Upper Fan H7125	Lower Fan H7125	Minimum Amps	Maximum Amps
Motor/Wire /Amps	3 HP/ #10 4.1 FLA	3 HP/ #10 4.1 FLA	30 HP/ #6 36 FLA	30 HP/ #6 36 FLA	80.2 Amps	250 Amps

TC2051B OR TC2052C – 20 Foot Dryer – 2 Fan / 2 Heater, LP OR NG 230 Volt – 3 Phase
Main Switch = 400 Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7175	Lower Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire /Amps	5 HP/ #10 13 FLA	5 HP/ #10 13 FLA	40 HP/ #2 96 FLA	40 HP/ #2 96 FLA	218 Amps	400 Amps

TC2051C or TC2052C – 20 Foot Dryer – 2 Fan / 2 Heater, LP or NG, 460 Volt – 3 Phase
Main Switch = 250 Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7175	Fan H7175	Minimum Amps	Maximum Amps
Motor/Wire /Amps	5 HP/ #10 6.5 FLA	5HP/ #10 6.5 FLA	40 HP/ #6 48 FLA	40 HP/ #6 48 FLA	109 Amps	250 Amps

TC2451B or TC2452B – 24 Foot Dryer – 2 Fan / Heater, LP or NG, 230Volt – 3 Phase
Main Switch = 400 Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7205	Lower Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire/ Amps	5 HP/ #10 13 FLA	5 HP/ #10 13 FLA	50 HP/ 1/0 120 FLA	50 HP/ 1/0 120 FLA	266 Amps	400 Amps

TC2451C or TC2452C – 24 Foot Dryer – 2 Fan / Heater, LP or NG, 460Volt – 3 Phase
Main Switch = 250Amps

	Top Auger H4190	Bottom Auger H4190	Upper Fan H7205	Lower Fan H7205	Minimum Amps	Maximum Amps
Motor/Wire /Amps	5 HP/ #10 6.5 FLA	5 HP/ #10 6.5 FLA	50 HP/ #4 60 FLA	50 HP/ #4 60 FLA	133 Amps	250 Amps

NOTE: Auxiliary Load and Unload Kits are available. See Appendix C for correct kit number.

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	Contactor	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	Contactor	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.

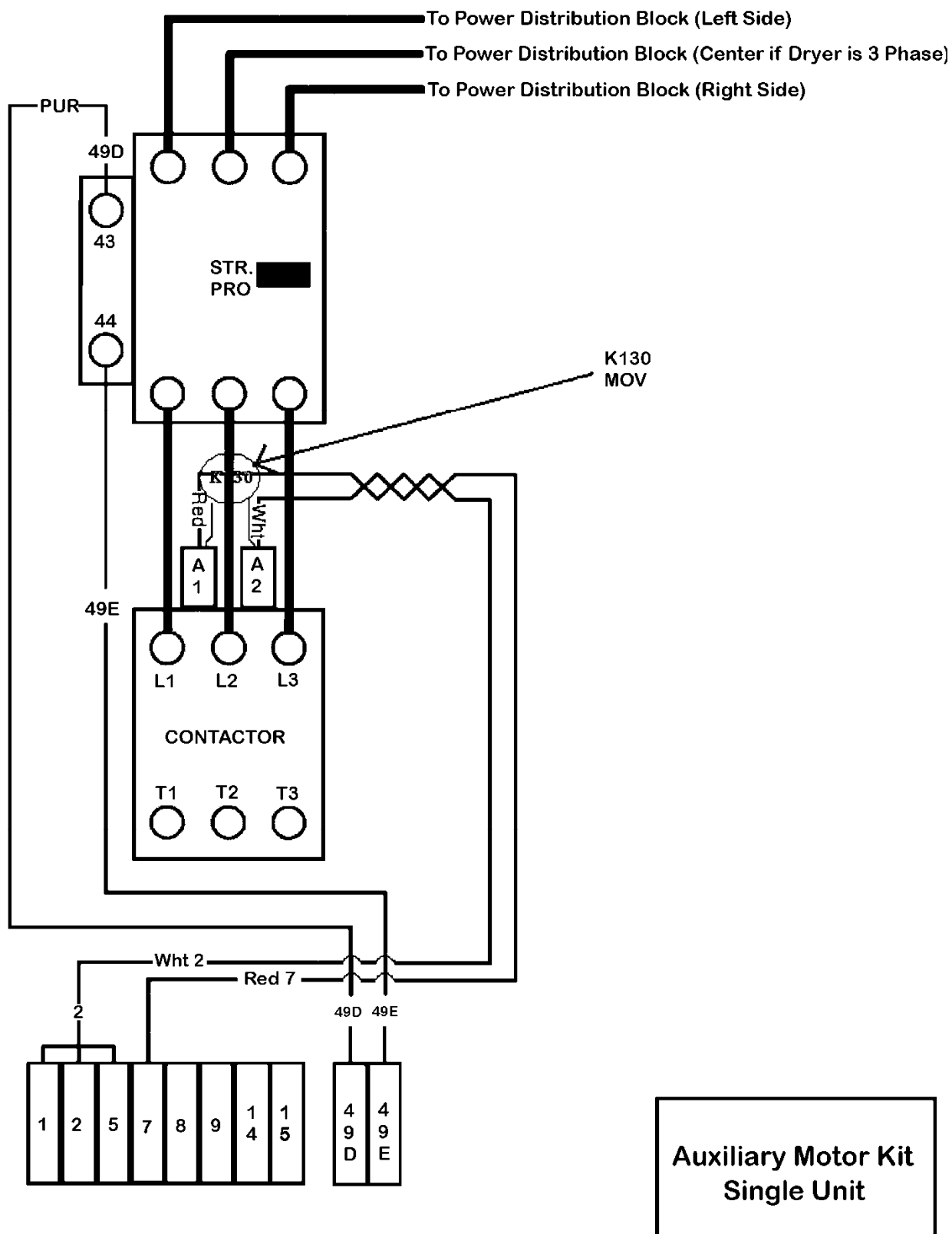
Temperature Compensated Overloads, 3-Phase Units

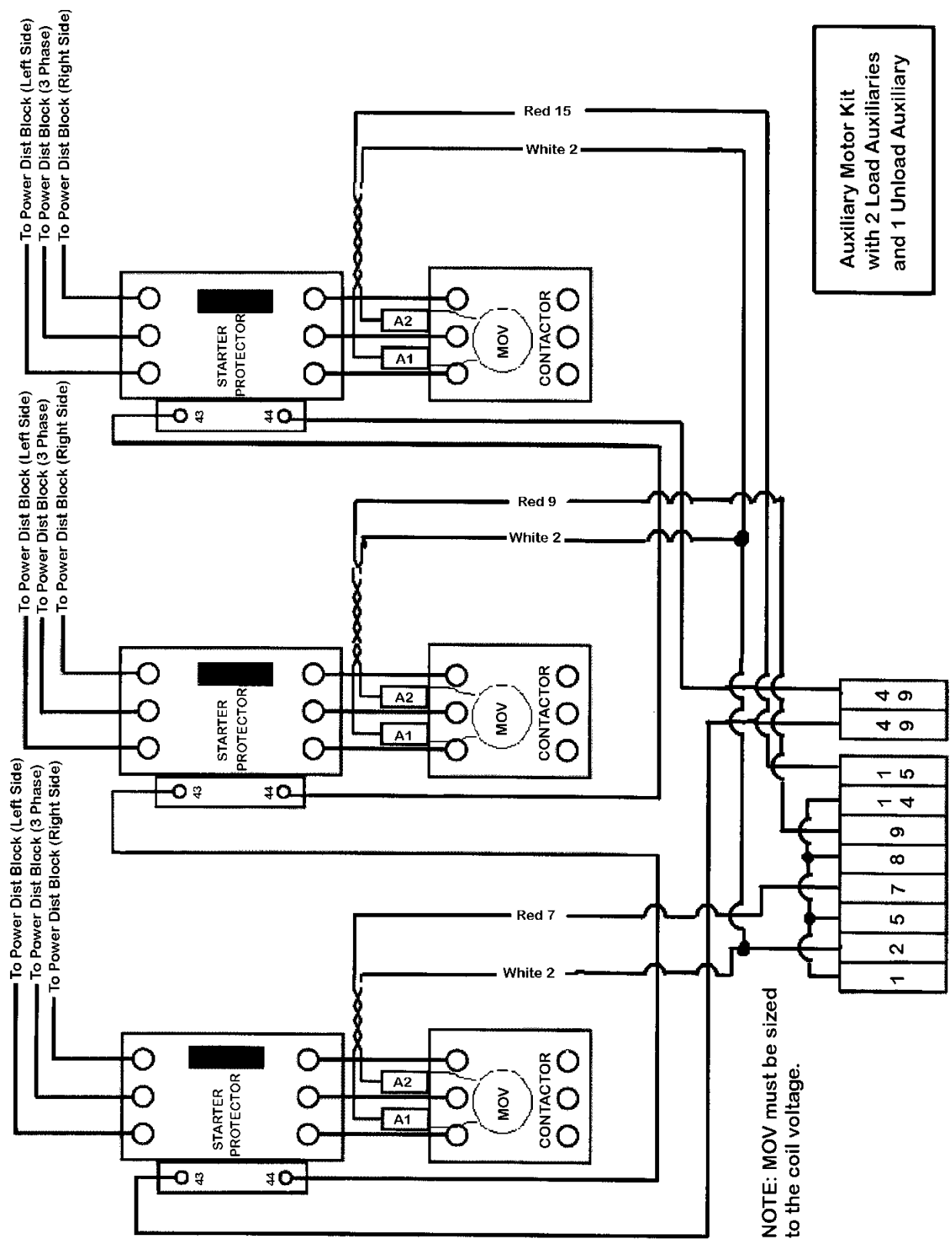
All dryers manufactured as three-phase units are equipped with temperature-compensated overloads. If auxiliary load and unload kits are installed and not purchased from Sukup Manufacturing Co., it is recommended that temperature-compensated units be used.

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)

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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Dryer Aspirator Component Instructions

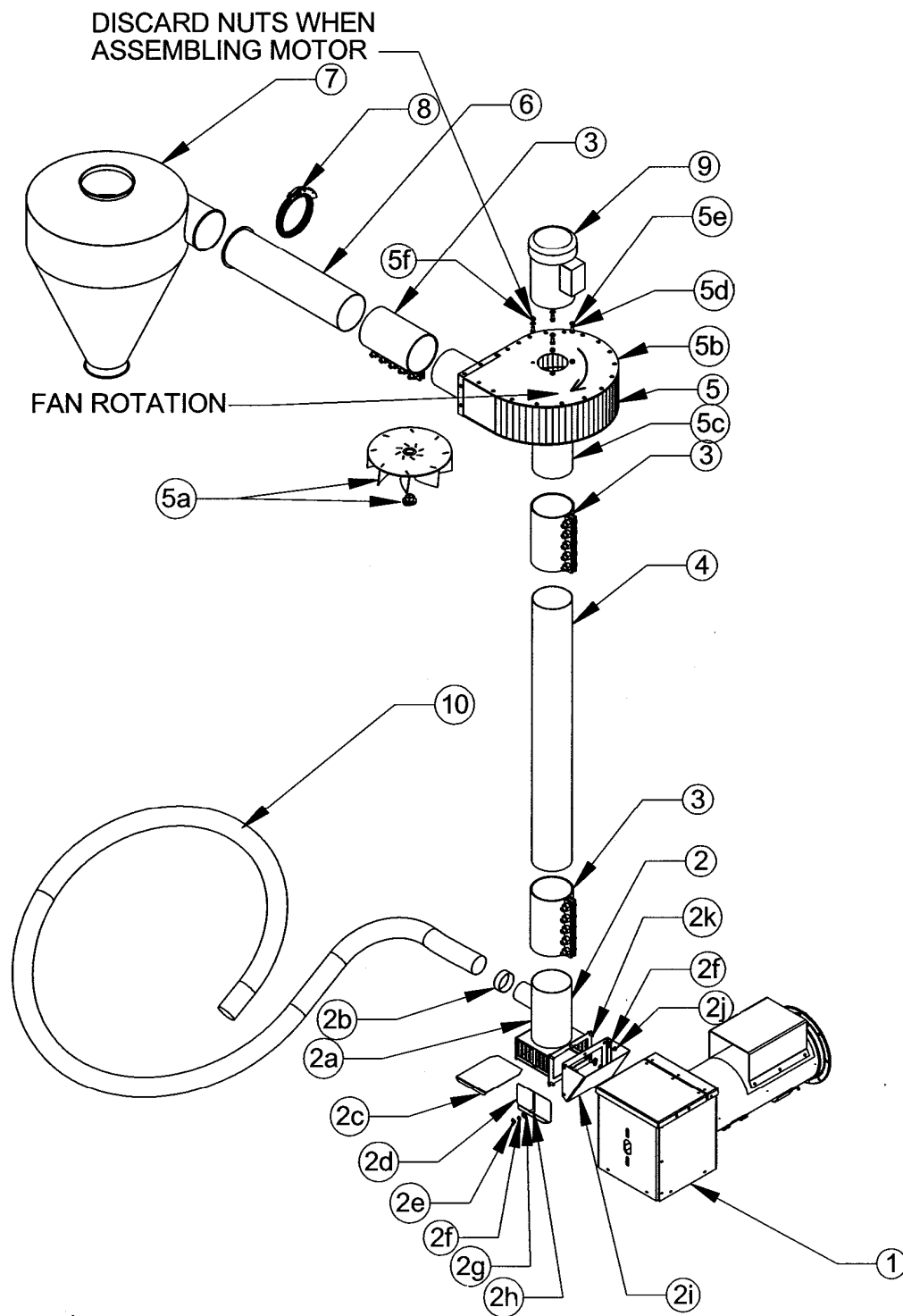
Assembly

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

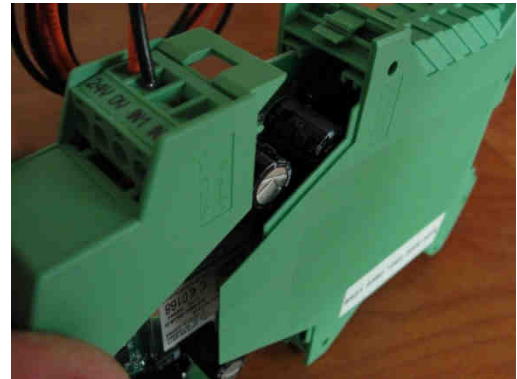
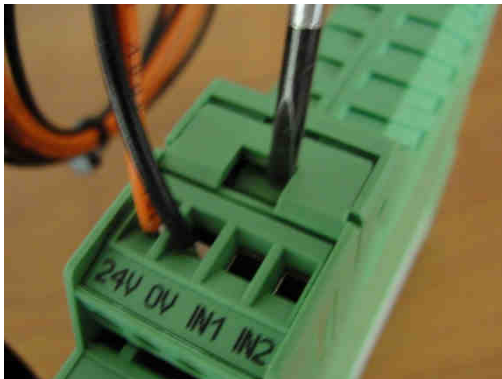
REF. #	DESCRIPTION	QTY.	COMP. #
1	Dryer outlet tube	1	T25670-A
2	Aspirator base assembly	1	D9585
2a	Aspirator base weldment	1	D9586
2b	Cap, 3"	1	J7535
2c	Plate, clean-up	1	D9588
2d	Plate, restrictor	2	D9587
2e	5/16" Wing nut	2	J1005
2f	5/16" Lock washer	8	J1200
2g	5/16" Flat washer	2	J1111
2h	5/16 x 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 it's 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.

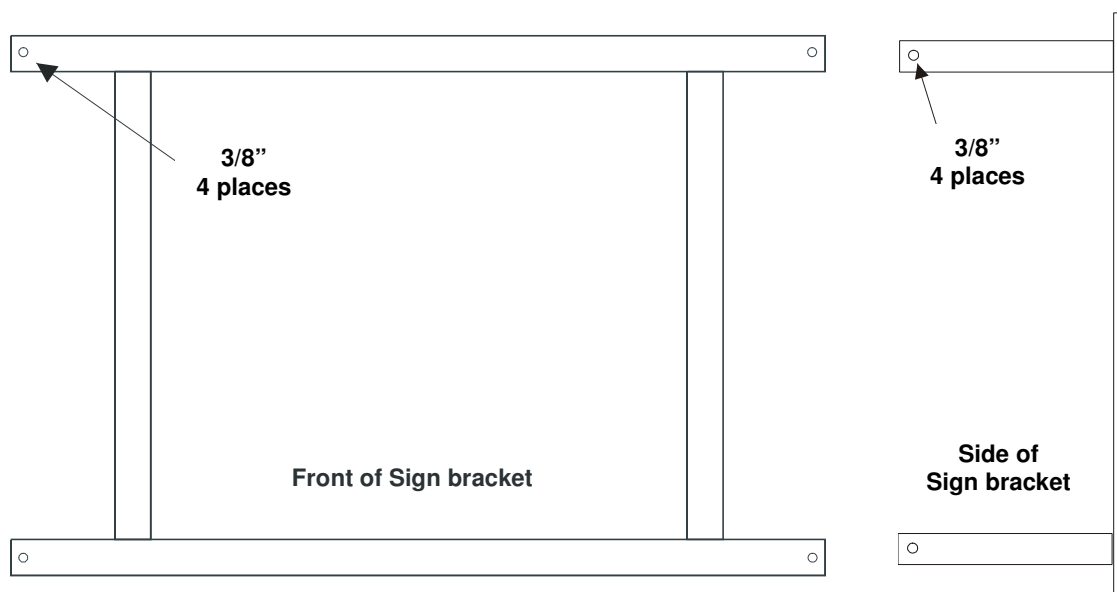
Example: "MST145" would give the dryer a new setpoint of 14.5%.

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 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.

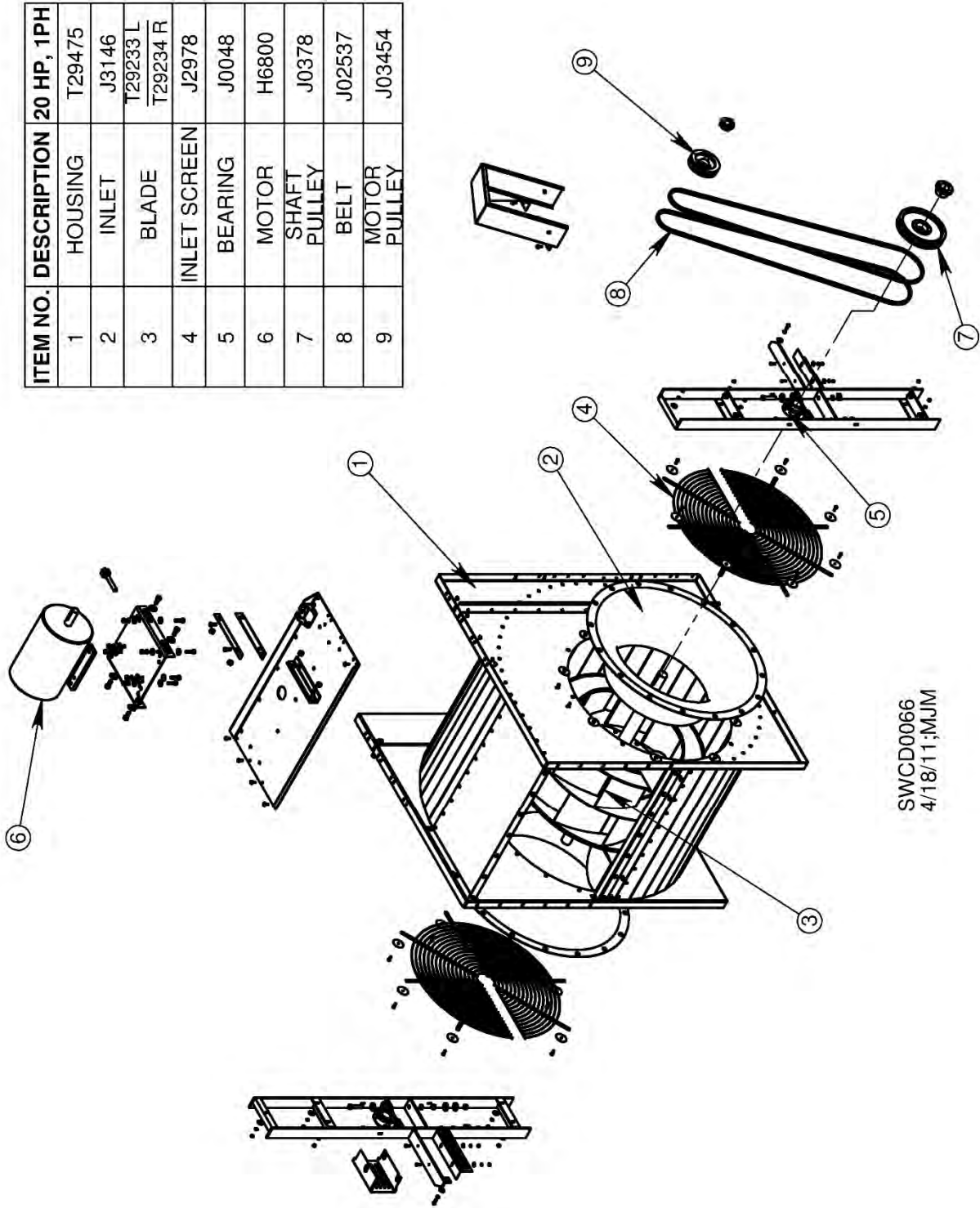
Appendix F

Parts Assemblies

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SINGLE-PHASE DRYER FAN PARTS

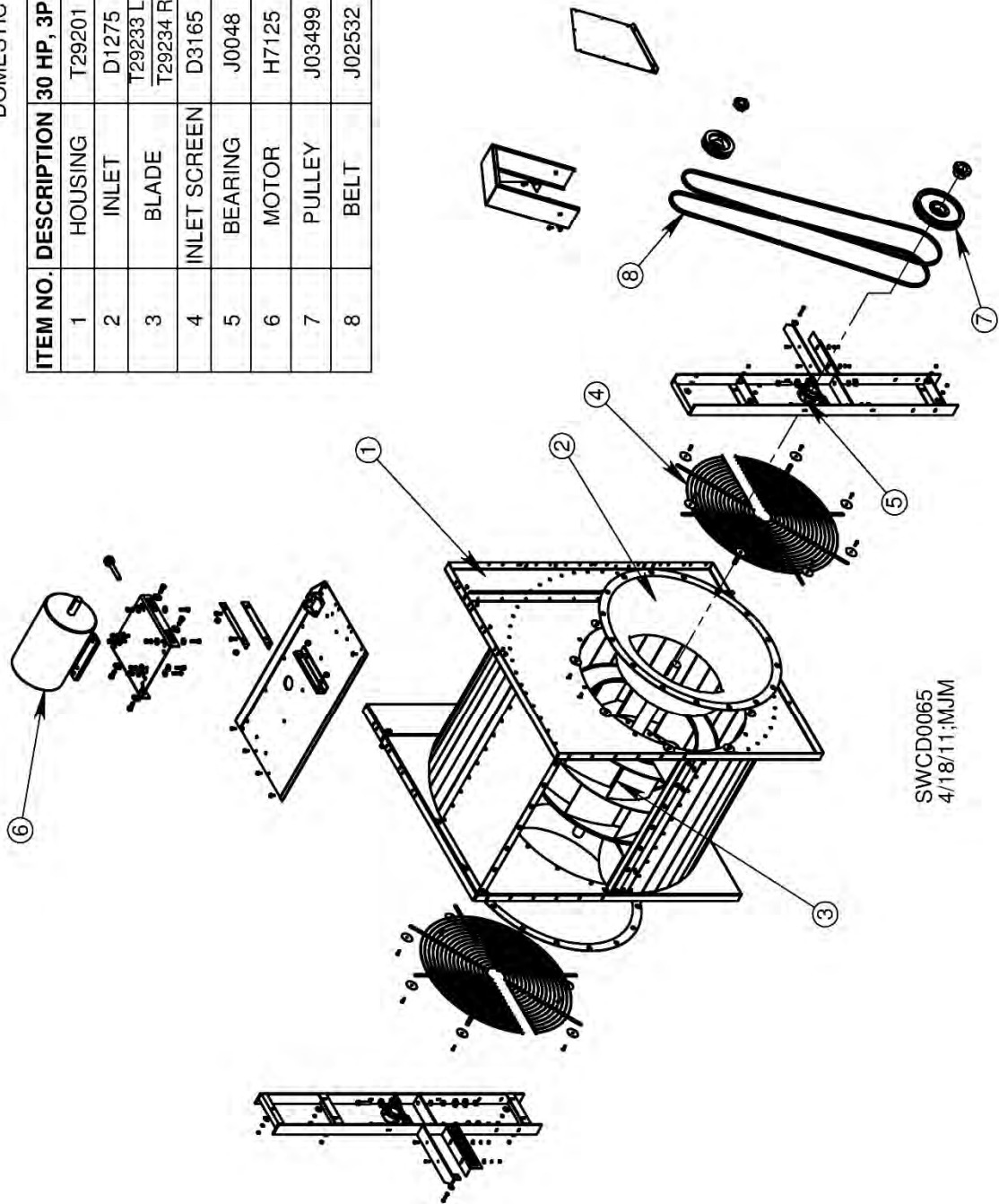


SWCD0066
4/18/11;MJM

THREE-PHASE DRYER FAN PARTS

DOMESTIC

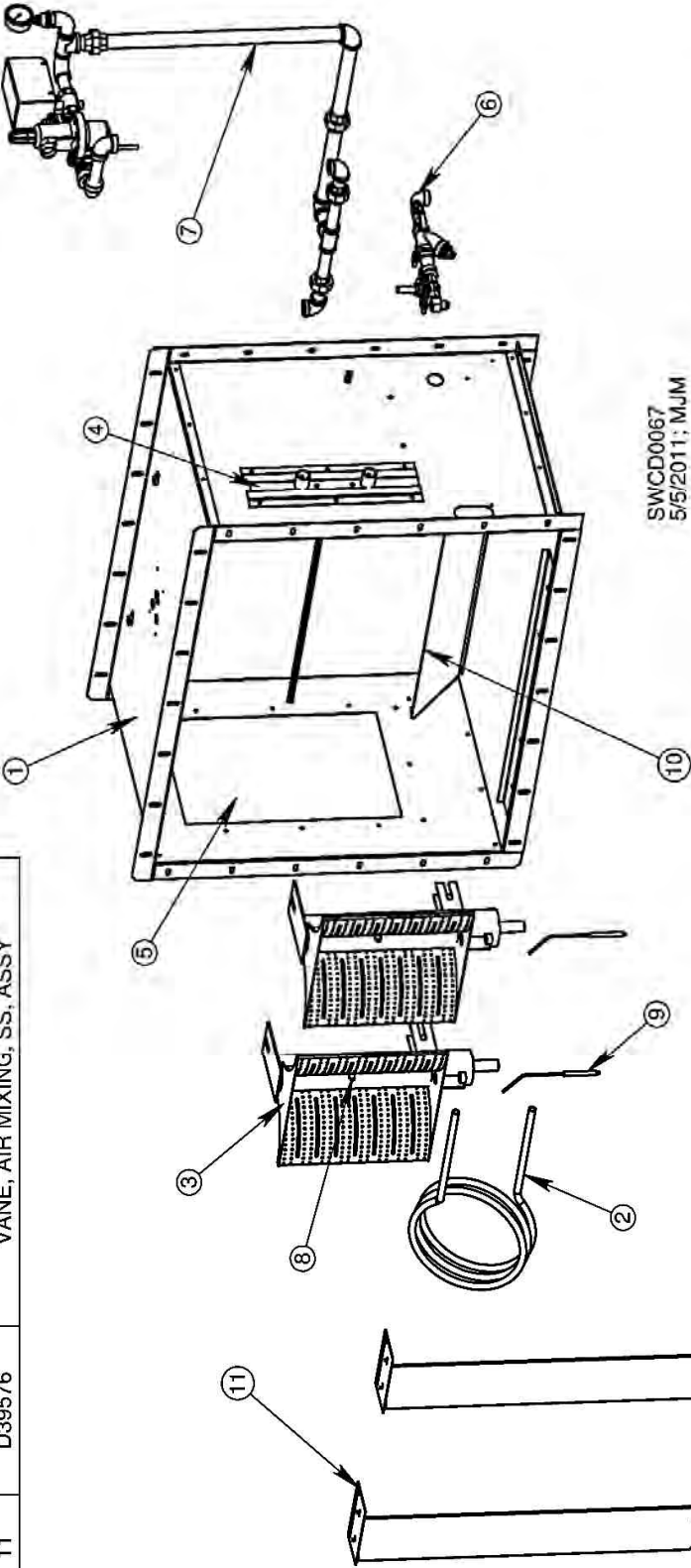
ITEM NO.	DESCRIPTION	30 HP, 3PH	40 HP, 3PH	50HP, 3PH
1	HOUSING	T29201	T29201	T29201
2	INLET	D1275	D1275	D1275
3	BLADE	T29233 L T29234 R	T29133 L T29134 R	T29333 L T29334 R
4	INLET SCREEN	D3165	D3165	D3165
5	BEARING	J0048	J0048	J0048
6	MOTOR	H7125	H7175	H7205
7	PULLEY	J03499	J03499	J03499
8	BELT	J02532	J02532	J02532

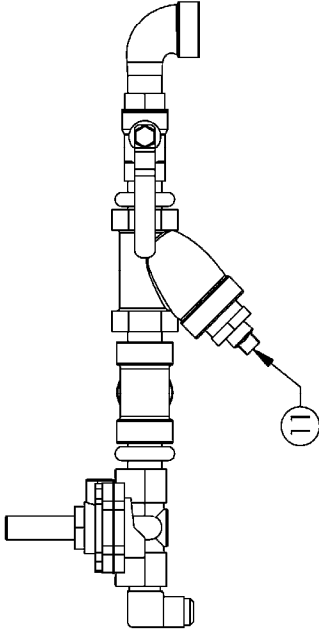
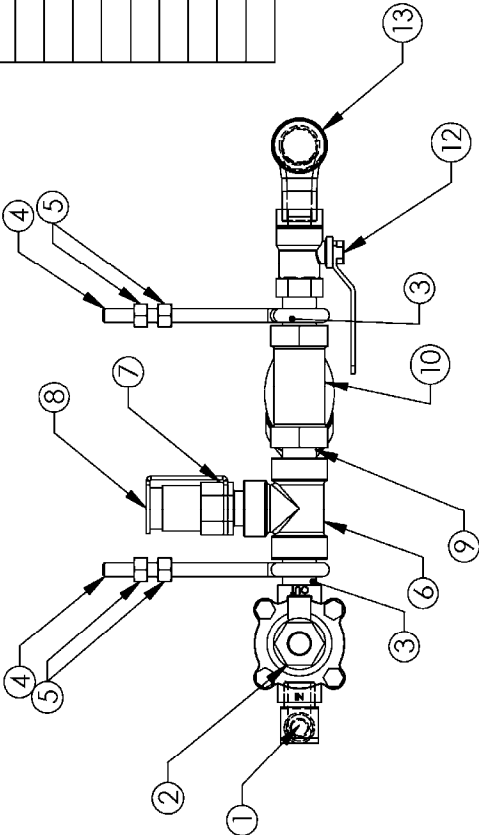


SWCD0065
4/18/11;MJM

CENTRIFUGAL HEATER PARTS

ITEM NO.	PART NUMBER	DESCRIPTION
1	T29181	HOUSING,BURNER,CENT,GALV,REV
2	D70321	VAPORIZER,3 COIL 10.5" ID - NO CROSSOVER
3	D70252	BURNER ELEMENT, C.F. DRYER
4	D7056	SLIDE PLATE, VAP, GALV
5	D7024	DOOR, SERVICE, CENT HTR, GALV.
6	T17134	PIPE TRAIN, LIQUID, 1/2" CENT REV
7	T17221	PIPE TRAIN, LP, CENT, REV 3/4"
8	J5739	SPARK PLUG,#64
9	J5747	FLAME SENSOR
10	D3829	SHIELD, DEFLECTOR
11	D39576	VANE, AIR MIXING, SS, ASSY





ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	J2745	ELBOW, 1/2 FL X 1/2 MIP, 90 DEG, E1-8D
2	1	T17034	SOLENOID ASSY, LIQUID 1/2" WITH WIRE
3	2	J2406	NIPPLE, 1/2 X 1 1/2, SCH 40
4	2	J0860	EYEBOLT, 3/8-16, 4.25, 1" ID EYE
5	4	J1020	NUT, HEX, 3/8-16, PLT
6	1	J2472	TEE, 1/2 X 1/2 X 1/2, SCH80
7	1	J6170	VALVE, 1/2", RELIEF, 3129G, H135-2
8	1	J6200	RAIN CAP, 7545-10
9	1	J2407	NIPPLE, 1/2" x CLOSE, SCH 80
10	1	J5992	STRAINER, LIQ, 1/2"
11	1	J2610	PLUG, 3/8, PIPE, BLK
12	1	J6082	VALVE, 1/2", BALL, ITT 1550
13	1	J2519	ELBOW, STREET, 1/2, 90 DEG., SCH80

UNLESS OTHERWISE SPECIFIED
X =±0.10
XX =±0.05
.XXX =±0.01
FRAC =± 1/32
=±

DRAWN BY JFJ

DATE 5/28/2008

USED IN ASY OF: CENT REV DRYER

B REVERSE 10 AND 12 KWI 04/11/2007

A REDRAW IN SW KGJ08/17/2001

REF ENG. ORDER # BY DATE

REVISION

SUKUP MFG. CO.



SUKUP PARKWAY
SHEFFIELD, IA. 50475

RAW MAT'L NO. T17134

DWG NO. T17134



ITEM NO.	QTY.	PART NO.	DESCRIPTION	ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T20215	VALVE, 3/4" VAPOR ASSY, W/WIRES	14	2	J24811	TEE, 3/4 X 3/4 X 1, SCH40
2	3	J2420	NIPPLE, 3/4 X 2, SCH40	15	1	J2574	COUPLING, REDUCING, 3/4X1/4 SC40
3	1	T18810	EYEBOLT, PIPE TRAIN, 1 1/16" SHAFT COLLAR	16	1	J5960	GAUGE, PRES, 0-30, LIQ, 1/4BTM, MT
4	1	J6112	REGULATOR, 3/4", 627/5810, 5 - 20 LB	17	1	J2417	NIPPLE, 1.00XCLOSE SCH40
5	1	J2532	ELBOW, STREET, 3/4, 90 DEG., EX HVY	18	2	J2696	UNION, 1" SCH40
6	1	J24251	PIPE, 3/4 X 4 1/2, SCH 80	19	1	T17216	PIPE, 1 X 24", SCH 40
7	1	J2531	ELBOW, 3/4, 90 DEG., SCH 80	20	2	J25251	ELBOW, 1, 90 DEG., SCH40
8	2	J2410	NIPPLE, 3/4 x CLOSE, SCH 40	21	2	J24171	NIPPLE, 1 X 10, SCH 40
9	1	J6126	VALVE, BUTTERFLY L/ACTUATOR, 3/4	22	1	J24172	NIPPLE, 1 X 2", SCH 40
10	1	T161935	BRACKET, ELECTRONIC MOD VALVE	23	2	D71220	ORIFICE PIPE, 3/4"X4.5"
11	1	T26902	COVER, ELECTRONIC VALVE, 5.625 X 3.5	24	2	J2710	UNION, 3/4, BLACK, #150
12	1	J2423	NIPPLE, 3/4" x 3"	25	2	J2525	ELBOW, 3/4, 90 DEG., SCH40
13	2	J2530	ELBOW, STREET, 3/4", 90 DEG., SCH 40				
				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 DATE 5/05/2008 USED IN ASSY OF: CENT CONT FLOW DRYER NAME PIPE TRAIN, LP, CENT, REV 3/4"			
				RAW MATL. NO. T17221 MATERIAL			
				CHG J2425 NIPPLE TO J2423			
				REF ENG. ORDER # BY DATE			
				R E V I S I O N			
				NOTICE: The information contained herein is a confidential disclosure. This material is property of Sukup Manufacturing Co., Sheffield, Iowa, USA and is not to be used in any way detrimental to Sukup's interest. Reproduction is prohibited.			

ITEM NO.	QTY.	PART NO.	DESCRIPTION	ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T20209	SOLND ASSY,NG, 1 1/2", CENT REV	14	1	J2707	UNION,1 1/2", SCH40
2	9	J2431	NIPPLE,1.5XCLOSE SCH40	15	1	T17215	PIPE, 1 1/2 X 19", SCH 40
3	5	J2541	ELBOW,1 1/2",90 DEG. SCH40	16	1	J2553	COUPLING, RED., 1 1/2" x 1", SCH 40
4	1	J2433	NIPPLE,1.5 x 3", SCH40	17	1	J2417	NIPPLE,1.00XCLOSE SCH40
5	1	J6087	VALVE,1 1/2", BALL (FIREING)	18	2	J25251	ELBOW, 1, 90 DEG., SCH40
6	1	J6127	VALVE, BUTTERFLY, L/ACTUATOR, 1 1/2", MAXON	19	2	J24171	NIPPLE, 1 X 10, SCH 40
7	1	J2479	TEE,REDUCE,1 1/2 x 1 1/2 x 1 1/2	20	1	J2696	UNION, 1" SCH40
8	1	J2520	ELBOW,STREET,1/2,90DEG,SCH40	21	1	J24172	NIPPLE, 1 X 2", SCH 40
9	1	J2405	NIPPLE, 1/2 x CLOSE, SCH 40	22	1	J24811	TEE,3/4 X 3/4 X 1, SCH40
10	1	J2572	COUPLING,REDUCING,1/2 X 1/4 SCH40	23	2	D71220	ORIFICE PIPE,3/4"x4.5"
11	1	J5967	GAUGE,PRESSURE,0-15,LIQ,1/4"BTM,MT	24	2	J2710	UNION, 3/4, BLACK,#150
12	1	T161935	BRACKET, ELECTRONIC MOD VALVE	25	2	J2420	NIPPLE, 3/4 X 2, SCH40
13	1	T26902	COVER, ELECTRONIC VALVE, 5.625 X 3.5	26	2	J2525	ELBOW,3/4, 90 DEG.,SCH40

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
DATE: 5/05/2008
MATERIAL: T17201

USED IN ASST OF: CENT CONT FLOW DRYER
NAME: PIPE TRAIN, NG, CENT, REV 1.5"

NOTICE: The information contained herein is a confidential disclosure. This material is property of Sukup Manufacturing Co., Sheffield, Iowa, USA and is not to be used in any way detrimental to Sukup's interest. Reproduction is prohibited.

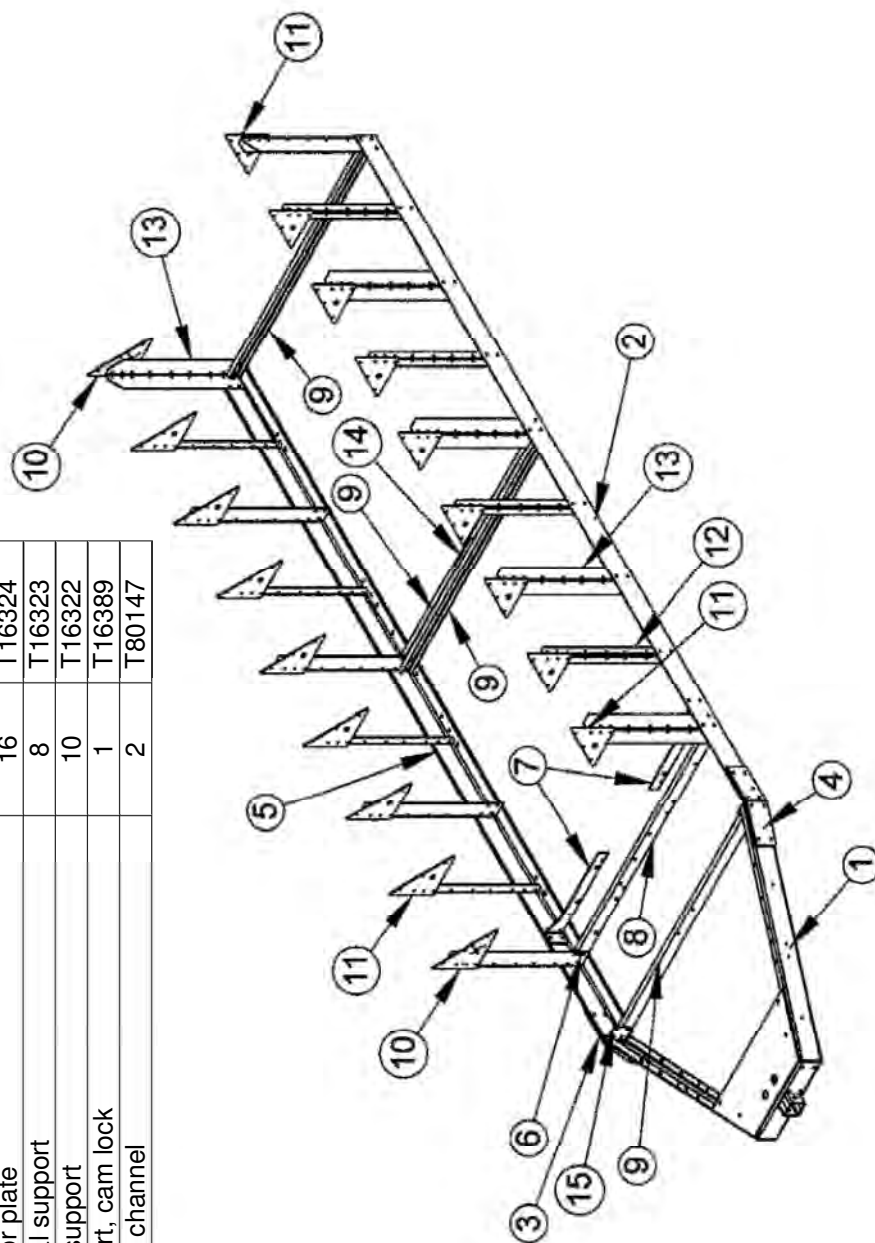
A	REVISED	DDV	05/25/2010
REF	ENG. ORDER #	BY	DATE
R E V I S I O N			



FRAME ASSEMBLY

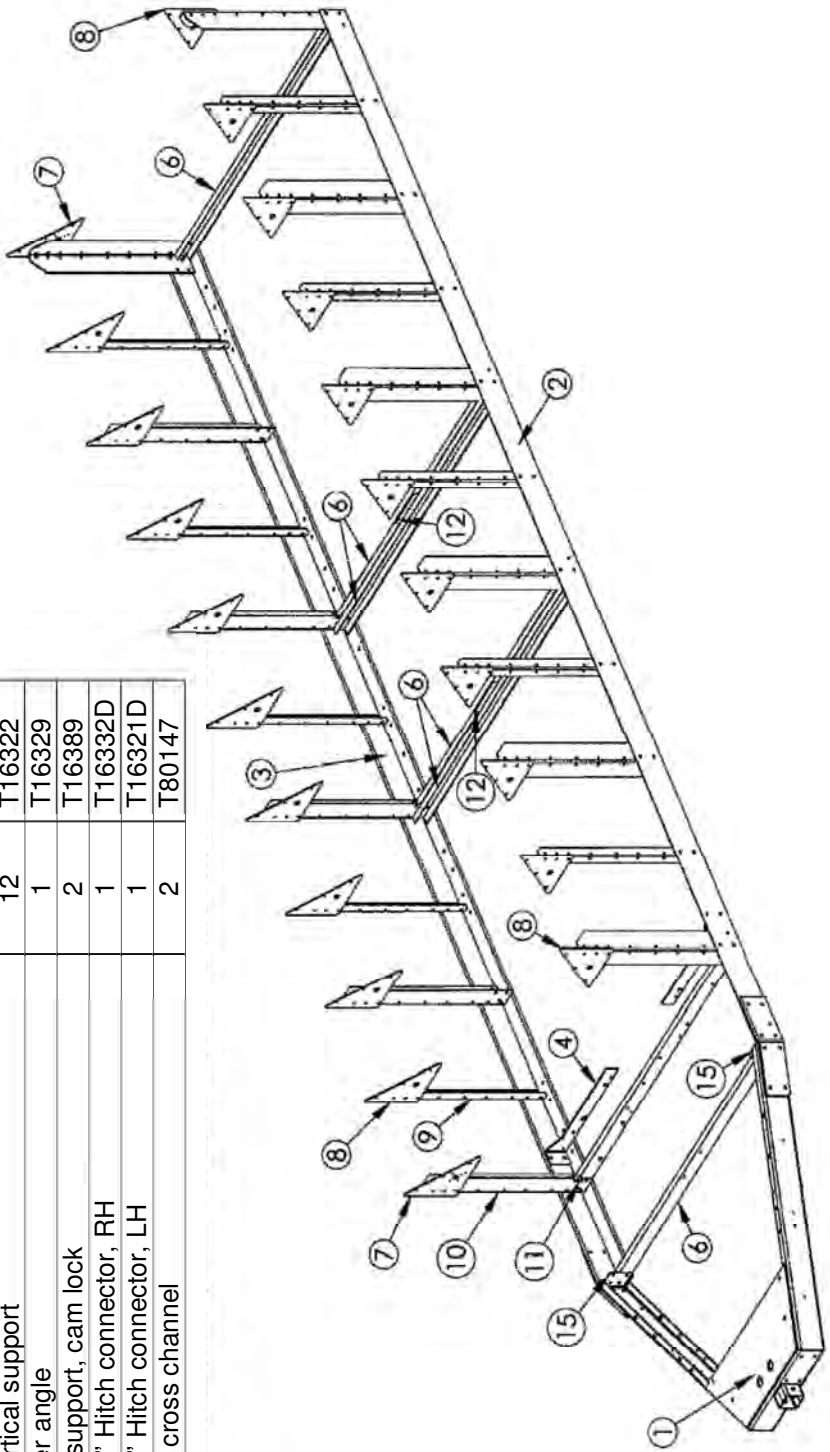
T16306 FRAME ASSEMBLY FOR 16' CENTRIFUGAL DRYER

REF #	DESCRIPTION	QTY	COMP #
1	Hitch receiver weldment	1	T24423
2	Frame angle, left, 16' Cent dryer	1	T80206
3	Plate, 3/4" Hitch connector, RH	1	T16332D
4	Plate, 3/4" Hitch connector, LH	1	T16321D
5	Frame angle, right, 16' Cent dryer	1	T80205
6	Tightener angle	1	T16329
7	DC motor brace	2	T16328
8	Front cross channel	1	T16333
9	Cross channel	4	T16325
10	Plate, main connector, box, conduit	2	T16331
11	Main connector plate	16	T16324
12	Narrow vertical support	8	T16323
13	Wide vertical support	10	T16322
14	Vertical support, cam lock	1	T16389
15	Bracket, cross channel	2	T80147



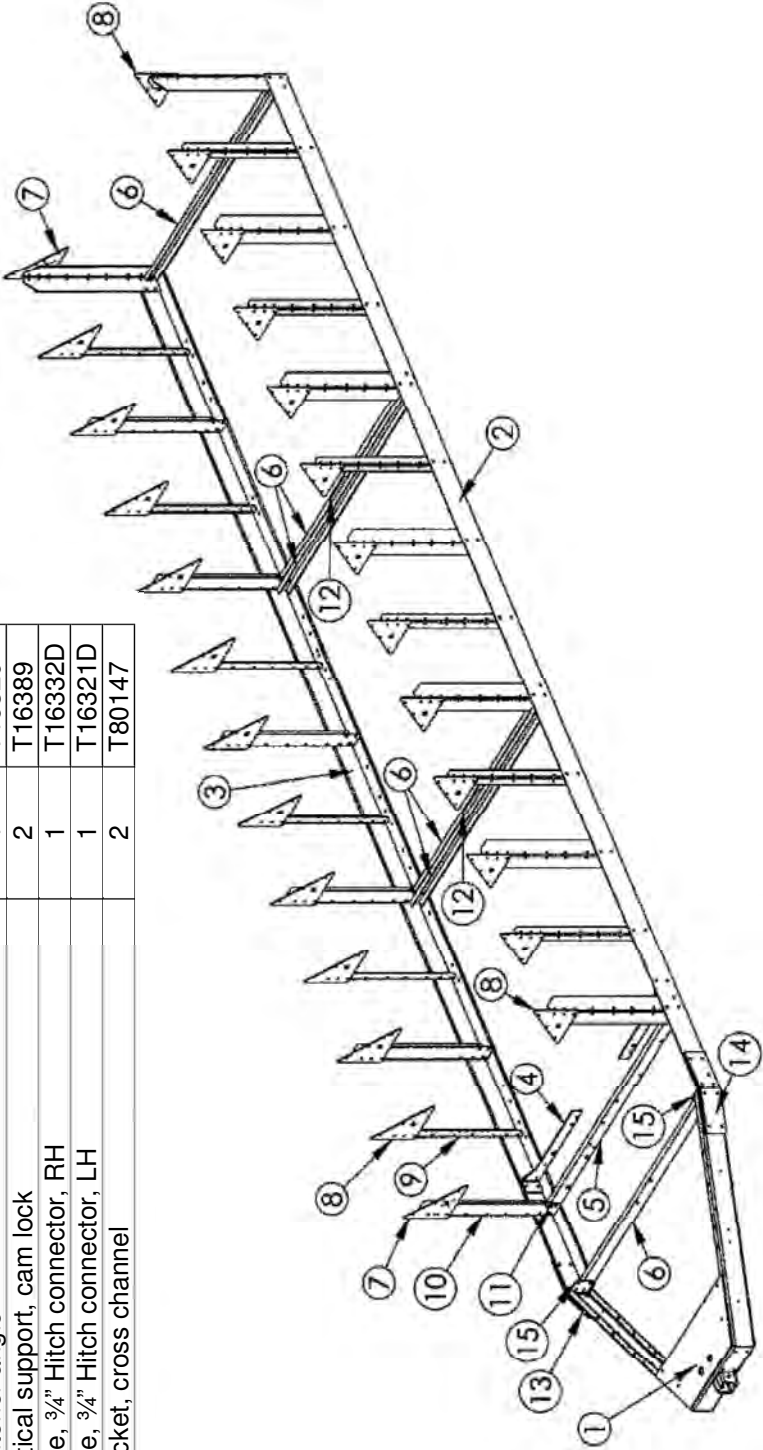
T20306 FRAME ASSEMBLY FOR 20' CENTRIFUGAL DRYER

REF #	DESCRIPTION	QTY	COMP #
1	Hitch receiver weldment	1	T24423
2	Frame angle, left, 20' Cent dryer	1	T20420
3	Frame angle, right, 20' Cent dryer	1	T20419
4	DC motor brace	2	T16328
5	Front cross channel	1	T16333
6	Cross channel	6	T16325
7	Plate, main connector, box, conduit	2	T16331
8	Main connector plate	20	T16324
9	Narrow vertical support	10	T16323
10	Wide vertical support	12	T16322
11	Tightener angle	1	T16329
12	Vertical support, cam lock	2	T16389
13	Plate, 3/4" Hitch connector, RH	1	T16332D
14	Plate, 3/4" Hitch connector, LH	1	T16321D
15	Bracket, cross channel	2	T80147

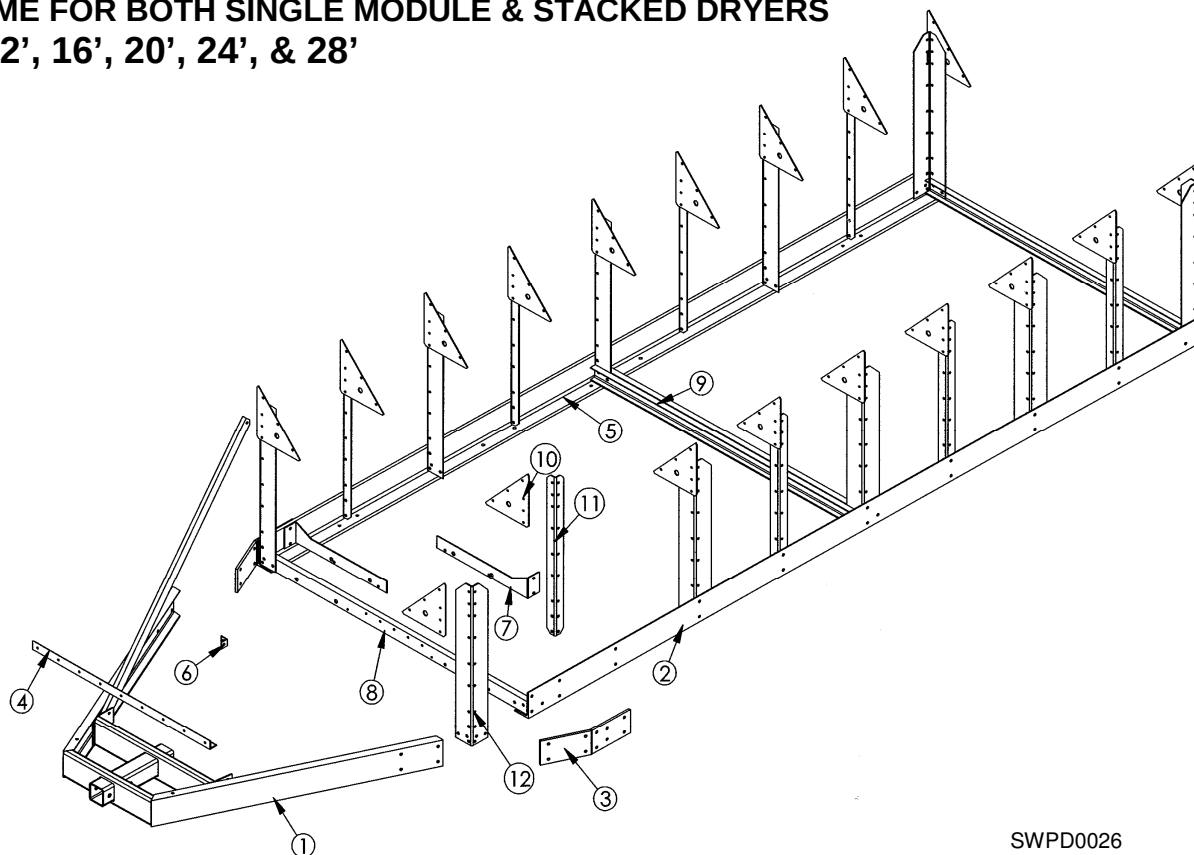


T24306 FRAME ASSEMBLY FOR 24' CENTRIFUGAL DRYER

REF #	DESCRIPTION	QTY	COMP #
1	Hitch receiver weldment	1	T24423
2	Frame angle, left, 24' Cent dryer	1	T24420
3	Frame angle, right, 24' Cent dryer	1	T24419
4	DC motor brace	2	T16328
5	Front cross channel	1	T16333
6	Cross channel	6	T16325
7	Plate, main connector, box, conduit	2	T16331
8	Main connector plate	24	T16324
9	Narrow vertical support	12	T16323
10	Wide vertical support	14	T16322
11	Tightener angle	1	T16329
12	Vertical support, cam lock	2	T16389
13	Plate, 3/4" Hitch connector, RH	1	T16332D
14	Plate, 3/4" Hitch connector, LH	1	T16321D
15	Bracket, cross channel	2	T80147



FRAME FOR BOTH SINGLE MODULE & STACKED DRYERS 8', 12', 16', 20', 24', & 28'

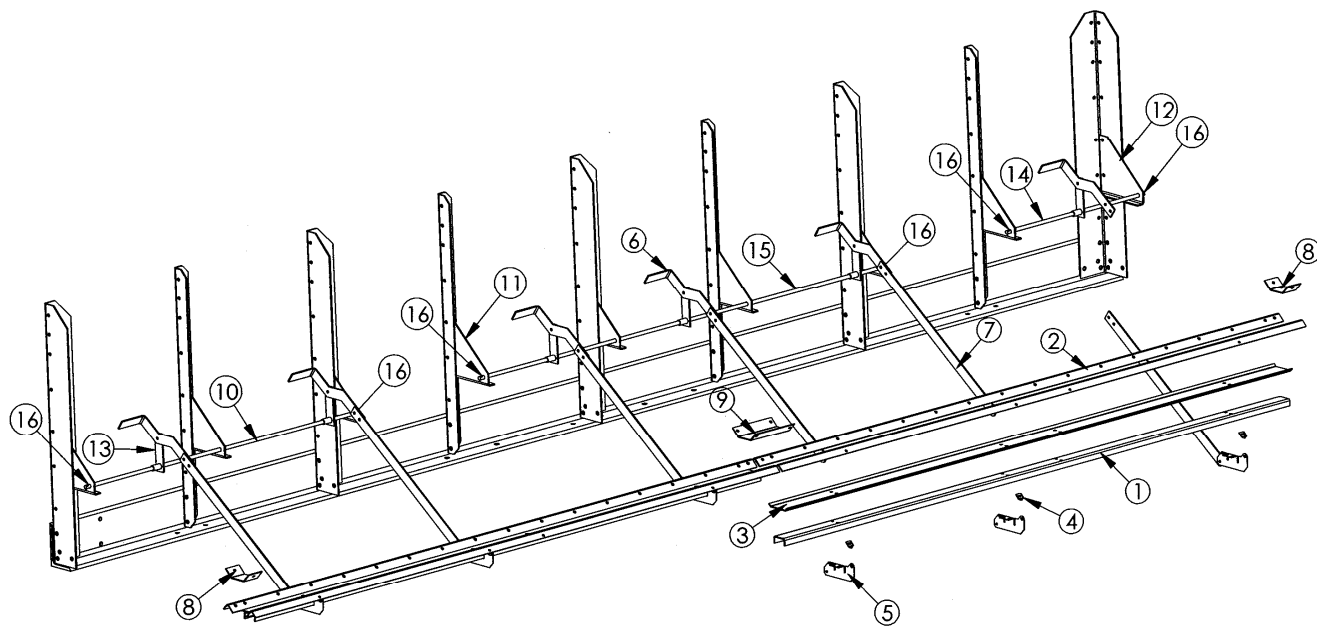


SWPD0026

REF#	DESCRIPTION	8' DRYER		12' DRYER		16' DRYER	
		QTY	COMP#	QTY	COMP#	QTY	COMP#
1	Hitch Receiver Weld	1	T16310	1	T16310	1	T16310
2	Left Frame Angle	1	T08518	1	T12518	1	T16319
3	Connector Plate	2	T16321	2	T16321	2	T16321
4	Angle (Fan Support)	1	T16176	1	T16176	1	T16176
5	Right Frame Angle	1	T08517	1	T12517	1	T16320
6	Tightener Angle	1	T16329	1	T16329	1	T16329
7	DC Motor Brace	2	T16328	2	T16328	2	T16328
8	Front Cross Channel	1	T16333	1	T16333	1	T16333
9	Cross Channel	1	T16325	3	T16325	3	T16325
10	Main Connector Plate	8	T16324	14	T16324	18	T16323
11	Narrow Vert Support	4	T16323	6	T16323	8	T16323
12	Wide Vert Support	6	T16322	8	T16322	10	T16322

REF#	DESCRIPTION	20' DRYER		24' DRYER		28' DRYER	
		QTY	COMP#	QTY	COMP#	QTY	COMP#
1	Hitch Receiver Weld	1	T16310	1	T16310	1	T16310
2	Left Frame Angle	1	T20320	1	T24320	1	T28310
3	Connector Plate	2	T16321	2	T16321	2	T16321
4	Angle (Fan Support)	1	T16176	1	T16176	1	T16176
5	Right Frame Angle	1	T20319	1	T24319	1	T28319
6	Tightener Angle	1	T16329	1	T16329	1	T16329
7	DC Motor Brace	2	T16328	2	T16328	2	T16328
8	Front Cross Channel	1	T16333	1	T16333	1	T16333
9	Cross Channel	5	T16325	5	T16325	7	T16325
10	Main Connector Plate	22	T16323	26	T16323	30	T16323
11	Narrow Vert Support	8	T16323	12	T16323	12	T16323
12	Wide Vert Support	14	T16322	14	T16322	16	T16322

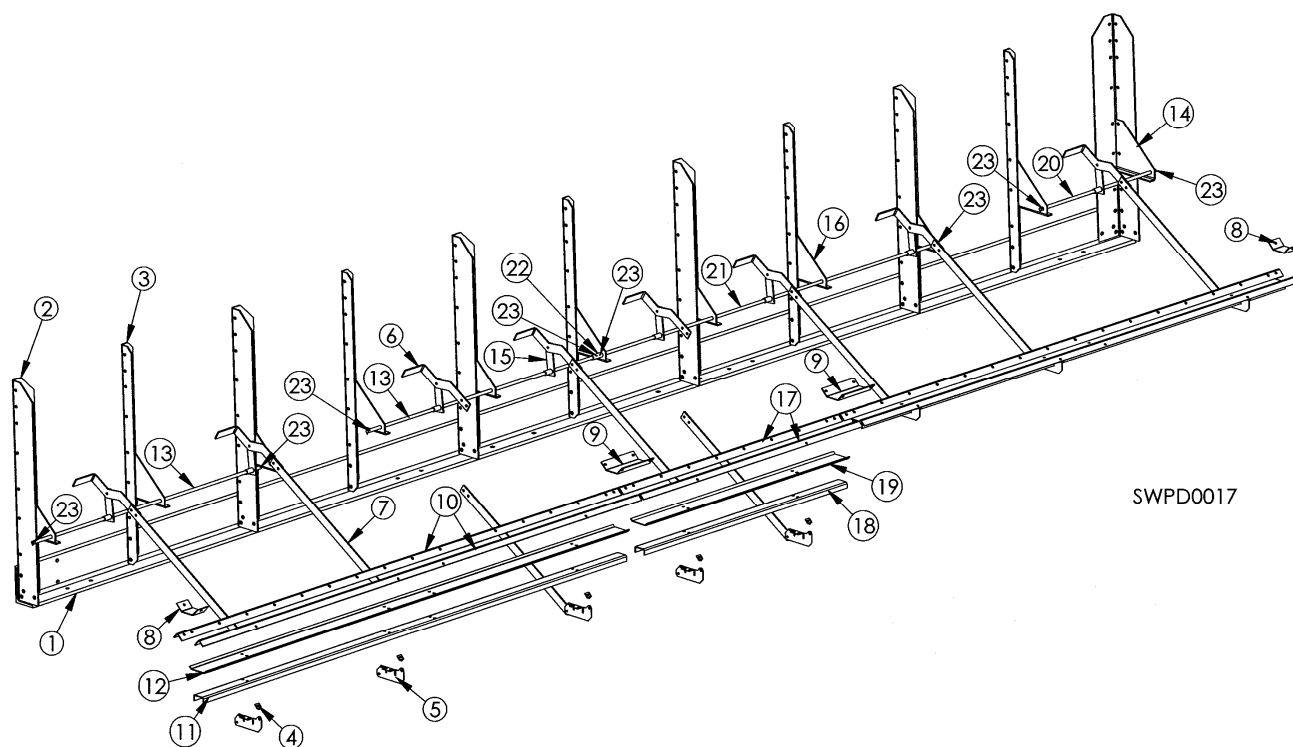
16' CAM LOCK ASSEMBLY



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

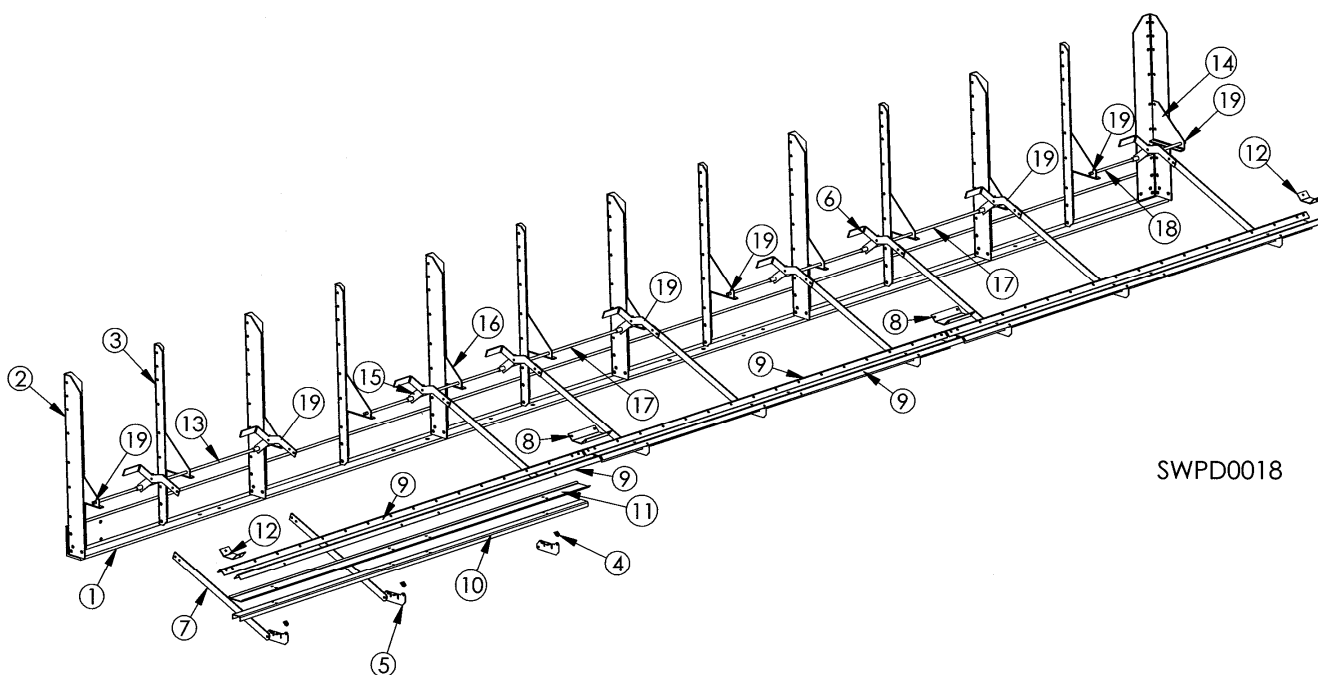
20' CAM LOCK ASSEMBLY



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

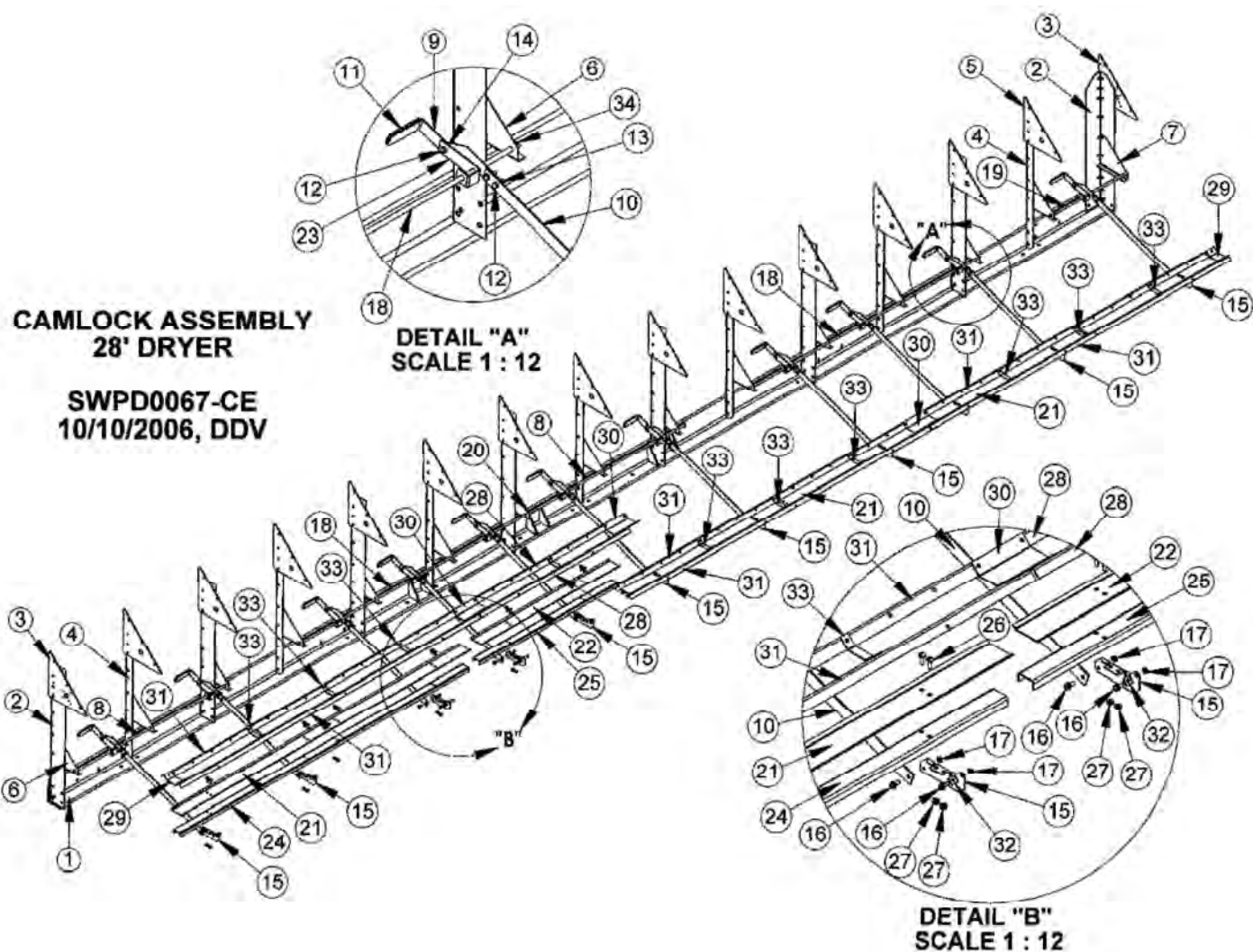
24' CAM LOCK ASSEMBLY



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

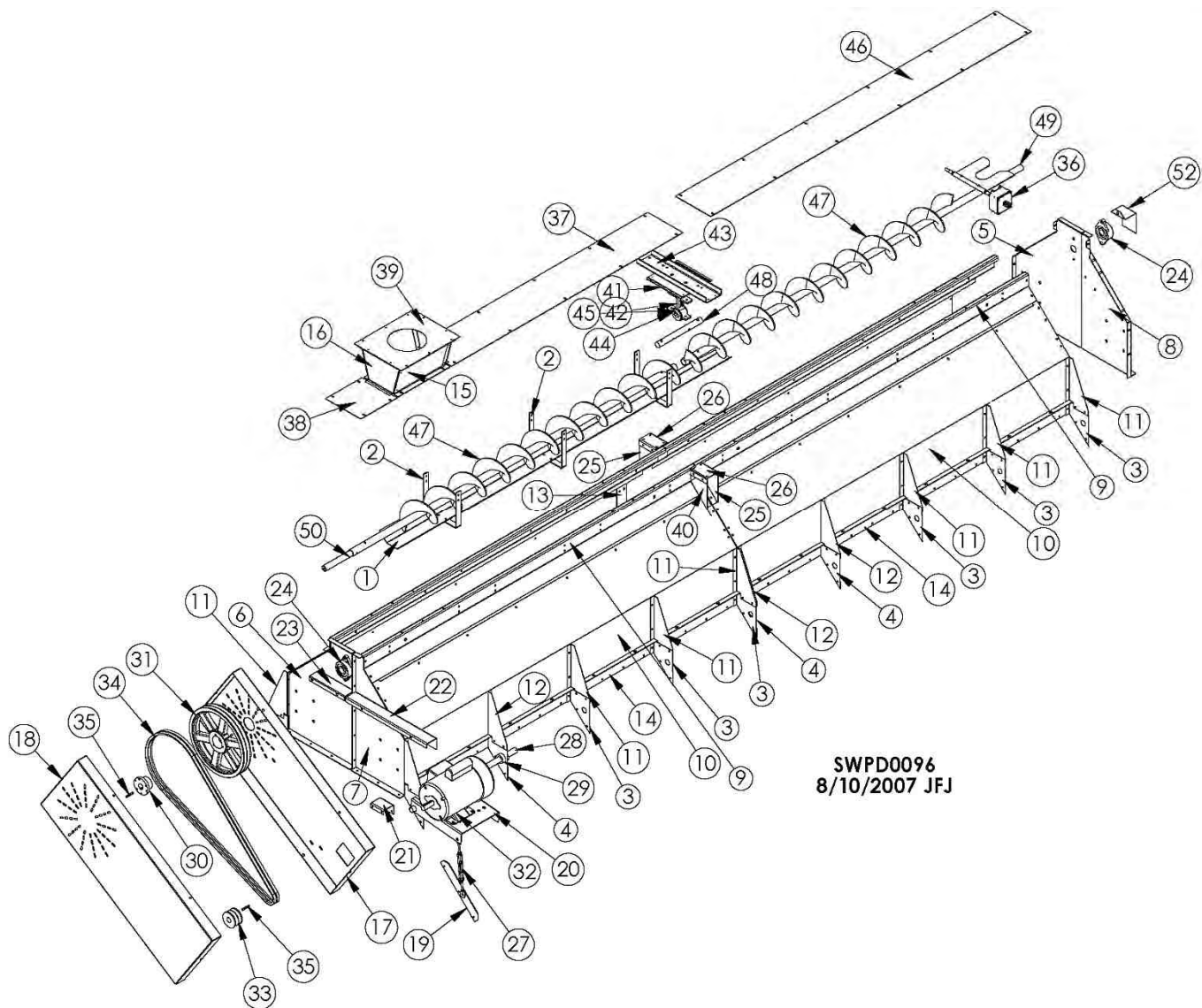
28' CAM LOCK ASSEMBLY



REF#	DESCRIPTION	COMP#	REF#	DESCRIPTION	COMP#
1	Right Frame Angle	T28318	18	Shaft, Cam Lock, 74"	T12516
2	Wide Vertical Support	T16322	19	Shaft, Cam Lock, 25"	T20401
3	Main Conn. Plate Conduit Box	T16331	20	Connector, Shaft	T20403
4	Narrow Vertical Support	T16323	21	8' Door, Cam Lock	T17455
5	Main Connector Plate	T16324	22	Door, Cam Lock 2000	T12528
6	Gusset, Front, Cam Lock	T16380	23	Pivot Arm Weldment	T16383
7	Gusset, Rear, Cam Lock	T16381	24	8' Door Support	T17454
8	Shaft, Cam Lock, 49.75"	T16400	25	Door Support, Cam Lock 4' 2000	T12530
9	Handle, Cam Lock	T16382	26	Screw, 5/16-18,1,PLT,TR,SL,RHMS	J0528
10	Extension Arm, Cam Lock	T16386	27	Nut, Whiz, 5/16-18	J1110
11	Cover, Plastic, Handle, 1 1/2 x 4 LG	J23182	28	Angle, Cam Lock 4' 2000	T12529
12	Screw, 3/8-16 x 1, JS500, GD5	J06063	29	Seal Plate, End, Cam Lock	T16398
13	Nut, Whizlock, 3/8-16	B5962	30	Seal Plate, Mid, Cam Lock	T16390
14	Nut, Hex, 3/8-16, PLT Lock	J1025	31	8'Angle, Cam Lock	T17456
15	Hinge, Bottom Door, Cam Lock	T16387	32	Pivot Bracket	T16393
16	Bolt, 5/16-18x3/4" GR5, Hex Wash	J0536	33	Connecting Bracket	T16399
17	Nut, Lock, 5/16-18, PLT	J1010	34	Pin, Cotter, 1/8,1,PLT	J1420

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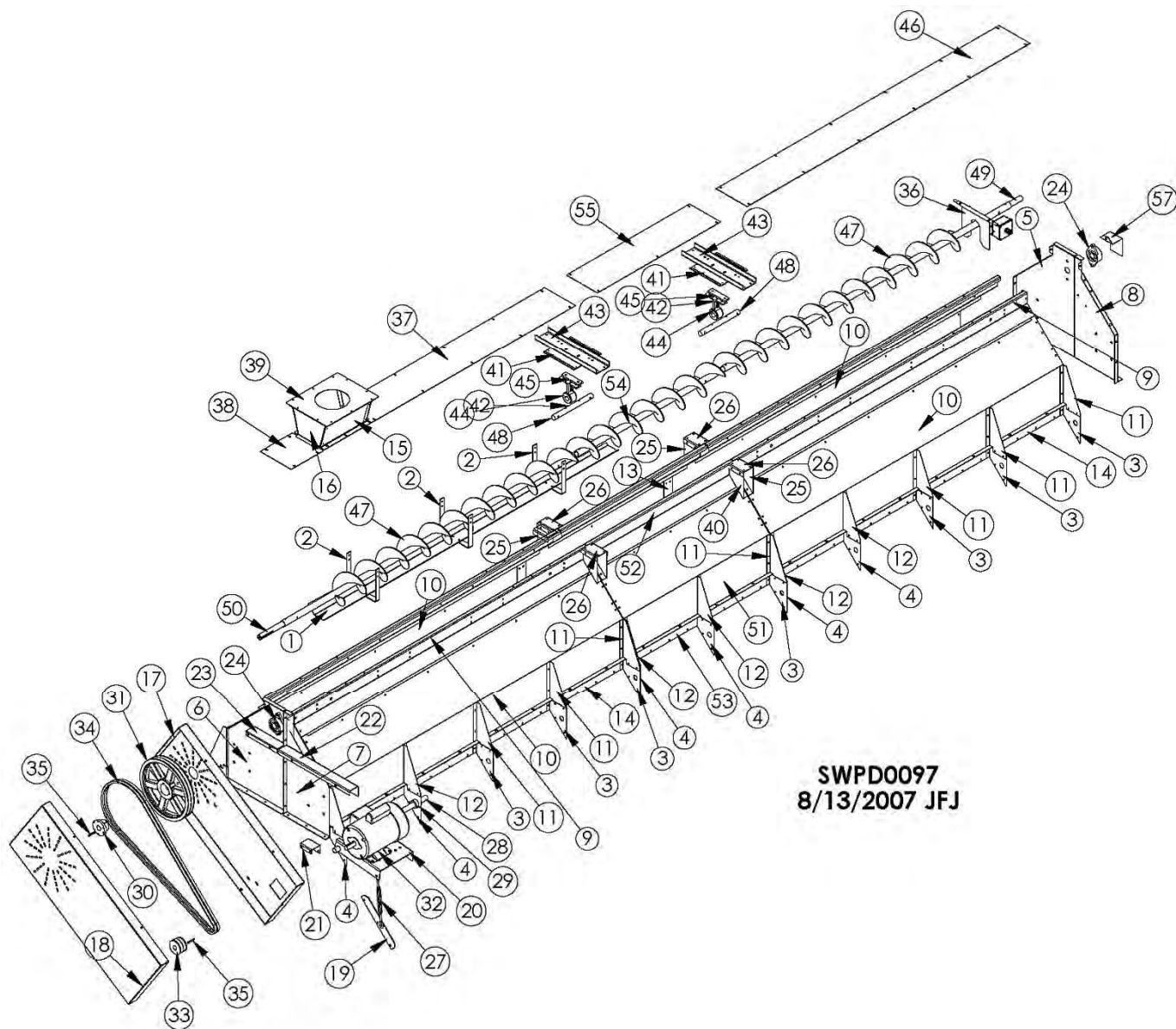
16' WET BIN



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 Perf, (Stainless)	4	T17450S
	Wet Bin Side Perf, (Galvanized)	4	T17450
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, Auger 3HP, 1ph, TEFC	1	T12590
	Motor, Auger 3HP, 3ph, TEFC	1	H3345
33	Pulley, 3.5 OD, 1.25, Double, B, Cast	1	J0317
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly	1	T16262
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	Plate, Short Splice	2	T16141
52	Rear Shaft Shield	1	T16420

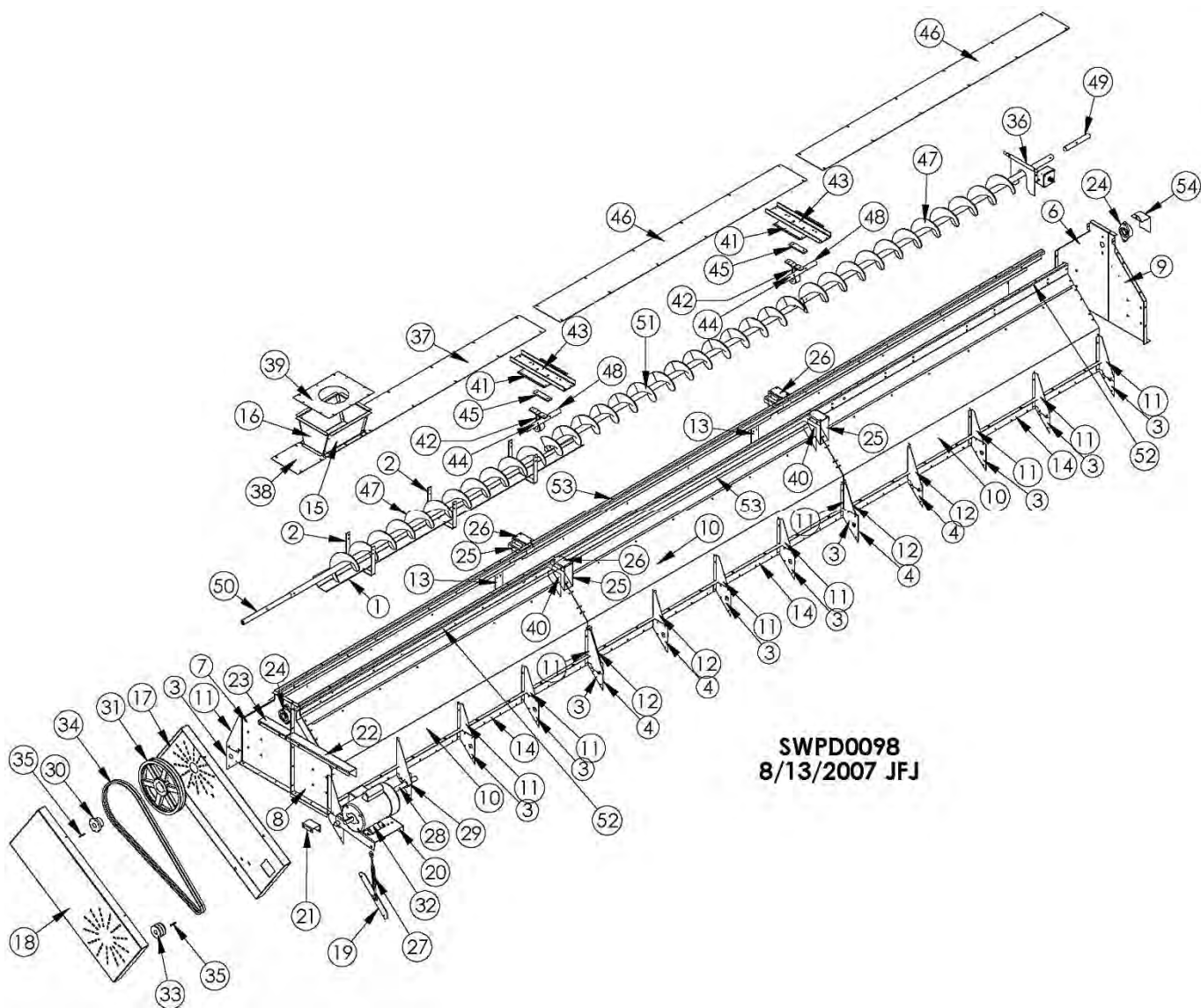
20' WET BIN



20' WET BIN

REF #	DESCRIPTION	QTY	COMP #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	14	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	Top 8' Panel (Fill Switch)	4	T17457
10	Wet Bin Side Perf, (Stainless)	4	T17450S
	Wet Bin Side Perf, (Galvanized)	4	T17450
11	LT Pivot Brace Wet Bin	14	T17410
12	RT Pivot Brace Wet Bin	12	T17411
13	Splice, Wet Bin Side	4	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	4	T16145
26	Channel, Splice, Short	4	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, Auger 5HP, 1ph, TEFC	1	T20590
	Motor, Auger 5HP, 3ph, TEFC	1	H4190
33	Pulley, 3.5 OD, 1.25, Double, B, Cast	1	J0317
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly	1	T16262
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	4	T16144
41	Crimp Plate	2	T16142
42	Hanger, Auger, T, 6CH2203	2	J0097
43	Splice Channel	2	T16143
44	Bushing, Wood, 1.25" ID	2	J0096
45	Spacer, T-Hanger, Top auger	2	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
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	Plate, Short Splice	4	T16141
57	Rear Shaft Shield	1	T16420

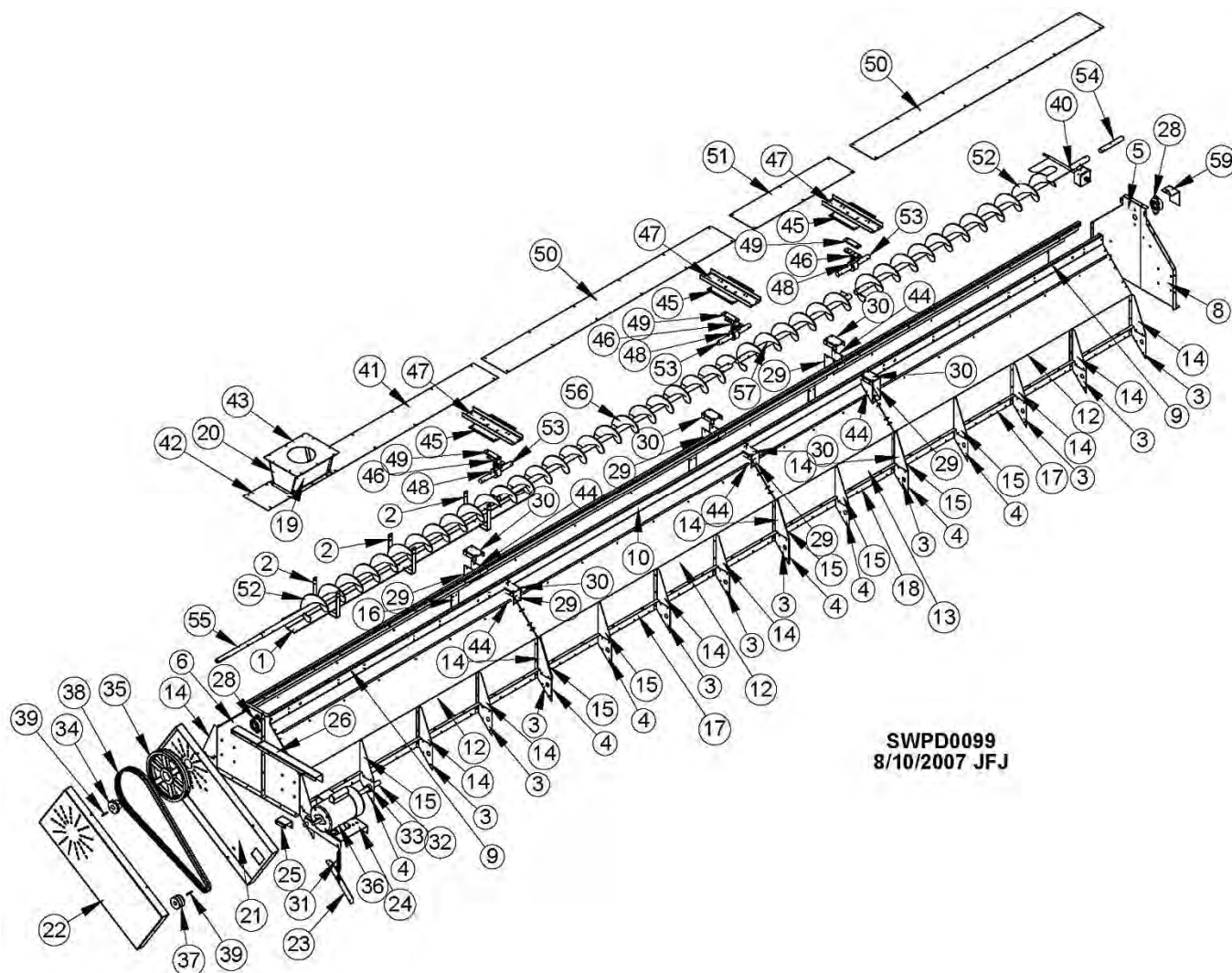
24' WET BIN



24' WET BIN

REF #	DESCRIPTION	QTY	COMP #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	17	T16117
4	Right Support Gusset	13	T16118
5	Plate, Short Splice	4	T16141
6	RR Wet Bin End Plate	1	T17401
7	RF Wet Bin End Plate	1	T17400
8	LF Wet Bin End Plate	1	T17402
9	LR Wet Bin End Plate	1	T17403
10	Wet Bin Side Perf, (Stainless)	6	T17450S
	Wet Bin Side Perf, (Galvanized)	6	T17450
11	LT Pivot Brace Wet Bin	17	T17410
12	RT Pivot Brace Wet Bin	13	T17411
13	Splice, Wet Bin Side	4	T17412
14	Bolt Down Lip 8', 2000	6	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	4	T16145
26	Channel, Splice, Short	4	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, Auger 5HP, 1ph, TEFC	1	T20590
	Motor, Auger 5HP, 3ph, TEFC	1	H4190
33	Pulley, 3.5 OD, 1.25, Double, B, Cast	1	J0317
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly	1	T16262
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	4	T16144
41	Crimp Plate	2	T16142
42	Hanger, Auger, T, 6CH2203	2	J0097
43	Splice Channel	2	T16143
44	Bushing, Wood, 1.25" ID	2	J0096
45	Spacer, T-Hanger, Top auger	2	T16096
46	Lid, 92-1/2" Wet Holding Bin	2	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	Auger, Bottom Front, 93-1/2"	1	T16430
52	Top 8' Panel (Fill Switch)	4	T17457
53	Top 8' Panel (LR&RF) 2000	2	T24451
54	Rear Shaft Shield	1	T16420

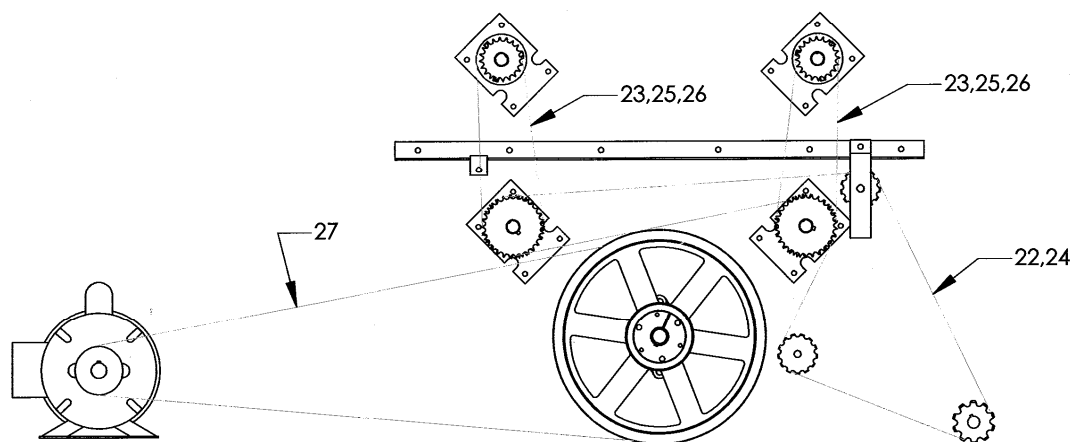
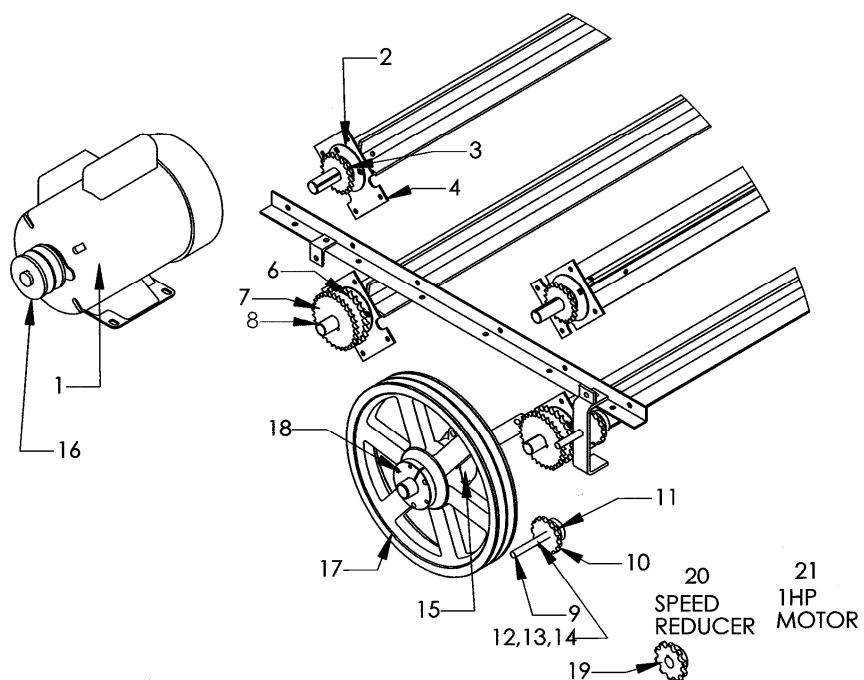
28' WET BIN



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	Top 8' Panel (Fill Switch)	4	T17457
10	Top 8' Panel (LR & RF) 2000	2	T24451
11	Top 4' Panel (LR) 12FT 2000	2	T20526
12	Wet Bin Side Perf, (Stainless)	6	T17450S
	Wet Bin Side Perf, (Galvanized)	6	T17450
13	Side, Wet Bin, 4FT 2000	2	T12525
14	LT Pivot Brace Wet Bin	20	T17410
15	RT Pivot Brace Wet Bin	16	T17411
16	Splice, Wet Bin Side	6	T17412
17	Bolt Down Lip 8', 2000	6	T17453
18	Bolt Down Lip 4', 2000	2	T12524
19	Hopper Side	2	T17935
20	Hopper End	2	T17936
21	Top Auger Shield (Inner)	1	T16256
22	Top Auger Shield (Outer)	1	T16255
23	Plate, Turnbuckle, Connector	1	T16283
24	Top Motor Mount	1	T16277
25	Top Shield Brace	1	T16258
26	Bracket, LF Top Auger Shield	1	T16861
27	Bracket, RF Top Auger Shield	1	T16860
28	Bearing, 1.25, FLG, W/LC, HCFTS207 - 20	2	J0010
29	Splice Gusset Right	6	T16145
30	Channel, Splice, Short	6	T16146
31	Turnbuckle, 3/8" x 6"	1	J0904
32	Pivot, Motor Mount, Top	1	T18150
33	Collar, Shaft, 1-3/16"	2	J1338
34	Bushing, 1.25 SK	1	J0410
35	Pulley, 15.75OD, Double "B" Gr. SK	1	J03992
36	Motor, Auger 5HP, 1ph, TEFC	1	T20590
	Motor, Auger 5HP, 3ph, TEFC	1	H4190
37	Pulley, 3.5 OD, 1.25, Double, B, Cast	1	J0317
38	Belt, B95	2	J0252
39	Key, 1/4 x 1/4 x 2	2	F4499
40	Paddle, Assembly	1	T16262
41	Lid, Wet Holding Bin	1	T16157
42	Lid, 10.5", Extension, Wet Bin	1	T16159
43	Cover, Hopper	1	T17937
44	Splice Gusset Left	6	T16144
45	Crimp Plate	3	T16142
46	Hanger, Auger, T, 6CH2203	3	J0097
47	Splice Channel	3	T16143
48	Bushing, Wood, 1.25" ID	3	J0096
49	Spacer, T-Hanger, Top auger	3	T16096
50	Lid, 92-1/2" Wet Holding Bin	2	T16158
51	Lid, Wet Holding Bin 20FT	1	T20158
52	Top Auger	2	T16428
53	Shaft, 8' Hanger Bearing	3	F4720
54	Shaft, 1.25" x 9"	1	G73291
55	Shaft, Top Front, 12-3/4"	1	T16436
56	Auger, Bottom Front, 93-1/2"	1	T16430
57	Top Middle Auger (20FT)	1	T16427
58	Plate, Short Splice	6	T16141
59	Rear Shaft Shield	1	T16420

DRIVE END OF DRYERS

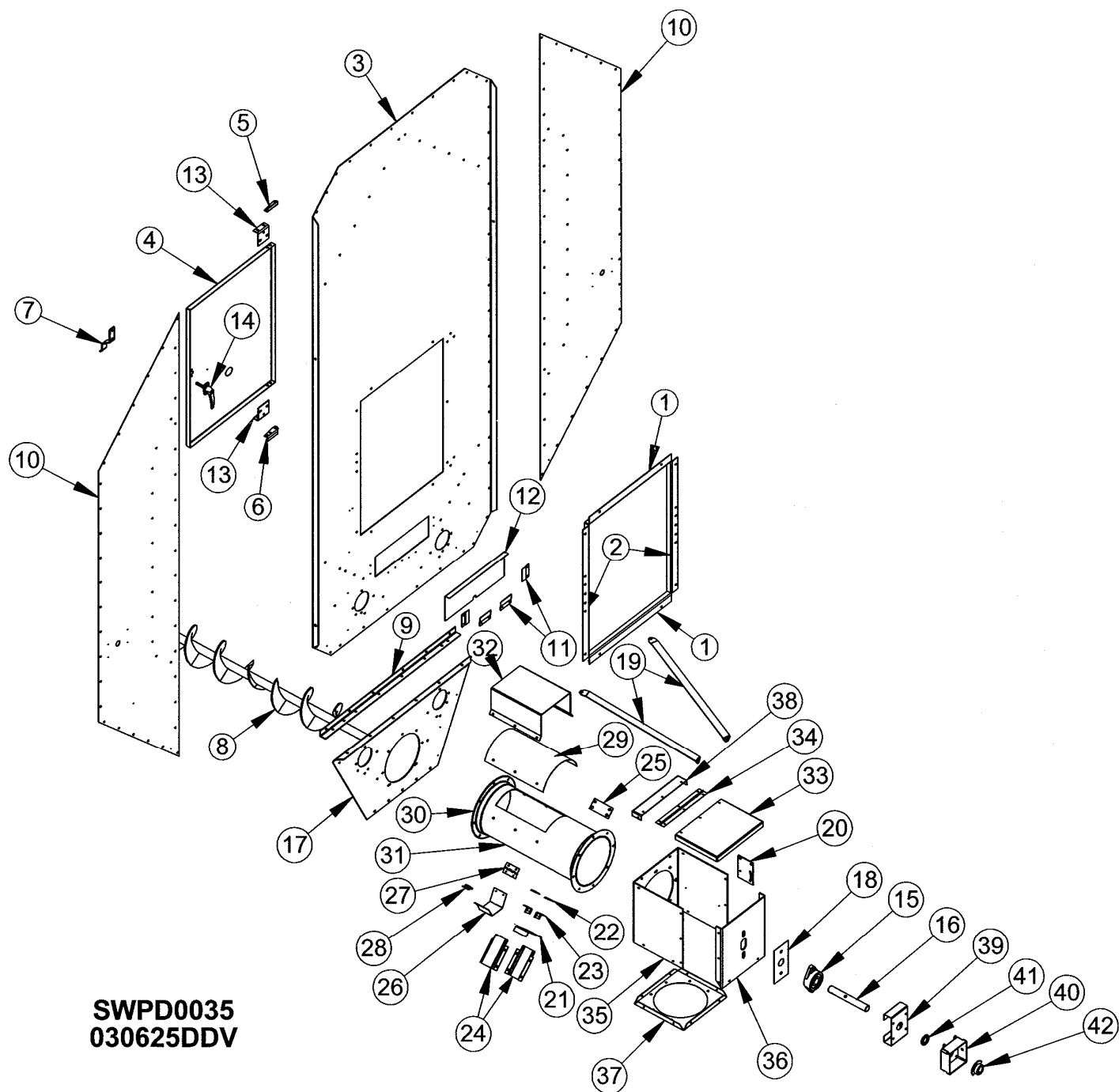


SWPD0014
010824BDW

DRIVE END OF DRYERS

REF #	DESCRIPTION	QTY	COMP #
1	Motor, 3HP, 1ph	1	T12590
	Motor, 3HP, 3ph	1	H3345
	Motor, 5HP, 1ph	1	T20590
	Motor, 5HP, 3ph	1	H4190
2	Flangette, 3 hole for 205 Bearing	8	J0098
3	Sprocket, 40B20, 1" Bore	2	J16487
4	Meter Plate	4	T17920
6	Sprocket, 50B12, 1" Bore	2	J1678
7	Sprocket, 40B30, 1" Bore	2	J1649
8	Shaft, Front, Meter Roll	4	T16266
9	Screw, 1/2-13, 3, PLTD, Gr. 5, HHCS	2	J0750
10	Sprocket, Idler, 50-13	2	J1685
11	Spacer, Sprocket, Continuous	2	T16282
12	Nut, Hex, 1/2-13, PLT, Gr. 5	2	J1040
13	Washer, Lock, 1/2, PLT, Split	2	J1215
14	Washer, Flat, 1/2, PLT	2	J1125
15	Bearing, 1.25, FLG, W/LC, HCFTS207-20	1	J0010
16	Pulley, 3.5 OD, 1.125, DBL, B, Cast	1	J0317
17	Pulley, 15.75OD, DBL "B" Gr., SK	2	J03992
18	Bushing, 1.25, SK	2	J0410
19	Sprocket, 50B12, 1.125" Bore	1	J16612
20	Reducer, Speed, 150: 1, 6003869	1	J3682
21	Motor, 1HP, 180V DC, 1750 RPM, TEFC	1	H1140
22	Chain, #50 157 Links	1	T16803
23	Chain, #40 73 Links	2	T16800
24	Chain Link, #50 Connector	1	J1760
25	Chain Link, #40 Connector	2	J1745
26	Chain Link, #40 Offset 1/2 Link	2	J1750
27	Belt, BX 72	2	J0246

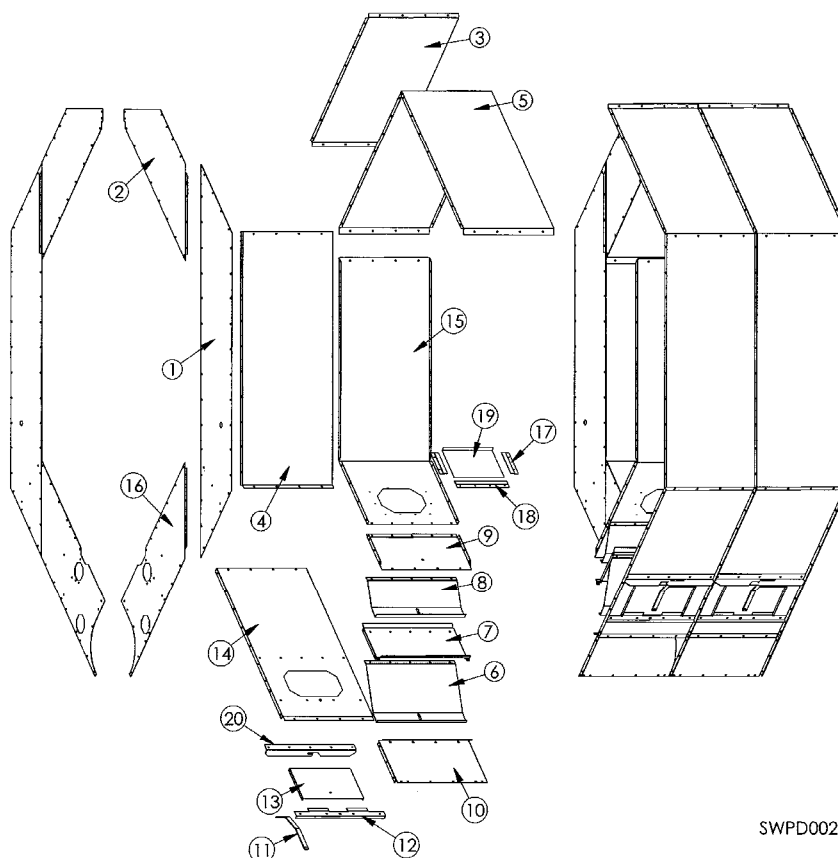
DRIVE END OF DRYERS, SINGLE MODULE - BACK END



SINGLE MODULE - BACK END

REF #	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

COLUMN PARTS

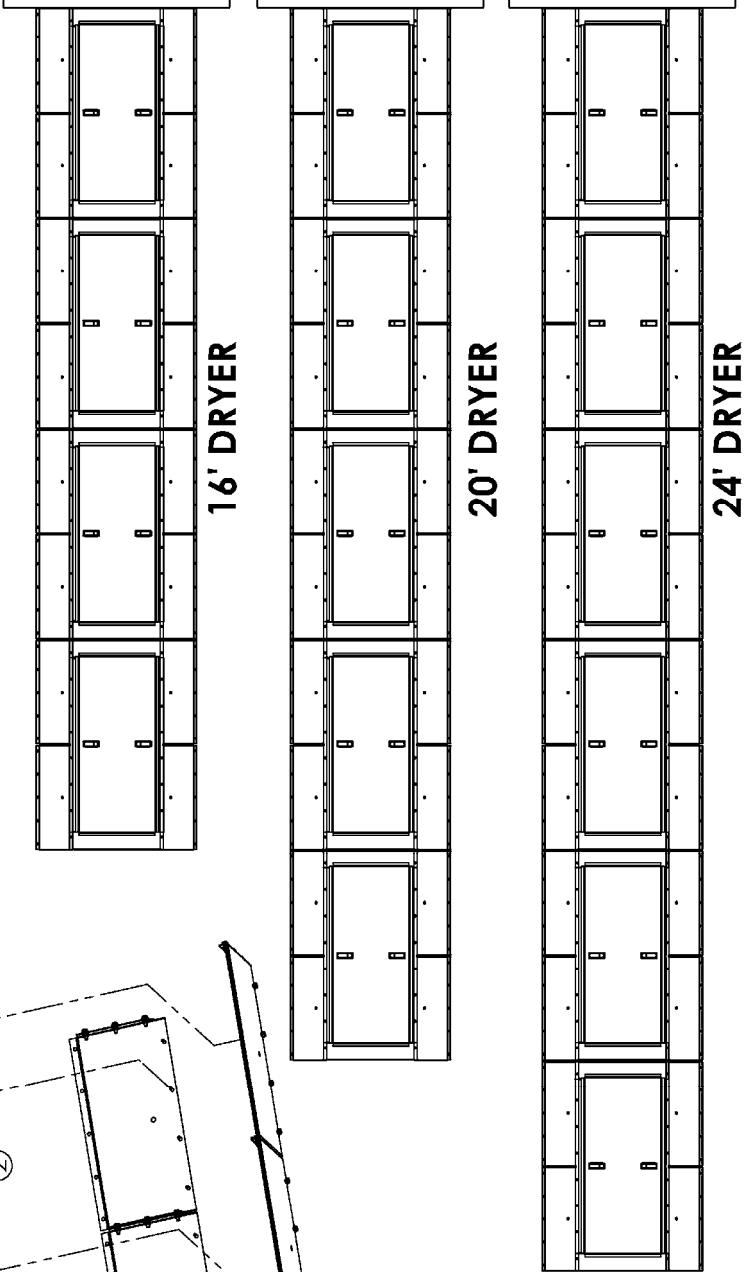
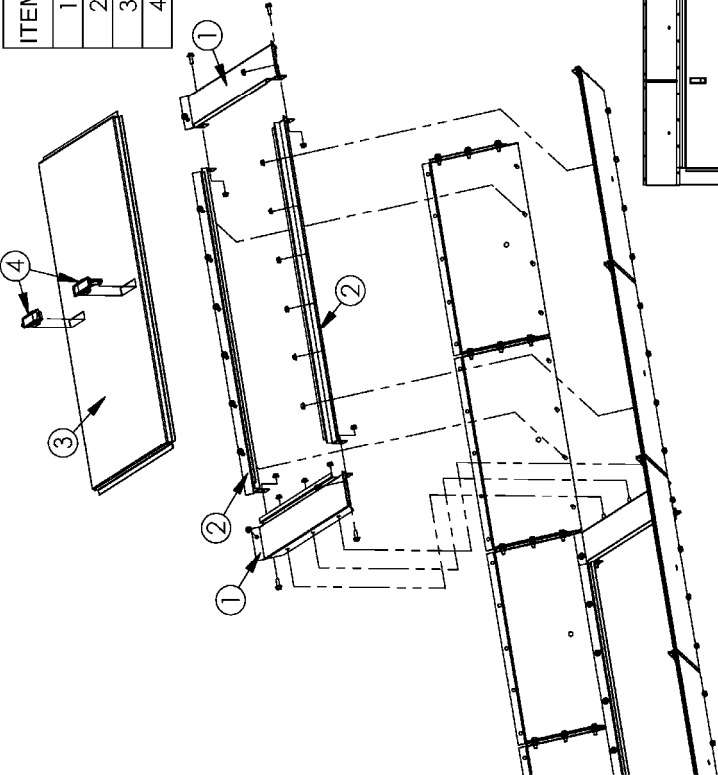


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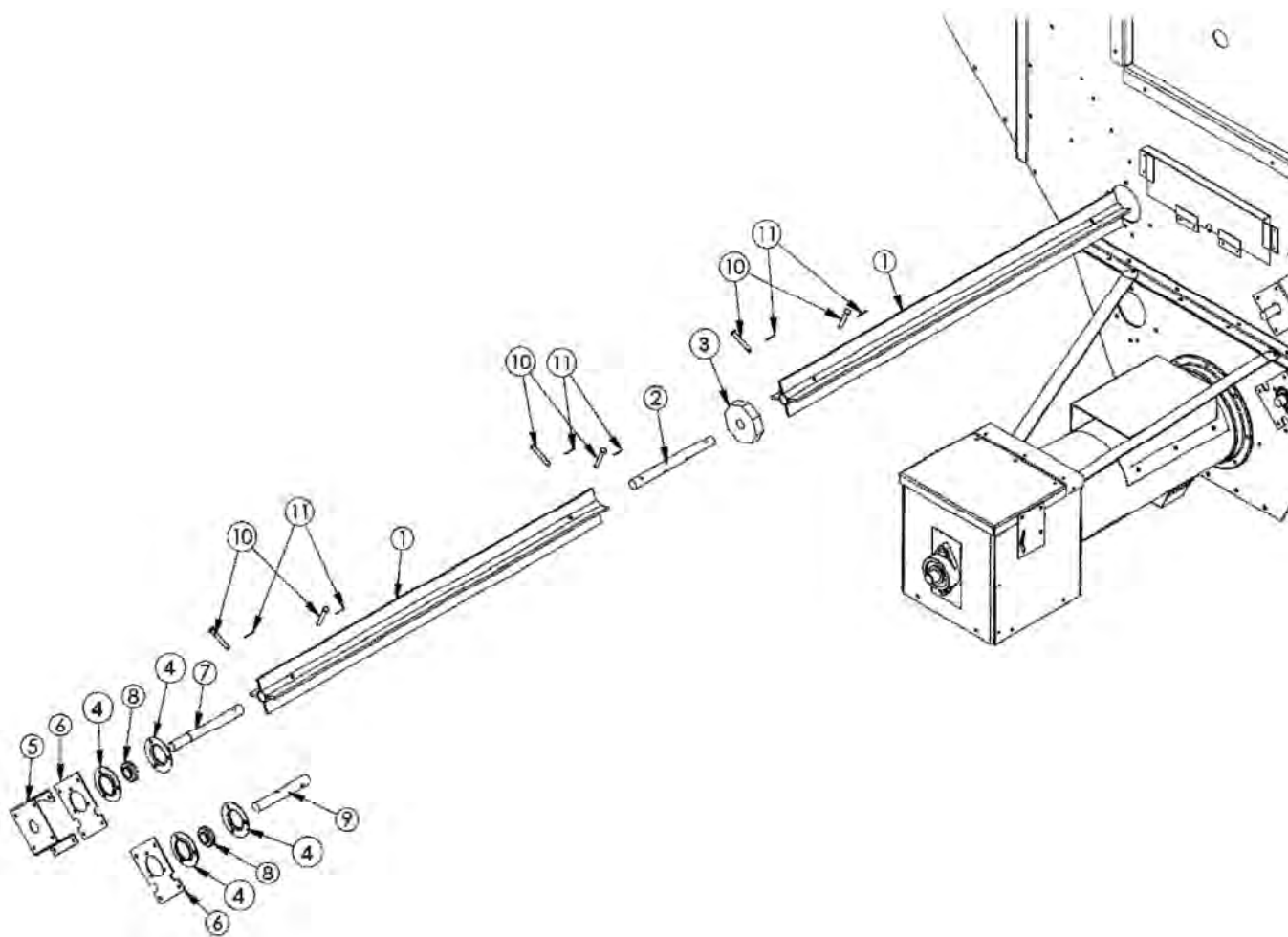
REF #	DESCRIPTION	12'		16'		20'		24'	
		QTY	COMP #	QTY	COMP #	QTY	COMP #	QTY	COMP #
1	Side Divider	10	T16110	14	T16110	18	T16110	22	T16110
2	Upper Divider	10	T16111	14	T16111	18	T16111	22	T16111
3	Outer Top Perf. Panel (Stainless)	12	T16105S	16	T16105S	20	T16105S	24	T16105S
	Outer Top Perf. Panel (Galvanized)	12	T16105	16	T16105	20	T16105	24	T16105
4	Outside Middle Perf. Panel (Stainless)	12	T16104S	16	T16104S	20	T16104S	24	T16104S
	Outside Middle Perf. Panel (Galv.)	12	T16104	16	T16104	20	T16104	24	T16104
5	Top Inner Perf. Panel	6	T16114	8	T16114	10	T16114	12	T16114
6	Bottom Flow Control Gate	12	T17900	16	T17900	20	T17900	24	T17900
7	Column Separator	12	T17901	16	T17901	20	T17901	24	T17901
8	Top Flow Control Gate	12	T17902	16	T17902	20	T17902	24	T17902
9	Rigid Adjustment Plate	12	T17903	16	T17903	20	T17903	24	T17903
10	Bottom Rigid Door	12	T17904	16	T17904	20	T17904	24	T17904
11	Latch	12	T17906	16	T17906	20	T17906	24	T17906
12	Support Latch Strap	12	T17907	16	T17907	20	T17907	24	T17907
13	Outer Cleanout Door	12	T17908	16	T17908	20	T17908	24	T17908
14	Bottom Outer Perf. Panel (Stainless)	12	T17909S	16	T17909S	20	T17909S	24	T17909S
	Bottom Outer Perf. Panel (Galv.)	12	T17909	16	T17909	20	T17909	24	T17909
15	Inner Side Perf. Panel	12	T17910	16	T17910	20	T17910	24	T17910
16	Lower Divider	10	T17924	14	T17924	18	T17924	22	T17924
17	Side Rail, Inner Access	24	T16219	32	T16219	40	T16219	48	T16219
18	Bottom Rail, Inner Access	12	T16220	16	T16220	20	T16220	24	T16220
19	Inner Access Door	12	T16221	16	T16221	20	T16221	24	T16221
20	Door Latch Bracket	12	T17657	16	T17657	20	T17657	24	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

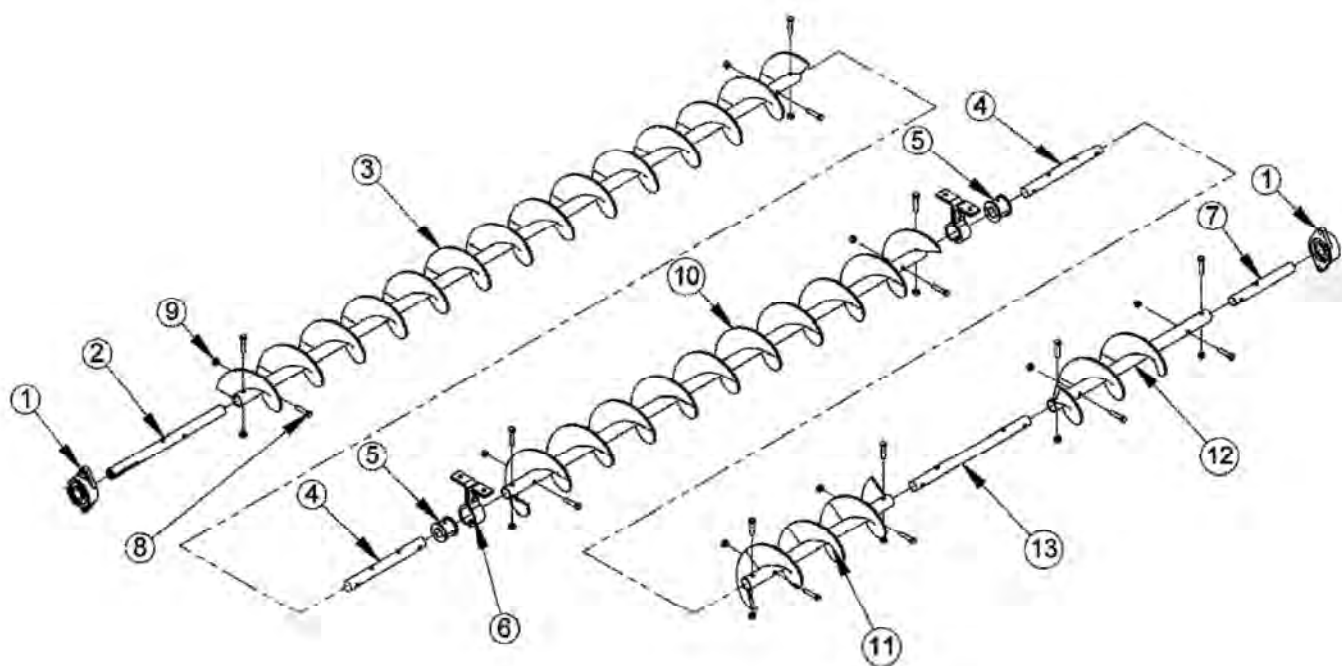


BACK METERING ROLLS



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	Pin, Picker, 3/8, 1-1/2, PLT	J15431
11	Pin, Cotter, 1/8, 1, PLT	J1420

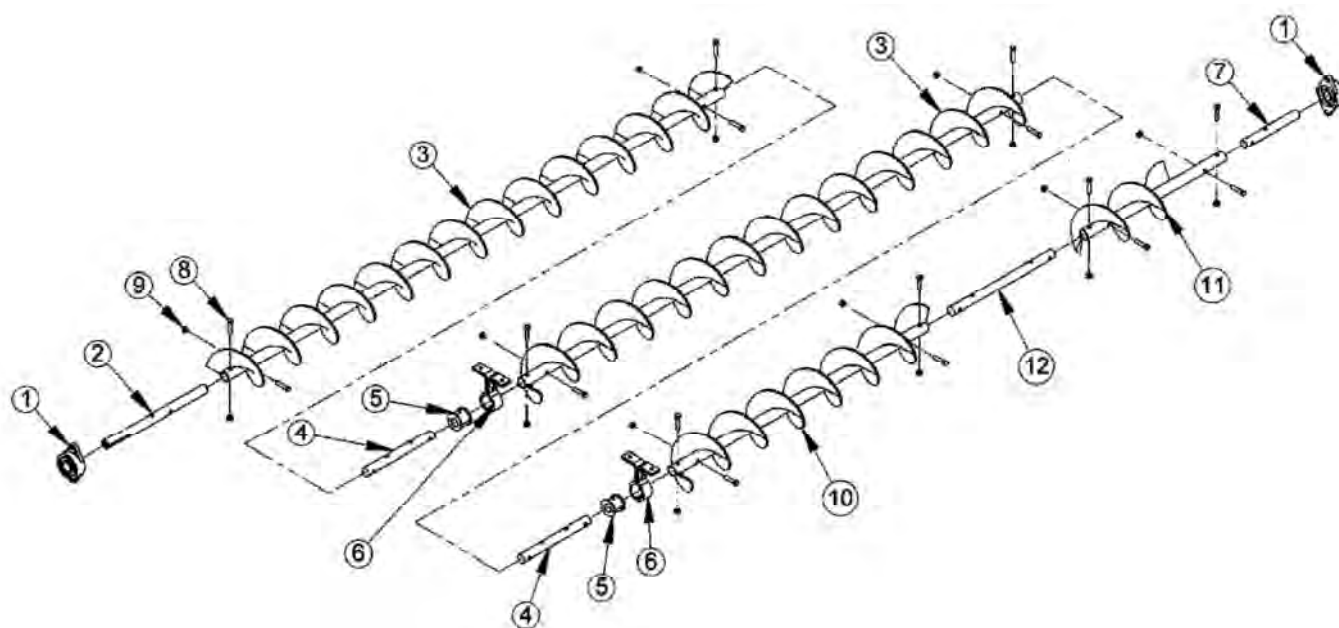
16' BOTTOM AUGER



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

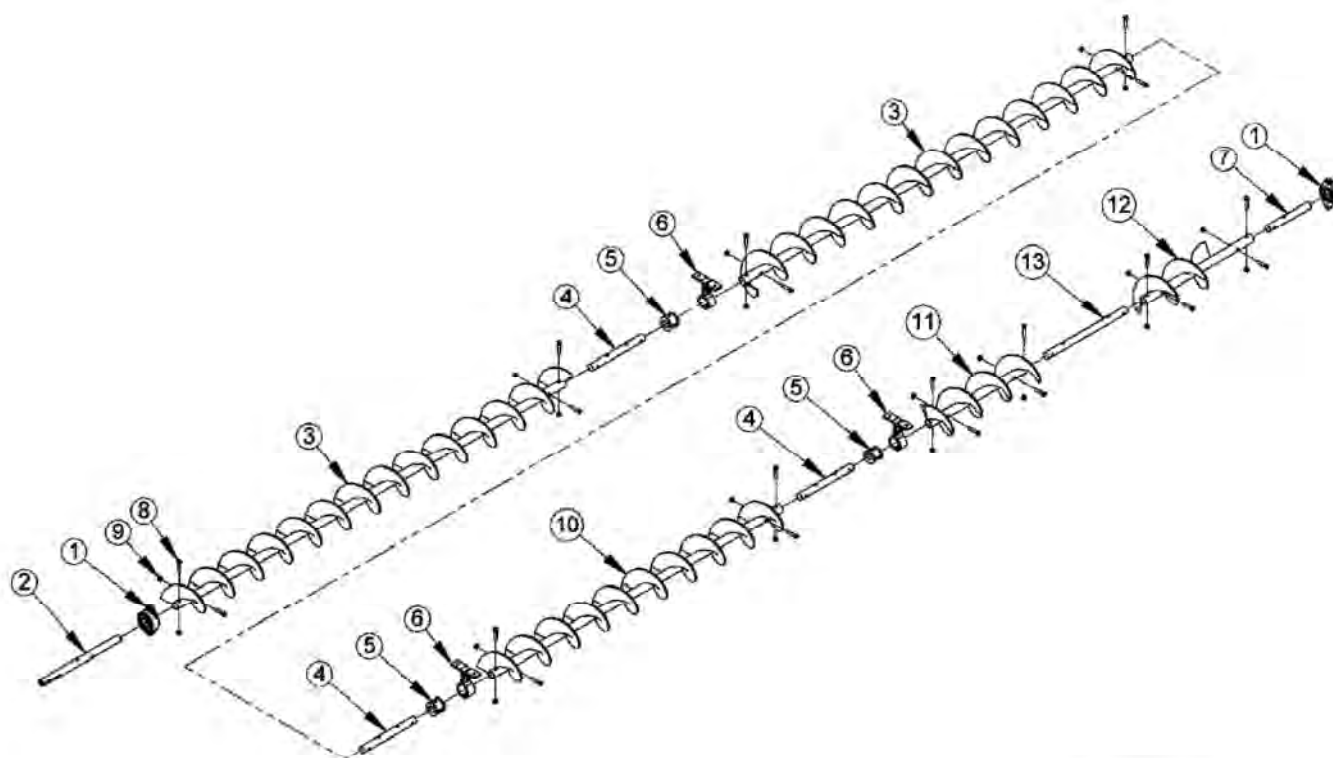
20' BOTTOM AUGER



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

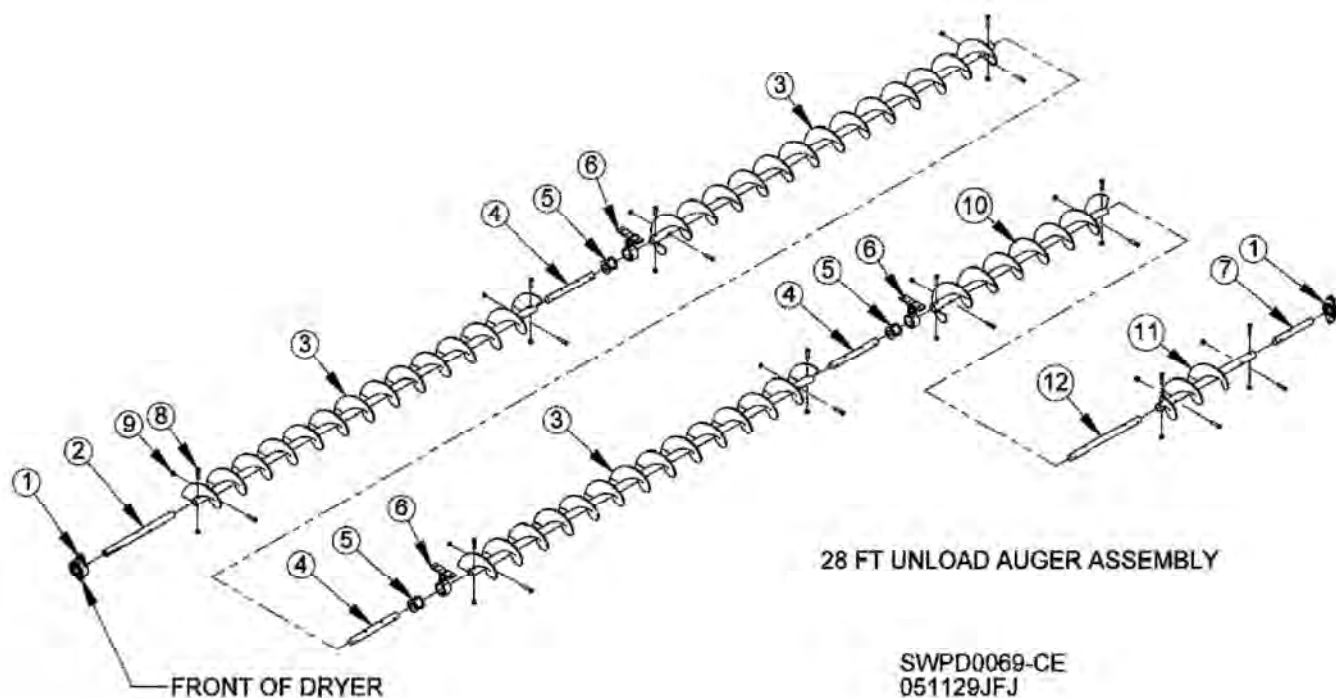
24' BOTTOM AUGER



SWPD0034

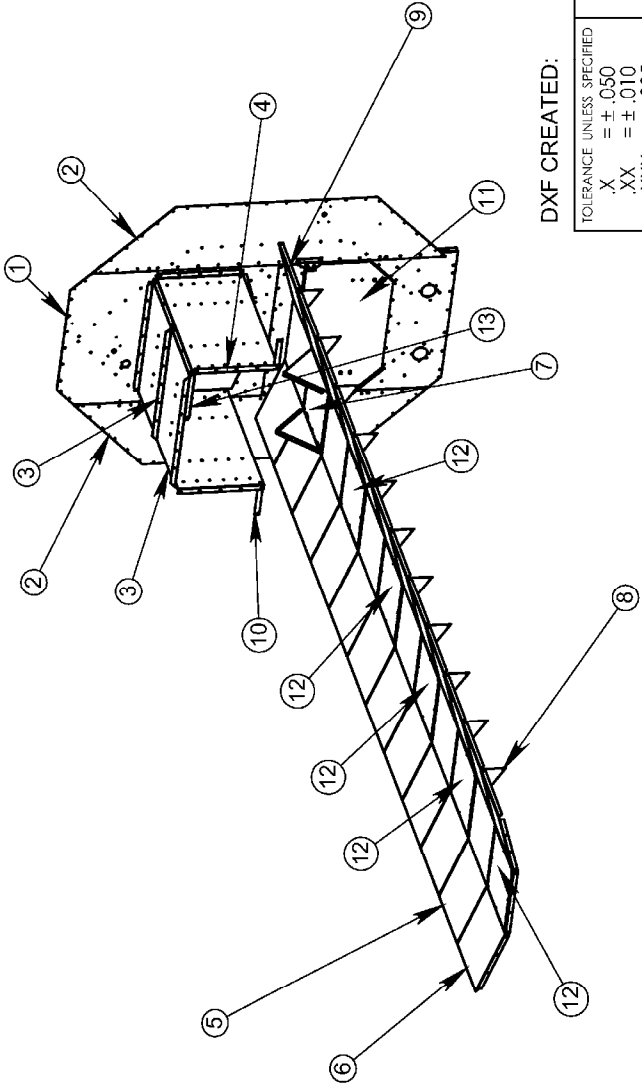
REF #	DESCRIPTION	QTY	COMP #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	2	T16430
4	Shaft, 8" Hanger Bearing	3	F4720
5	Bushing, Wood, 1.25" I.D.	3	J0096
6	Hanger Auger, T, 6CH2203	3	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
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

T15713C FRONT PANEL,
FAN SUPPORT



ITEM NO.

PART NO.

DESCRIPTION

QTY.

1	T80150	FRONT END PLATE, CENT. FAN	1
2	T16101	SIDE END PLATE	2
3	T80151	TOP PANEL, HEATER SHIELD	2
4	T80241	PANEL, SIDE, TUNNEL EXTEN	2
5	T24600	DIVIDER, PLENUM	6
6	T80144AM	DIVIDER WITH HOLE ASSM. WITH NUT INSERTS	6
7	T80145	COVER, PLENUM DIVIDER W/ CUTOUT	1
8	T24601	GUSSET, PLENUM DIVIDER	22
9	T80128	UPPER SEAL PLATE, END PLT SUCTION OPEN	1
10	T80240	BRKT EXTENSION TO PERF	2
11	T43940	AIR BAFFLE ASSEMBLY	1
12	T80260	COVER, PLENUM DIVIDER, FLAT	5
13	T80257	STAGNATOR 11IN, CFD, CENT	1

DXF CREATED:

TOLERANCE UNLESS SPECIFIED

X = ± .050

XX = ± .010

XXX = ± .005

FRAC = ± 1/32



 = ± 1°

DRAWN BY

DATE

USED IN ASSY OF

JFJ

4/15/2008

CONT FLOW DRYER

RAW MAT. NO.

PART NO.

MATERIAL

T15713C

REVISIONS

REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
B	CHG TUNNEL EXTENSION	1/13/2012	MJM
A	CHG TUNNEL EXTENSION	1/22/2010	DJB

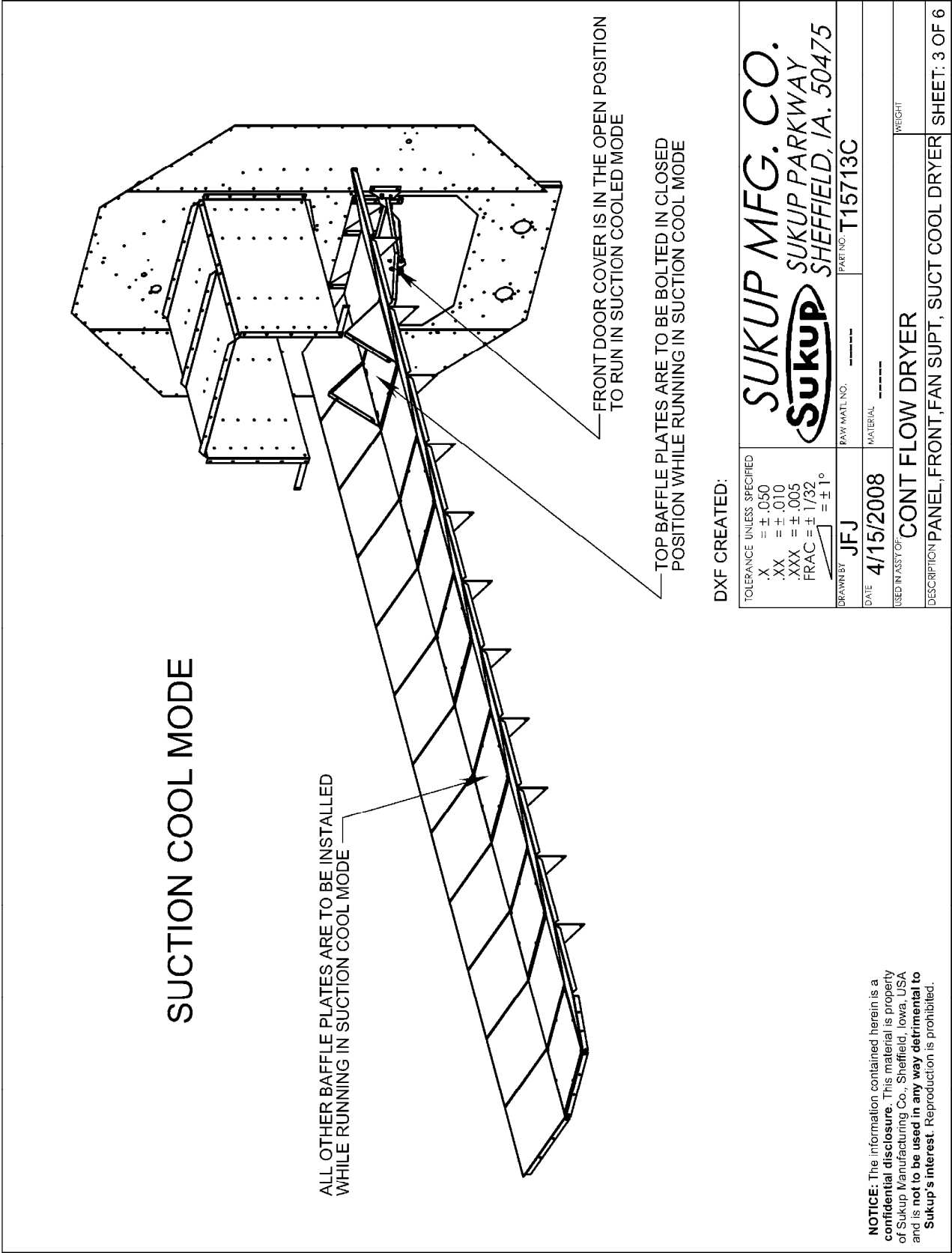
NOTICE:

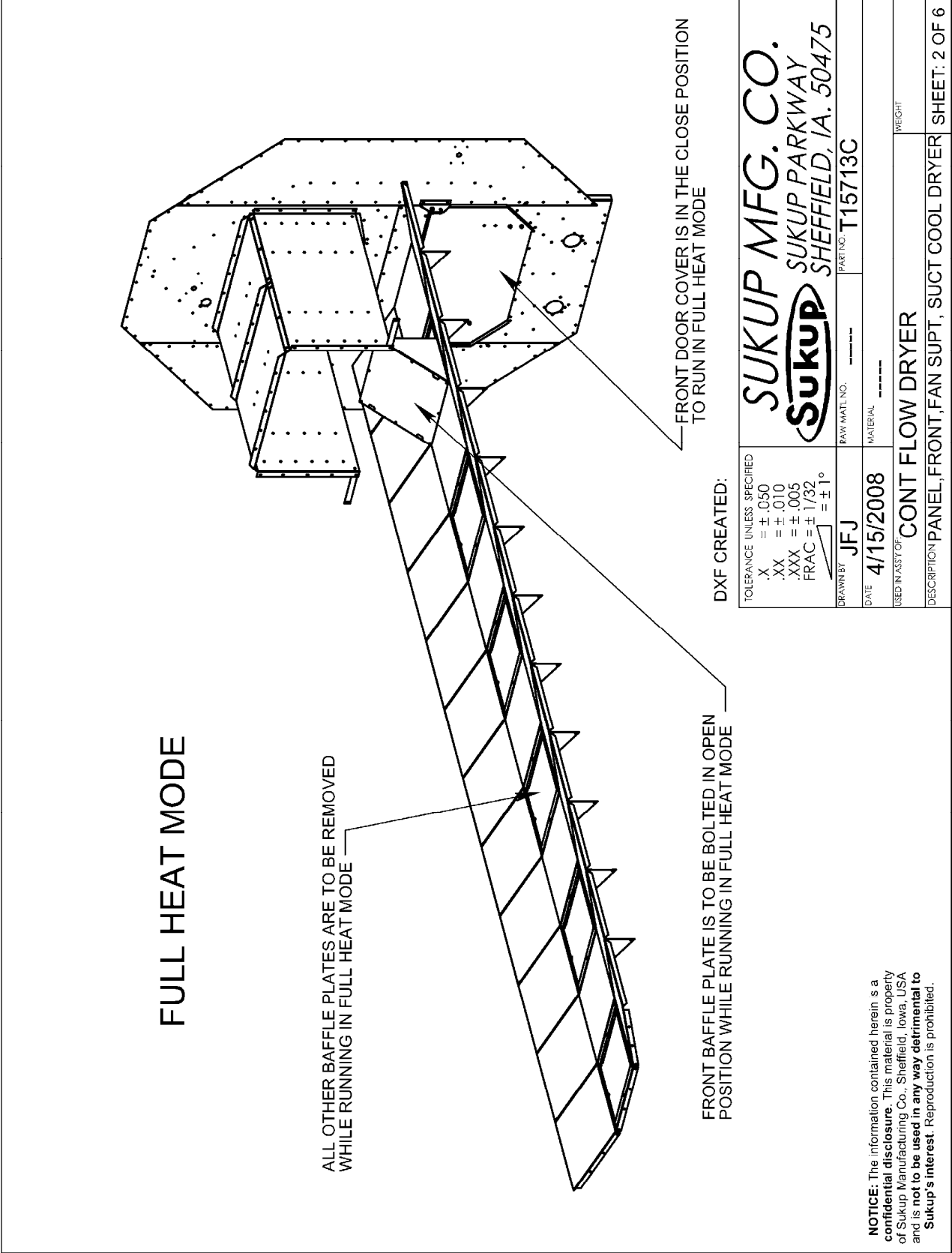
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DESCRIPTION: PANEL, FRONT, FAN SUPT, SUCT COOL DRYER

SHEET: 1 OF 6







ITEM NO.		PART NUMBER	EXPLODED VW/QTY.	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
= ± 1°

DRAWN BY: KGJ

DATE: 10/30/2009

USED IN ASS'Y OF: AIR BAFFLE, CENTRIFUGAL DRYER

DESCRIPTION: AIR BAFFLE ASSEMBLY

RAW MAT. NO. T43940

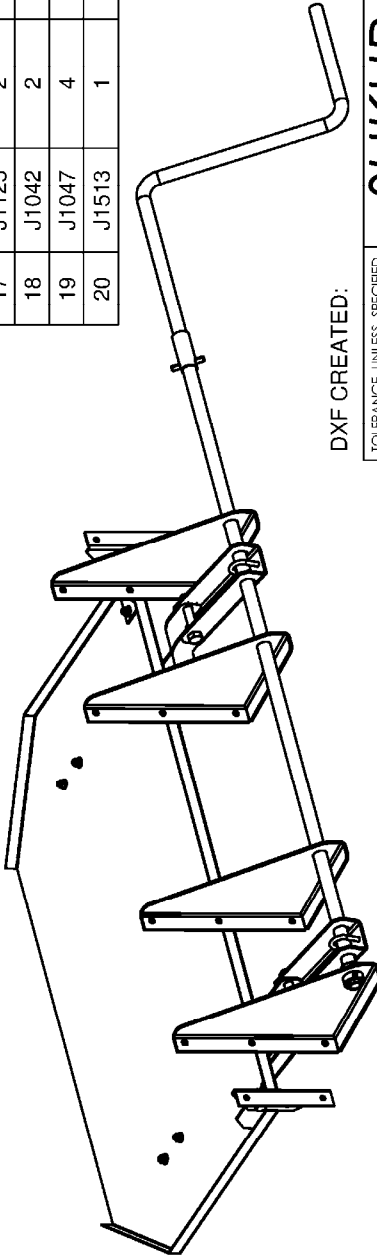
PART NO. T43940

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

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WEIGHT: 82.76

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**
DATE: **10/30/2009**
USED IN ASSY OF: **AIR BAFFLE, CENTRIFUGAL DRYER**
DESCRIPTION: **AIR BAFFLE ASSEMBLY**

RAW MAT'L NO.: **T43940**
MATERIAL: **82.76**
SHEET: 2 OF 2

REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			



SWCD0064
4/15/2011 MJM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	T80151	TOP PANEL, HEATER SHIELD	2
2	T80241	PANEL,SIDE,TUNNEL EXTEN	2
3	T80240	BRKT,EXTENSION TO PERF	2
4	T16164	DEFLECTOR,AIR	11

DXF CREATED:

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

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

DRAWN BY: **MJM**
DATE: **4/15/2011**

RAW MATL NO. -----
PART NO. -----
MATERIAL -----

USED IN ASSY OF: **CONT FLOW DRYER**

DESCRIPTION: **INNER PLENUM DUCTWORK**

SHEET: 1 OF 1

REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			

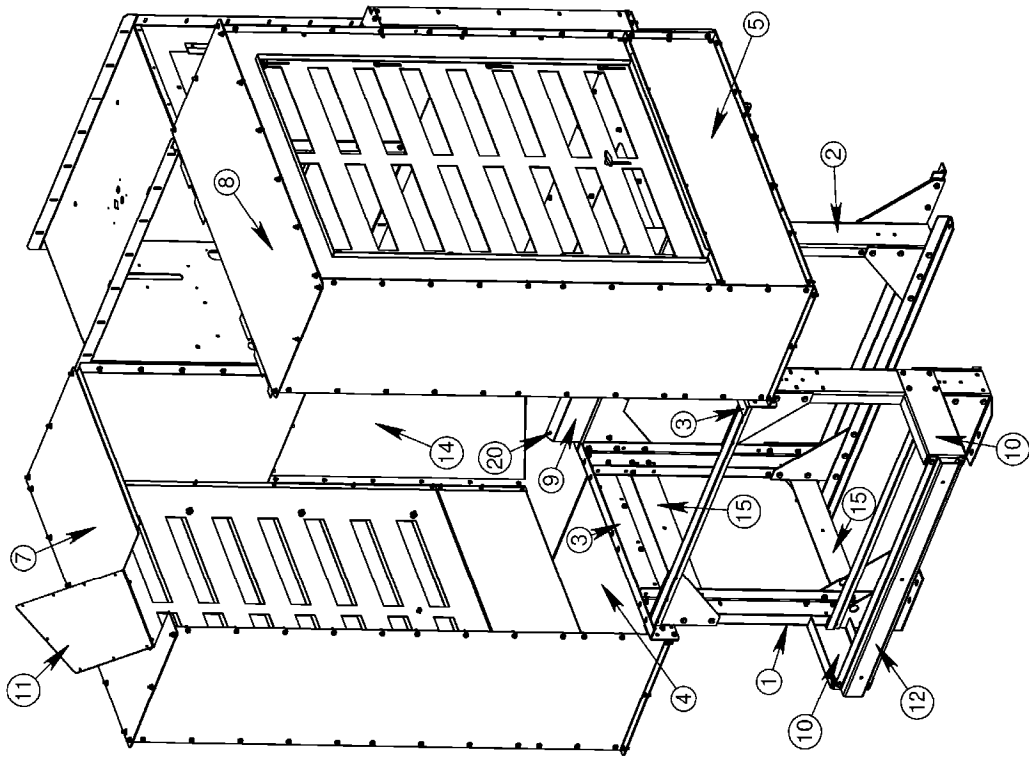
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SINGLE-PHASE
T157432 DRYER FRONT FAN SUPPORT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29451	1	FRAME, 1 PH FAN SUPPORT, BACK
2	T29452	1	FRAME FAN SUPPORT, FRONT
3	T29456	2	HOZT SIDE, BLOWER MOUNT FRAME
4	T29457	1	LOWER PANEL ASSY, RH
5	T29458	1	LOWER PANEL ASSY, LH
6	T29463	2	CLIP, FRONT PANEL
7	T29464	1	INTAKE PLENUM, RH
8	T29465	1	INTAKE PLENUM, LH
9	T29470	1	SEAL PLATE, REAR, BLOWER
10	T29472	2	EXTENSION BRACKET, POWER BOX
11	T29474	1	OUTER COVER BELT GUARD
12	T29156	1	BRACE, LOWER POWER BOX MOUNTING
13	T29157	4	BRACE, TOP POWER BOX MTG
14	T80164	1	DUCTWORK, SUCT COOL DRYER CONNECTION
15	T80219	2	MOUNTING PLATE, MANUAL CONTROL BOX
16	J1110	159	NUT, WHIZ, 5/16-18
17	J0536	159	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
18	J0611	12	BOLT, BIN, 3/8-16X1", GR8, 2PLT
19	J1017	12	NUT, 3/8-16 FLANGE WHIZLOK
20	J0496	6	SCREW, 1/4-20, 3/4", PLT, SELFDRILL



DXF CREATED:

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

SUKUP MFG. CO.

SUKUP PARKWAY
SHEFFIELD, IA. 50475

RAW MTL. NO. PART NO. T157432

DATE	3/14/2011	MATERIAL
USED IN ASSY OF:	1 PH FAN SUCT/COOL DRYER	WEB# 1457.755
DESCRIPTION	CENT FAN SPRT, SUCT COOL DUCT	SHEET: 1 OF 5

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REV.	DESCRIPTION OR ORDER #	DATE	BY
REVISIONS			



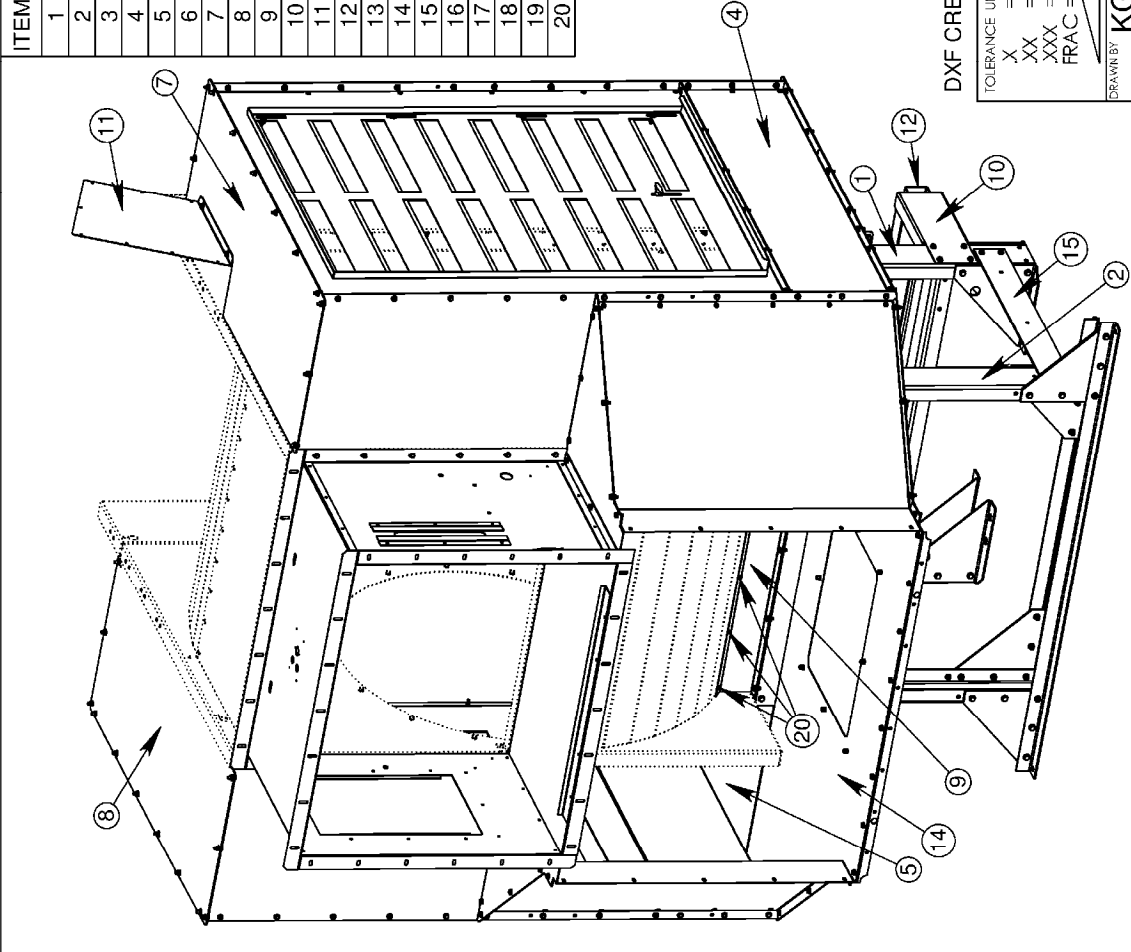
SINGLE-PHASE T157432 DRYER FRONT FAN SUPPORT

CENTRIFUGAL FAN SUPPORT, SUCTION COOL DUCT

ITEM #	DESCRIPTION	QTY	PART #	ITEM #	DESCRIPTION	QTY	PART #
1	FRAME, 1PH FAN SUPPORT, BACK	1	T29451	6 (cont.)	NUT, WHIZ, 5/16-13	24	J1110
	FRONT LEG, BLOWER MOUNT FRAME	2	T29453		PANEL, CLEAN OUT	1	T80230
	LF BRACKET, FRONT LEGS, BLOWER MOUNT FRAME	2	T80155	7	MOUNTING PLATE, MANUAL CONTROL BOX	2	T80219
	GUSSET PLATE, BLOWER MOUNT FRAME	2	T80138	8	SEAL PLATE, REAR, BLOWER	1	T29470
	HORIZONTAL BASE 1, BLOWER MOUNT FRAME	2	T80140	9	CLIP, FRONT PANEL	2	T29463
	RT BRACKET, FRONT LEGS, BLOWER MOUNT FRAME	2	T80156	10	INTAKE, PLENUM, RH	1	T29464
	BOLT, BIN, 3/8-16x1", GR8.2PLT	22	J0611		AIR PANEL, STATIONARY ASSY	1	T29466
	NUT, 3/8-16 FLANGE WHIZLOK	22	J1017		AIR PANEL, STATIONARY	1	T29467
2	FRAME, FAN SUPPORT, FRONT	1	T29452		END FLANGE, AIR PANEL	2	T80103
	REAR LEG, BLOWER MOUNT FRAME	2	T29454		1/4" X 5/8" HUCKBOLT	12	J0892
	GUSSET PLATE, BLOWER MOUNT FRAME	6	T80138		SLEEVE, HUCKBOLT, 1/4"	12	J0893
	HORIZONTAL BASE 2, BLOWER MOUNT FRAME	1	T80141		NUT, RIVET, 5/16"-18	9	J1007
	HORIZONTAL BASE 3, BLOWER MOUNT FRAME	1	T80142		RT SIDE PANEL, BLOWER INTAKE DUCT	1	T80110
	SUPPORT, FRONT FAN, FRAME	1	T29455		RT TOP PANEL, FAN INTAKE DUCT	1	T29468
	BOLT, 3/8-16, 1GR8.2, WASHER	2	B5932		FRONT PANEL, BLOWER INTAKE DUCT	1	T29469
	BOLT, BIN, 3/8-16x1", GR8.2PLT	24	J0611		KNOB, PLASTIC, 5/16-18 X 3/4"	1	J4167
3	NUT, 3/8-16 FLANGE WHIZLOK	26	J1017		SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	26	J0536
4	HORIZONTAL SIDE, BLOWER MOUNT FRAME	2	T29456		NUT, WHIZ, 5/16-13	26	J1110
	LOWER PANEL ASSY, RH	1	T29457		AIR PANEL ASSEMBLY, ADJUSTABLE	1	T80204
	LOWER SIDE PANEL ASSEMBLY	1	T29459		AIR PANEL, ADJUSTABLE	1	T80104
	END FLANGE	2	T80107		VINYL EDGE GUARD 13/32 X 35/64	1	J70955
	SLEEVE, HUCKBOLT, 1/4"	6	J0893		WASHER, FLAT, 5/16	16	J1111
	1/4" X 5/8" HUCKBOLT	6	J0892		SCREW, 5/16-18, 1.25", PLT, GR5	8	J0550
	LOWER SIDE PANEL	1	T29460		NUT, LOCK, 5/16-18, PLT	8	J1010
	BOTTOM RT PANEL, BLOWER DUCT	1	T29462		NUT, RIVET, 5/16"-18	2	J1007
5	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	5	J0536	11	INTAKE PLENUM, LH	1	T29465
	NUT, WHIZ, 5/16-13	5	J1110		AIR PANEL, STATIONARY, ASSEM	1	T29466
	LOWER PANEL ASSY, LH	1	T29458		AIR PANEL, STATIONARY	1	T29467
	LOWER SIDE PANEL ASSEMBLY	1	T29459		END FLANGE, AIR PANEL	2	T80103
	END FLANGE	2	T80107		1/4" X 5/8" HUCKBOLT	12	J0892
	SLEEVE, HUCKBOLT, 1/4"	6	J0893		SLEEVE, HUCKBOLT, 1/4"	12	J0893
	1/4" X 5/8" HUCKBOLT	6	J0892		NUT, RIVET, 5/16"-18	9	J1007
	LOWER SIDE PANEL	1	T29460		AIR PANEL ASSEMBLY, ADJUSTABLE	1	T80204
	BOTTOM LT PANEL, BLOWER DUCT	1	T29461		AIR PANEL, ADJUSTABLE	1	T80104
	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	5	J0536		VINYL EDGE GUARD 13/32 X 35/64	1	J70955
6	NUT, WHIZ, 5/16-13	5	J1110		LT SIDE PANEL, BLOWER INTAKE DUCT	1	T80119
	DUCTWORK, SUCT COOL DRYER CONNECTION	1	T80164		LT TOP PANEL, INTAKE DUCT	1	T29471
	TRANSITION TOP PANEL	2	T80111		SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	26	J0536
	BOTTOM ANGLE, BLOWER TRANS-END PLT	1	T80121		NUT, WHIZ, 5/16-13	26	J1110
	PANEL, BOTTOM BLOWER TRANSITION ASSEMBLY	1	T80231		SCREW, 5/16-18, 1.25", PLT, GR5	8	J0550
	BOTTOM PANEL, BLOWER TRANSITION	1	T80122		KNOB, PLASTIC, 5/16-18 X 3/4"	1	J4167
	NUT, RIVET, 5/16"-18	8	J1007		WASHER, FLAT, 5/16	16	J1111
	TRANSITION SIDE PANEL W/HOLE	1	T80146		NUT, LOCK, 5/16-18, PLT	8	J1010
	PANEL, TRANSITION SIDE, W/HOLE	1	T80157		FRONT PANEL, BLOWER INTAKE DUCT	1	T29469
	END FLANGE, TRANSITION SIDE PANEL	1	T80114	12	OUTER COVER BELT GUARD	1	T29474
	1/4" X 5/8" HUCKBOLT	6	J0892	13	BRACE, TOP POWER BOX MTG	4	T29157
	SLEEVE, HUCKBOLT, 1/4"	6	J0893	14	NUT, WHIZ, 5/16-13	159	J1110
	TRANSITION SIDE PANEL	1	T80112	15	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	159	J0536
	PANEL, TRANSITION SIDE PANEL ASSY	1	T80113	16	BOLT, BIN, 3/8-16 X 1", GR8.2PLT	12	J0611
	END FLANGE, TRANSITION SIDE PANEL	1	T80114	17	NUT, 3/8-16 FLANGE WHIZLOK	12	J1017
	1/4" X 5/8" HUCKBOLT	6	J0892	18	EXTENSION BRACKET, POWER BOX	2	T29472
	SLEEVE, HUCKBOLT, 1/4"	6	J0893	19	BRACE, LOWER POWER BOX MOUNTING	1	T29156
	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ	32	J0536	20	SCREW, 1/4-20, 3/4", PLT, SELFDRILL	6	J0496

SINGLE-PHASE
T157432 DRYER FRONT FAN SUPPORT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29451	1	FRAME, 1 PH FAN SUPPORT, BACK
2	T29452	1	FRAME FAN SUPPORT, FRONT
3	T29456	2	HOZT SIDE, BLOWER MOUNT FRAME
4	T29457	1	LOWER PANEL ASSY, RH
5	T29458	1	LOWER PANEL ASSY, LH
6	T29463	2	CLIP, FRONT PANEL
7	T29464	1	INTAKE PLENUM, RH
8	T29465	1	INTAKE PLENUM, LH
9	T29470	1	SEAL PLATE, REAR, BLOWER
10	T29472	2	EXTENSION BRACKET, POWER BOX
11	T29474	1	OUTER COVER BELT GUARD
12	T29156	1	BRACE, LOWER POWER BOX MOUNTING
13	T29157	4	BRACE, TOP POWER BOX MTG
14	T80164	1	DUCTWORK, SUCT COOL DRYER CONNECTION
15	T80219	2	MOUNTING PLATE, MANUAL CONTROL BOX
16	J1110	159	NUT, WHIZ, 5/16-18
17	J0536	159	SCREW, 5/16-18, 3/4" PLT, GR5, HHWZ
18	J0611	12	BOLT, BIN, 3/8-16X1" GR8, 2PLT
19	J1017	12	NUT, 3/8-16 FLANGE WHIZLOK
20	J0496	6	SCREW, 1/4-20, 3/4, PLT, SELFDRILL



DXF CREATED:

TOLERANCE UNLESS SPECED X = ± .050 XX = ± .010 XXX = ± .005 FRAC = ± 1/32 ANGLE = ± 1°	SUKUP MFG. CO. Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475
DRAWN BY KGJ	PART NO. T157432
DATE 3/14/2011	MATERIAL
USED IN ASSY OF: 1 PH FAN SUCT/COOL DRYER	WEIGHT 1457.755
DESCRIPTION CENT FAN SPRT, SUCT COOL DUCT	SHEET: 2 OF 5

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SINGLE-PHASE
T157432 DRYER FRONT FAN SUPPORT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29451	1	FRAME, 1 PH FAN SUPPORT, BACK
2	T29452	1	FRAME FAN SUPPORT, FRONT
3	T29456	2	HOZT SIDE, BLOWER MOUNT FRAME
4	T29457	1	LOWER PANEL ASSY, RH
5	T29458	1	LOWER PANEL ASSY, LH
6	T29463	2	CLIP, FRONT PANEL
7	T29464	1	INTAKE PLENUM, RH
8	T29465	1	INTAKE PLENUM, LH
9	T29470	1	SEAL PLATE, REAR, BLOWER
10	T29472	2	EXTENSION BRACKET, POWER BOX
11	T29474	1	OUTER COVER BELT GUARD
12	T29156	1	BRACE, LOWER POWER BOX MOUNTING
13	T80164	1	DUCTWORK, SUCT COOL DRYER CONNECTION
14	T80219	2	MOUNTING PLATE, MANUAL CONTROL BOX

DXF CREATED:

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

DRAWN BY: KGJ
DATE: 3/14/2011
USED IN ASY OF: 1 PH FAN SUCT/COOL DRYER
DESCRIPTION: CENT FAN SPPT, SUCT COOL DUCT

SUKUP MFG. CO.
SUKUP PARKWAY
SHEFFIELD, IA. 50475
PART NO. T157432
RAW MAT L NO.
MATERIAL
WEIGHT: 1457.755
SHEET: 3 OF 5

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SINGLE-PHASE
T157432 DRYER FRONT FAN SUPPORT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29451	1	FRAME, 1 PH FAN SUPPORT, BACK
2	T29452	1	FRAME FAN SUPPORT, FRONT
3	T29456	2	HOZT SIDE, BLOWER MOUNT FRAME
4	T29457	1	LOWER PANEL ASSY, RH
5	T29458	1	LOWER PANEL ASSY, LH
6	T29463	2	CLIP, FRONT PANEL
7	T29464	1	INTAKE PLENUM, RH
8	T29465	1	INTAKE PLENUM, LH
9	T29470	1	SEAL PLATE, REAR, BLOWER
10	T29472	2	EXTENSION BRACKET, POWER BOX
11	T29474	1	OUTER COVER BELT GUARD
12	T29156	1	BRACE, LOWER POWER BOX MOUNTING
13	T29157	4	BRACE, TOP POWER BOX MTG
14	T80164	1	DUCTWORK, SUCT COOL DRYER CONNECTION
15	T80219	2	MOUNTING PLATE, MANUAL CONTROL BOX
16	J1110	159	NUT, WHIZ, 5/16-18
17	J0536	159	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
18	J0611	12	BOLT, BIN, 3/8-16X1", GR8, 2PLT
19	J1017	12	NUT, 3/8-16 FLANGE WHIZLOK
20	J0496	6	SCREW, 1/4-20, 3/4", PLT, SELFDRILL

DXF CREATED:

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

DRAWN BY: KGJ
DATE: 3/14/2011
MATERIAL: RAW MAX L INQ.

SUKUP MFG. CO.
SUKUP
SUKUP PARKWAY
SHEFFIELD, IA. 50475
PART NO. T157432

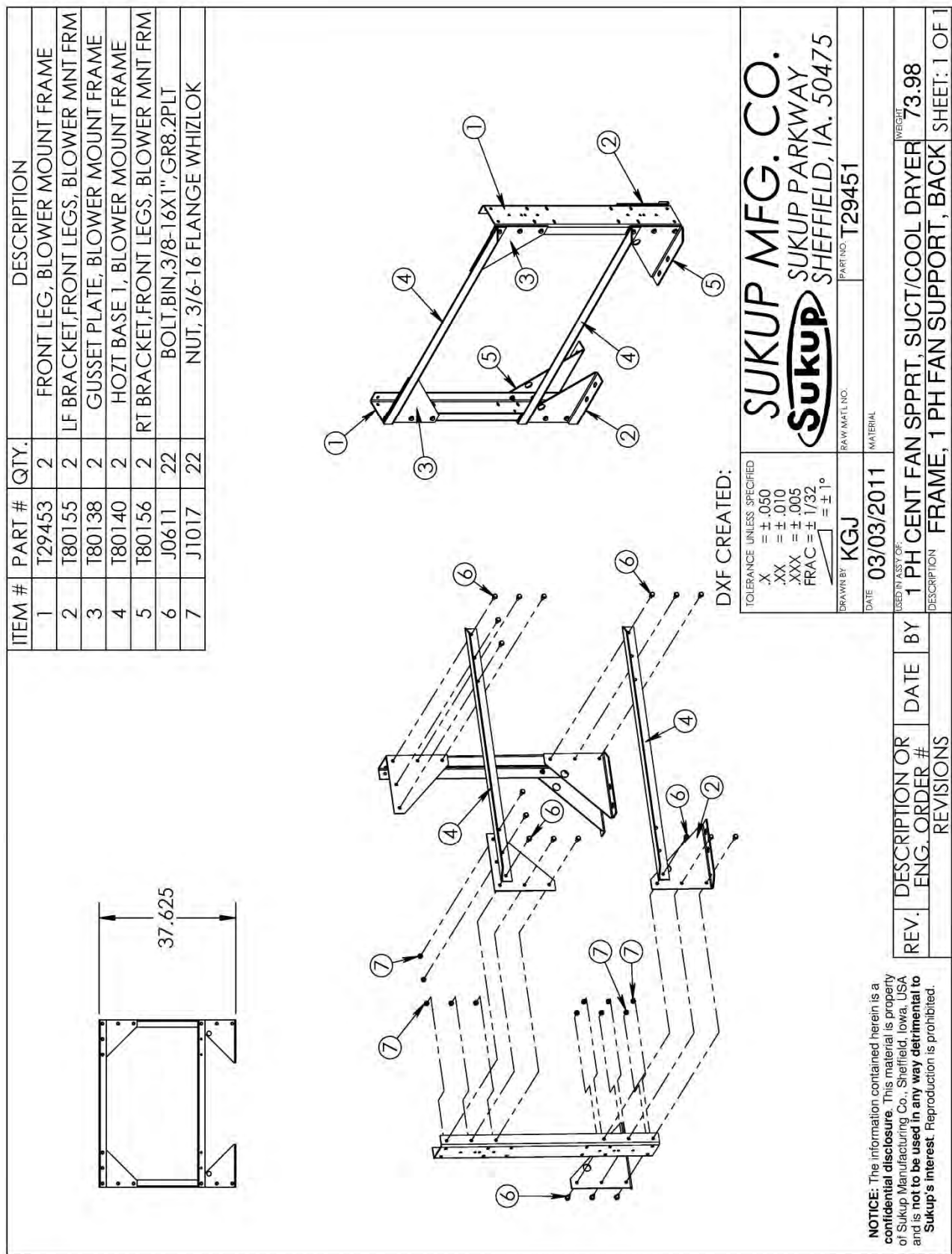
USED IN ASSY OF:
1 PH FAN SUCT/COOL DRYER
CENT FAN SPRT, SUCT COOL DUCT

WEIGHT: 1457.755
SHEET: 4 OF 5

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SINGLE-PHASE
T157432 FRAME FAN SUPPORT, BACK



SINGLE-PHASE
T157432 FRAME FAN SUPPORT, FRONT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29454	2	REAR LEG, BLOWER MOUNT FRAME
2	T80138	6	GUSSET PLATE, BLOWER MOUNT FRAME
3	T80141	1	HOZT BASE 2, BLOWER MOUNT FRAME
4	T80142	1	HOZT BASE 3, BLOWER MOUNT FRAME
5	T29455	1	FRAME FAN SUPPORT, FRONT
6	J0611	24	BOLT, BIN, 3/8-16X1", GR8, 2PLT
7	J1017	26	NUT, 3/8-16 FLANGE WHIZLOK

38 3/8"

DXF CREATED:

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

DRAWN BY: KGJ
DATE: 03/03/2011
USED IN ASSY OF: 1 PH CENT SUCT/COOL DRYER

RAW MAT L NO. T29452
MATERIAL

REV. DESCRIPTION OR ENG. ORDER # DATE BY

REVISIONS

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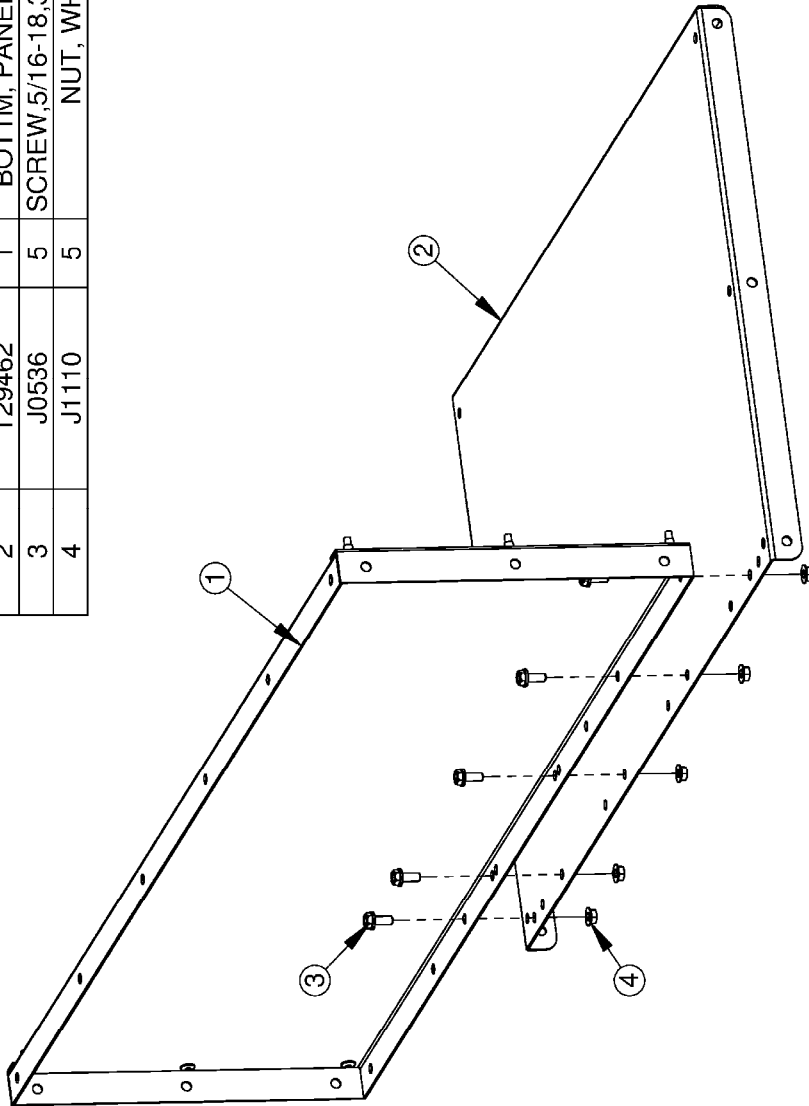
SUKUP MFG. CO.
SUKUP
SUKUP PARKWAY
SHEFFIELD, IA. 50475

WEIGHT: 91.25
SHEET: 1 OF 1



SINGLE-PHASE
T29457 LOWER PANEL ASSEMBLY, RIGHT

ITEM NO.	PART NUMBER	QTY.	DESCRIPTION
1	T29459	1	LOWER SIDE PANEL ASSEMBLY
2	T29462	1	BOTTOM, PANEL, BLOWER DUCT
3	J0536	5	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
4	J1110	5	NUT, WHIZ, 5/16-18



DXF CREATED:

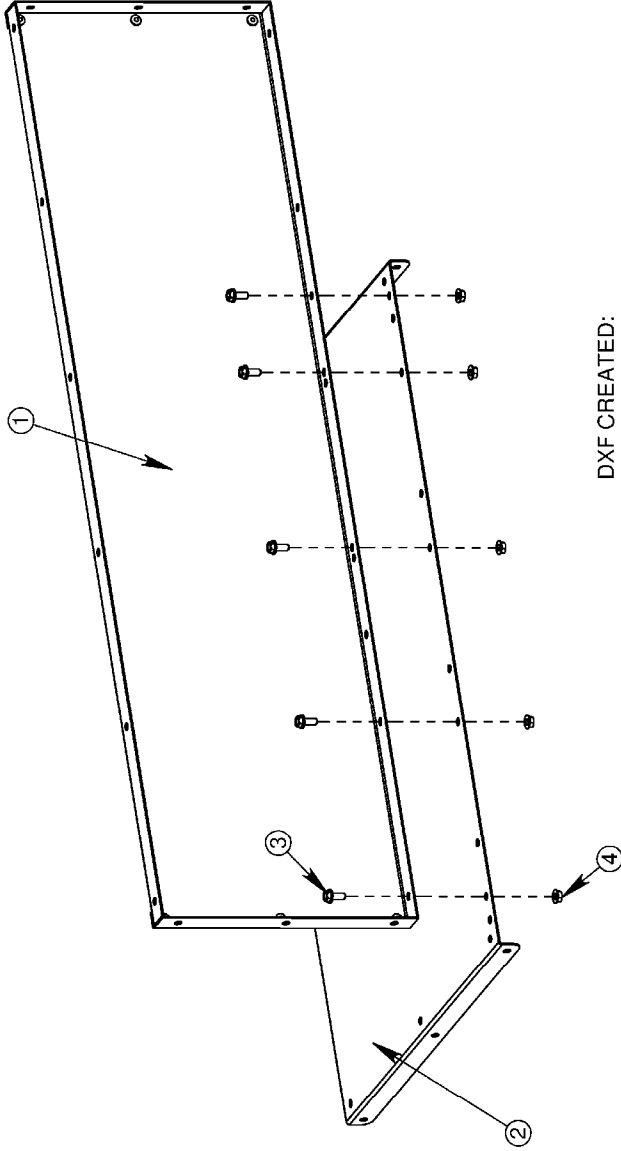
TOLERANCE UNLESS SPECIFIED X = ± .050 XX = ± .010 XXX = ± .005 FRAC = ± 1/32 ANGLE = ± 1°		SUKUP MFG. CO. Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475	
DRAWN BY	KGJ	RAW MATL. NO.	-----
DATE	03/04/2011	PART NO.	T29457
USED IN ASSY OF:	1PH CENT SUCT COOL DRYER		
DESCRIPTION	LOWER PANEL ASSY, RH		
REV	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			
			WEIGHT
			39.88
			SHEET: 1 OF 1

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SINGLE-PHASE
T29458 LOWER PANEL ASSEMBLY, LEFT

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	T29459	LOWER SIDE PANEL ASSEMBLY
2	1	T29462	BOTTOM, PANEL, BLOWER DUCT
3	5	J0536	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
4	5	J1110	NUT, WHIZ, 5/16-18



DXF CREATED:

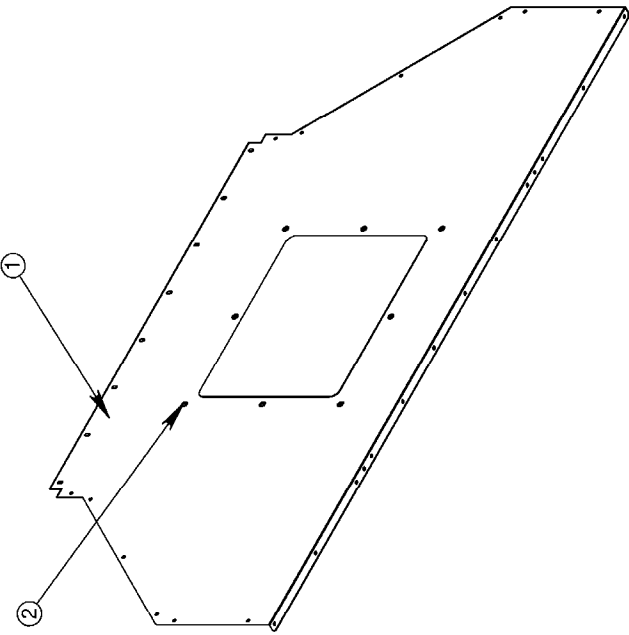
TOLERANCE UNLESS SPECIFIED X = ± .050 XX = ± .010 XXX = ± .005 FRAC = ± 1/32 ANGLE = ± 1°	SUKUP MFG. CO. Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475
DRAWN BY: KGJ	RAW MAT'L NO. -----
DATE: 03/07/2011	PART NO. T29458
USED IN ASSY OF: 1 PH CENT SUCT/COOL DRYER	MATERIAL: -----
REV. ORDER #	DESCRIPTION LOWER PANEL ASSY, LH
DATE	BY
REVISIONS	
SHEET: 1 OF 1	

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SINGLE-PHASE
T80231 BOTTOM BLOWER PANEL
TRANSITION ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80122	BOTTOM PANEL, BLOWER TRANSITION	1
2	J1007	NUT, RIVET, 5/16"-18	8



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

SUKUP MFG. CO.

SUKUP PARKWAY
SHEFFIELD, IA. 50475

DRAWN BY: DJB

DATE: 11-25-08

USED IN ASSY OF: SUCT COOL DRYER

DESCRIPTION: PANEL, BTM BLOWER TRANSITION ASSEMBLY

RAW MATL NO.

PART NO. T80231

MATERIAL

WEIGHT 58.64

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REF

ENG. ORDER #

BY

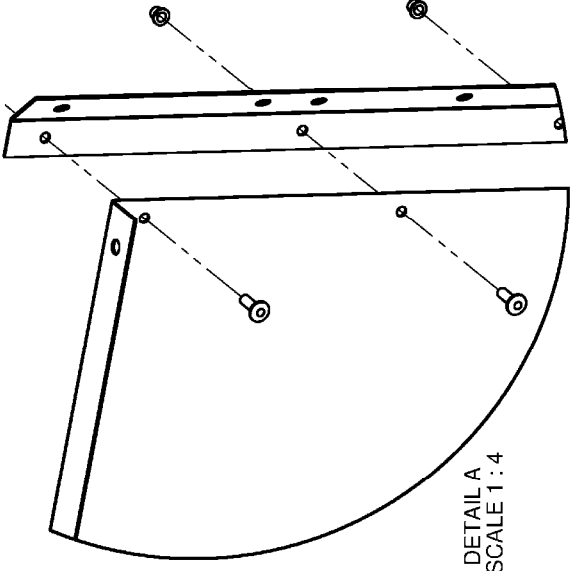
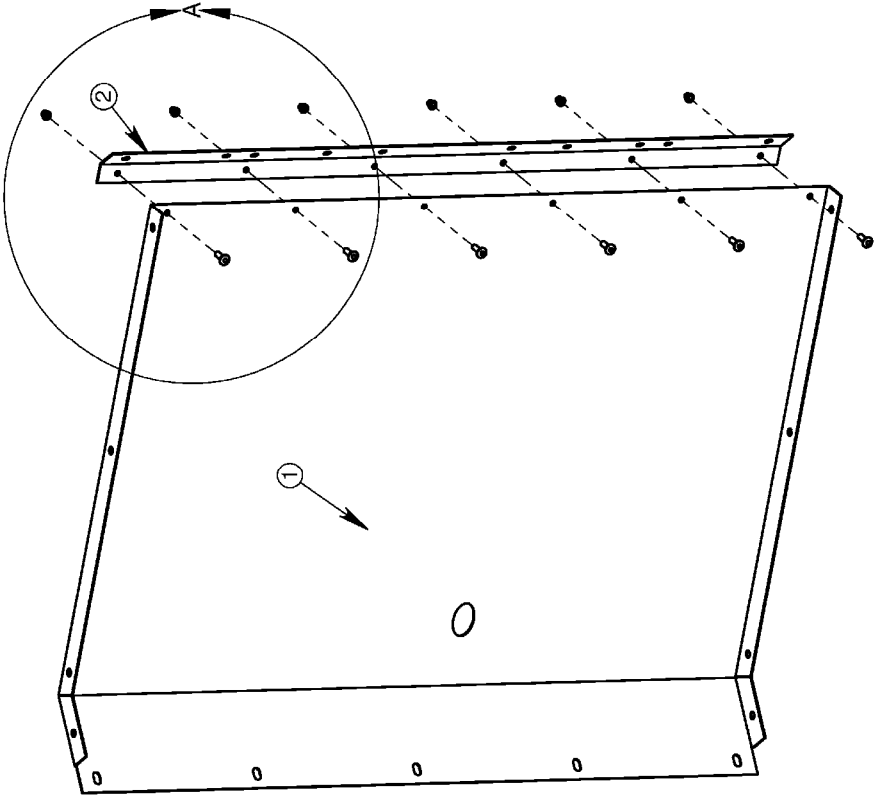
DATE

R E V I S I O N



SINGLE-PHASE
T80146 TRANSITION SIDE PANEL, W/ HOLE

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80157	PANEL, TRANSITION SIDE, W/ HOLE	1
2	T80114	END FLANGE, TRANSITION SIDE PANEL	1
3	J0892	1/4" X 5/8" HUCKBOLT	6
4	J0893	SLEEVE, HUCKBOLT, 1/4"	6



DXF CREATED:

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

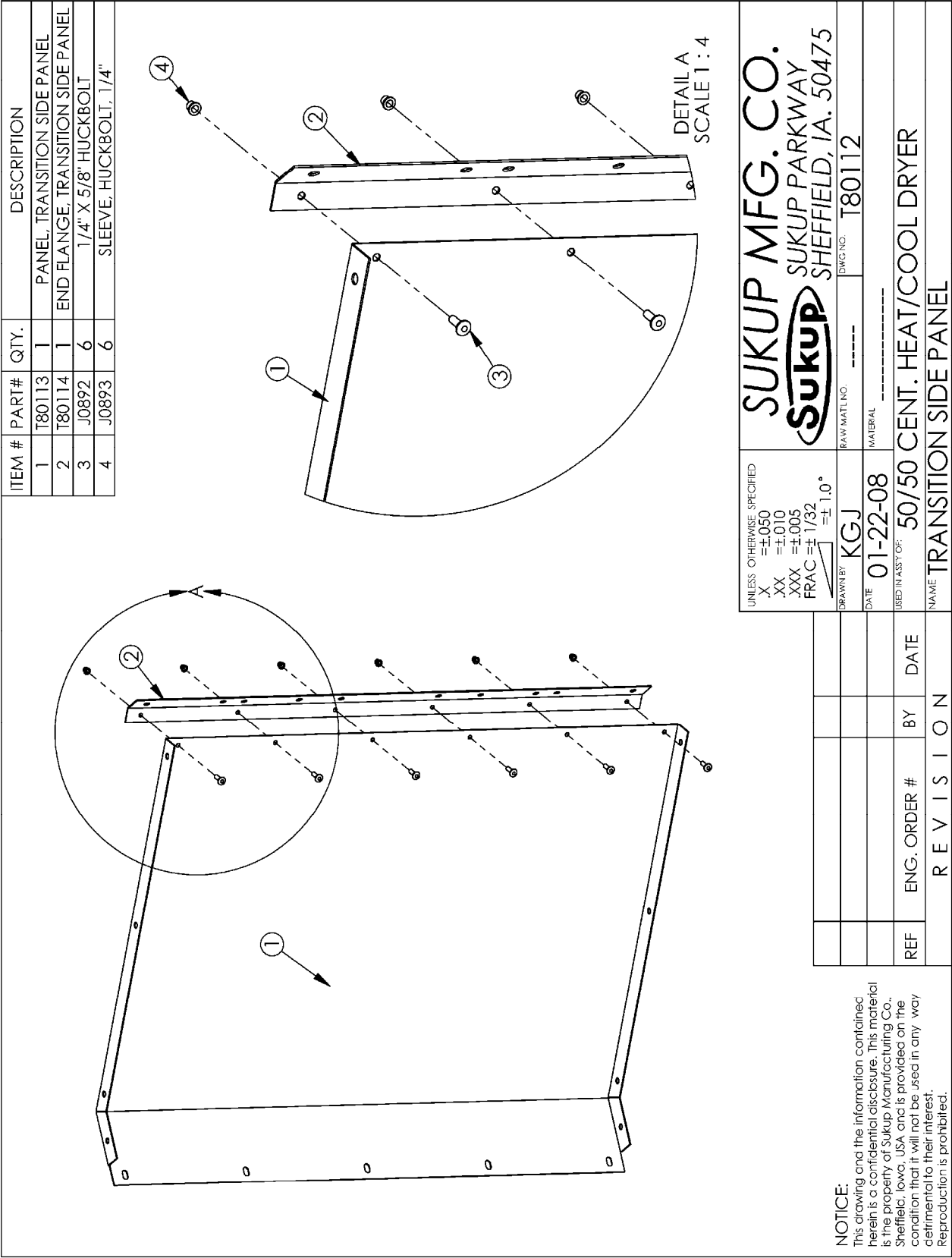
SUKUP MFG. CO.
Sukup
SUKUP PARKWAY
SHEFFIELD, IA. 50475

DRAWN BY	KGJ	PART NO.	T80146
DATE	012208	RAW MATL NO.	-----
USED IN ASY OF	50/50 CENT. HEAT/COOL DRYER	MATERIAL	-----
REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			
DESCRIPTION		TRANSITION SIDE PANEL W/ HOLE	SHEET: 1 OF 1

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SINGLE-PHASE
T80112 TRANSITION SIDE PANEL



SINGLE-PHASE
T29464 INTAKE PLENUM, RIGHT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29466	1	AIR PANEL, STATIONARY ASSEM
2	T80110	1	RT SIDE PANEL, BLOWER INTAKE DUCT
3	T29468	1	RT TOP PANEL, FAN INTAKE DUCT
4	T29469	1	FRONT PANEL, BLOWER INTAKE DUCT
5	T80204	1	AIR PANEL ASSEMBLY, ADJUSTABLE
6	J4167	1	KNOB, PLASTIC, 5/16-18 X 3/4"
7	J0536	26	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
8	J1110	26	NUT, WHIZ, 5/16-18
9	J1111	16	WASHER, FLAT, 5/16
10	J0550	8	SCREW, 5/16-18, 1.25, PLT, GR5
11	J1010	8	NUT, LOCK, 5/16-18, PLT
12	J1007	2	NUT, RIVET, 5/16"-18

DXF CREATED:

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

DRAWN BY: KGJ
DATE: 03/08/2011
USED IN ASSY OF: 1 PH CENT FAN SUCT/COOL DRYER

RAW MAT'L NO.:
MATERIAL:

PART NO: T29464

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

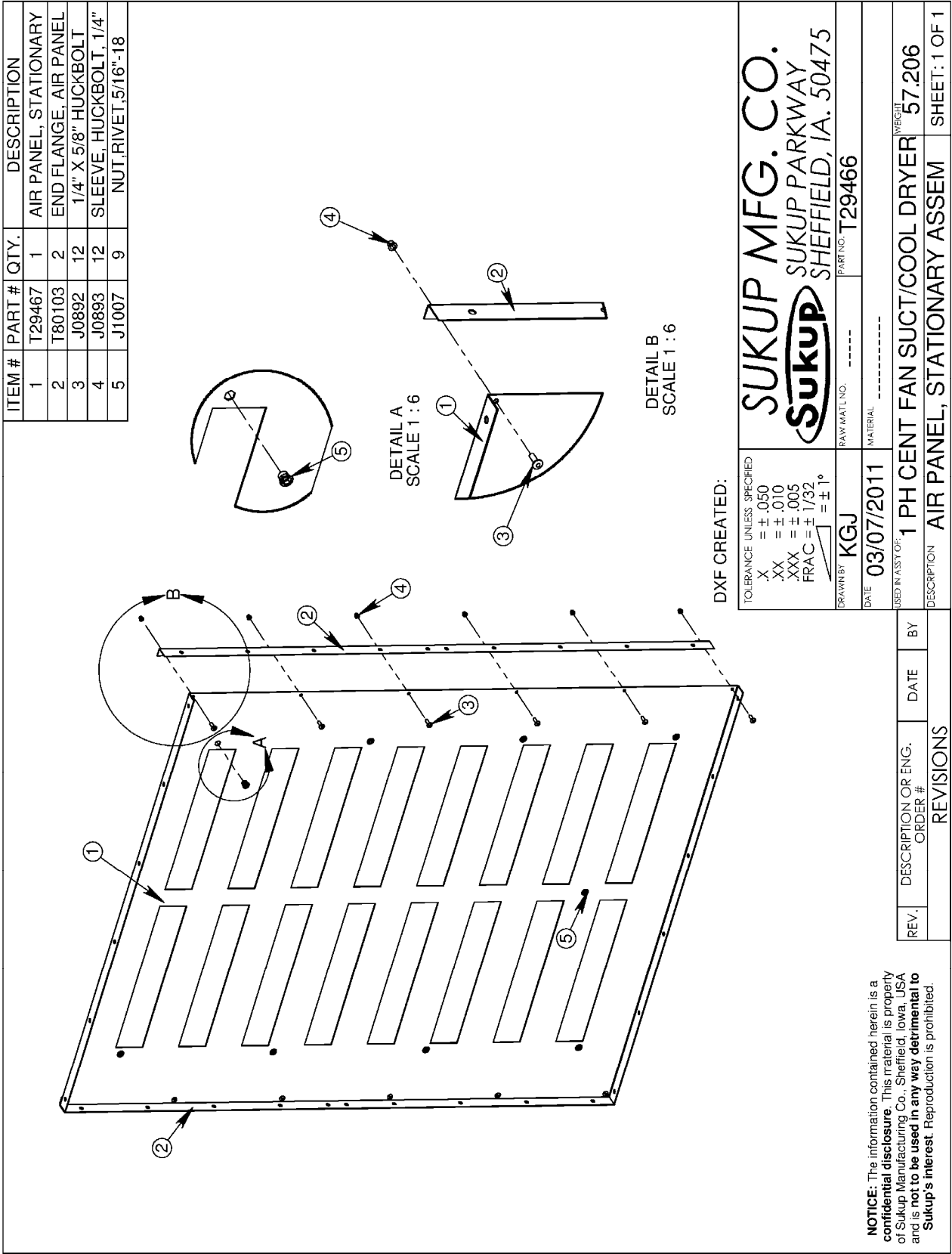
REV.	DESCRIPTION OR ENG. ORDER #	DATE	BY
REVISIONS			

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WEIGHT: 168.10
SHEET: 1 OF 1



SINGLE-PHASE
T29466 AIR PANEL, STATIONARY ASSEMBLY



SINGLE-PHASE
T29465 INTAKE PLENUM, LEFT

ITEM #	PART #	QTY.	DESCRIPTION
1	T29466	1	AIR PANEL, STATIONARY ASSEM
2	T80204	1	AIR PANEL ASSEMBLY, ADJUSTABLE
3	T80119	1	LT SIDE PANEL, BLOWER INTAKE DUCT
4	T29471	1	LT TOP PANEL, INTAKE DUCT
5	T29469	1	FRONT PANEL, BLOWER INTAKE DUCT
6	J0536	26	SCREW, 5/16-18, 3/4", PLT, GR5, HHWZ
7	J1110	26	NUT, WHIZ, 5/16-18
8	J0550	8	SCREW, 5/16-18, 1.25, PLT, GR5
9	J1010	8	NUT, LOCK, 5/16-18, PLT
10	J1111	16	WASHER, FLAT, 5/16
11	J4167	1	KNOB, PLASTIC, 5/16-18 X 3/4"

DXF CREATED:

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

DRAWN BY: KGJ
DATE: 03/07/2011
USED IN ASSEMBLY OF: 1 PH CENTFAN SUCT/COOL DRYER

RAW MAT LNO.: T29465
MATERIAL:

DESCRIPTION: INTAKE PLENUM, LH
SHEET: 1 OF 1

REV. DESCRIPTION OR ENG. ORDER # DATE BY REVISIONS

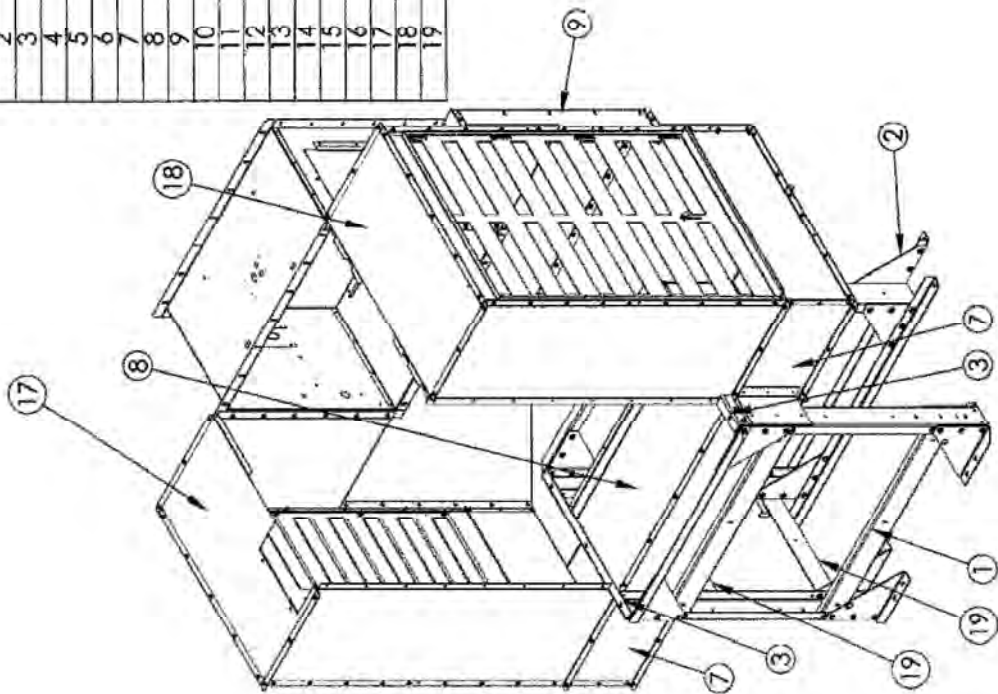
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Sukup MFG. CO.
SUKUP PARKWAY
SHEFFIELD, IA. 50475



THREE-PHASE
T15743C DRYER FRONT FAN SUPPORT

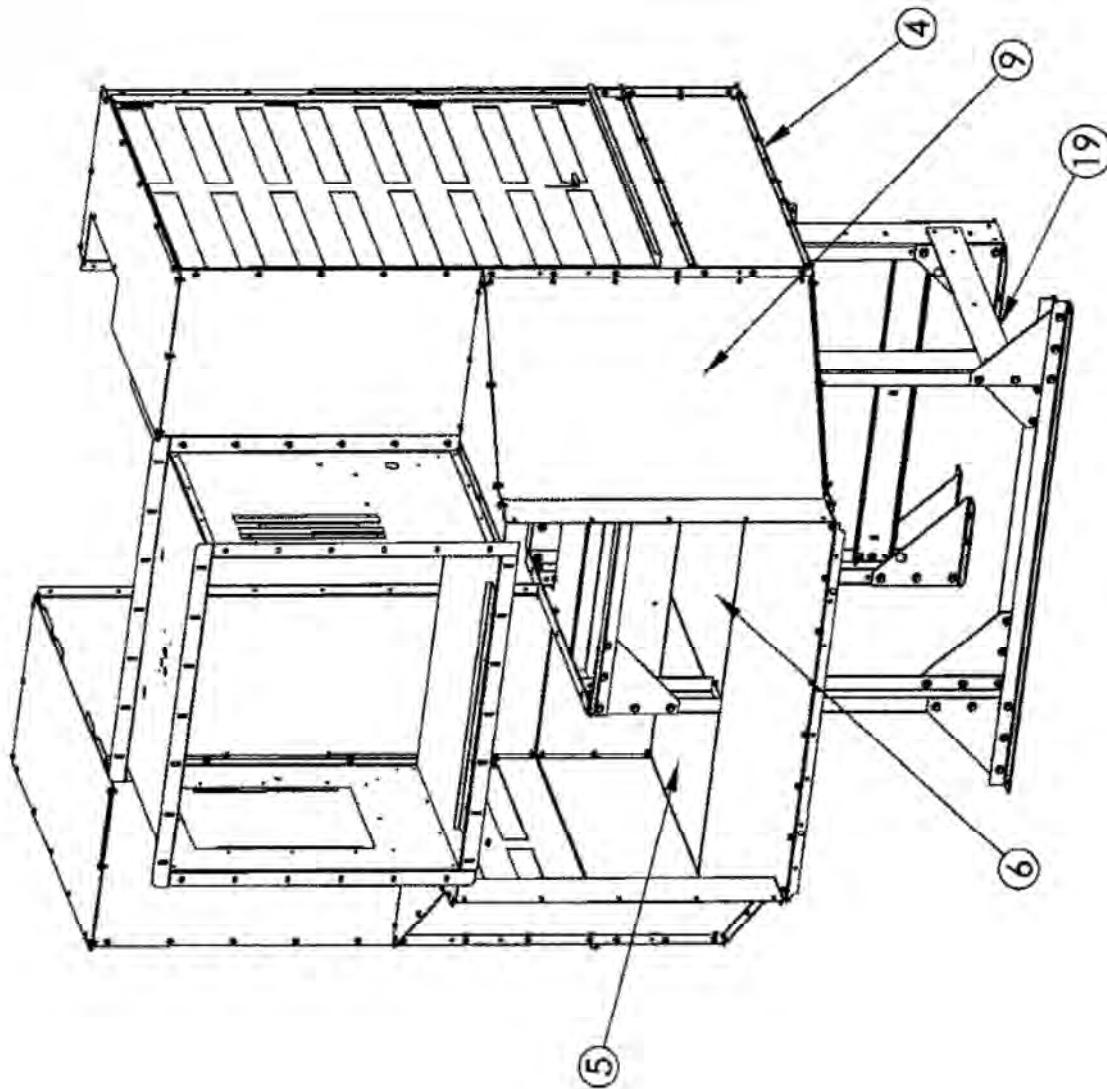
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80160	FRAME HEATER SUPPORT, BACK	1
2	T80161	FRAME HEATER SUPPORT, FRONT	1
3	T80139	HOZ SIDE, BLOWER MOUNT FRAME	2
4	T801052	LOWER PANEL ASSY, RH	1
5	T80105	LOWER PANEL ASSY, LH	1
6	T80123	BOTTOM CENTER PANEL, BLOWER DUCT	1
7	T80115	FRONT PANEL, BLOWER INTAKE DUCT	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



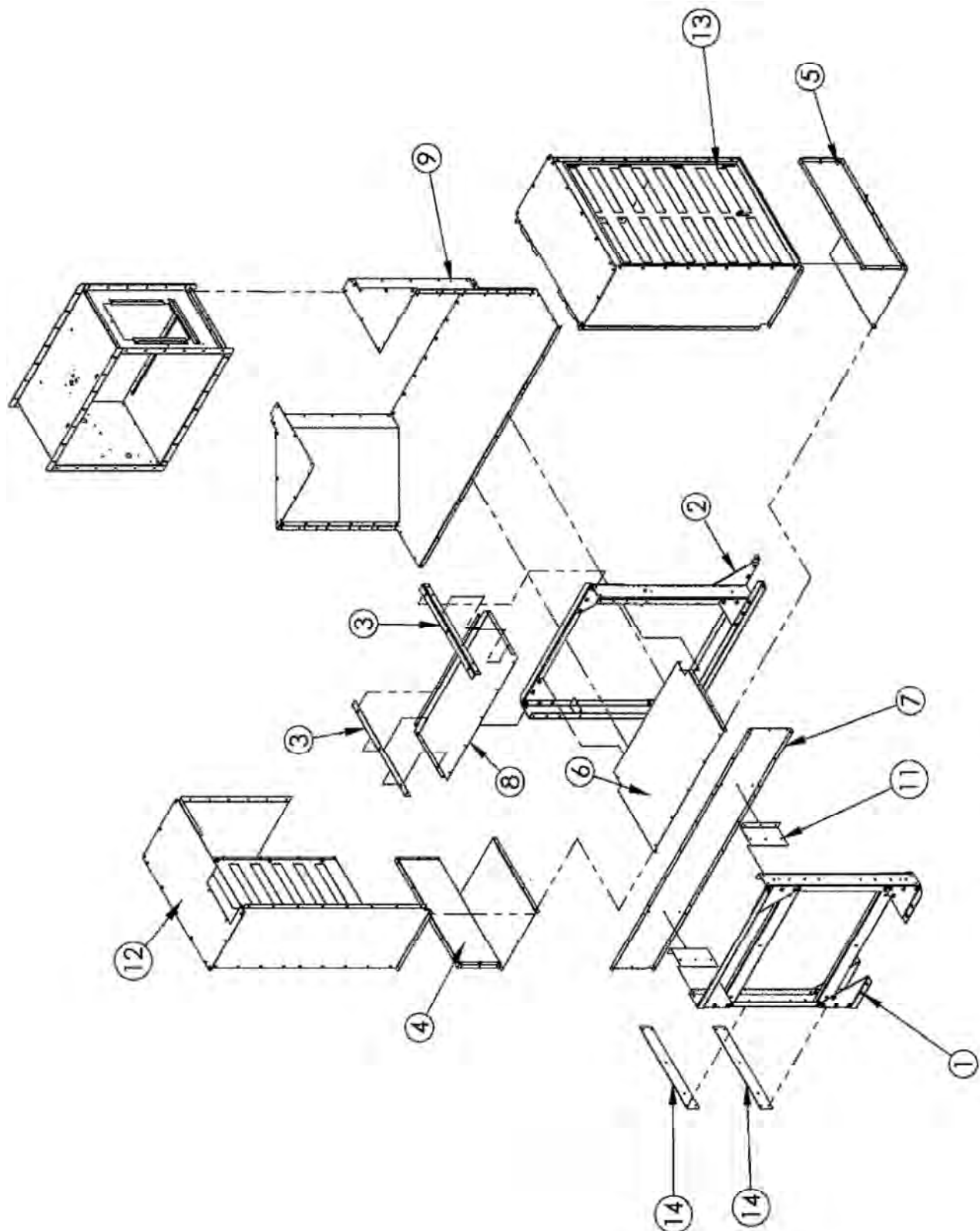
THREE-PHASE T15743C DRYER FRONT FAN SUPPORT

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 RIVET,5/16"-18	9	
	T80142	HOZT BASE 3, BLOWER MOUNT FRAME	1	J4167	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	J0955	VINYL EDGE GUARD 13/32X35/64	1	
	J1110	NUT,WHIZ,5/16-13	2	J1111	WASHER,FLAT,5/16	16	
3	T80139	HOZT BASE 1, BLOWER MOUNT FRAME	1	J0550	SCREW,5/16-18,1.25,PLT,GR5	8	
4	T801052	LOWER PANEL ASSY, RH	2	J1010	NUT, LOCK, 5/16-18, PLT	8	
	T80107	END FLANGE	2	T80162	INTAKE PLENUM, LH	1	
	T80106	LOWER PANNEL	1	T80101	AIR PANEL, STATIONARY ASSEM	1	
	J0892	1/4" X 5/8" HUCKBOLT	6	T80102	AIR PANEL, STATIONARY	1	
	J0893	SLEEVE, HUCKBOLT, 1/4"	6	T80103	END FLANGE, AIR PANEL	2	
	T80124	BOTTOM LEFT PANEL, BLOWER DUCT	1	J0892	1/4" X 5/8" HUCKBOLT	12	
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	4	J0893	SLEEVE, HUCKBOLT, 1/4"	12	
	J1110	NUT,WHIZ,5/16-13	4	T80204	AIR PANEL ASSEMBLY, ADJUSTABLE	1	
5	T80105	LOWER PANEL ASSY, LH	4	T80104	AIR PANEL, ADJUSTABLE	1	
	T80107	END FLANGE	2	J0955	VINYL EDGE GUARD 13/32X35/64	1	
	T80106	LOWER PANNEL	1	T80119	LT SIDE PANEL, BLOWER INTAKE DUCT	1	
	J0892	1/4" X 5/8" HUCKBOLT	6	T80118	LF FRONT PANEL, BLOWER INTAKE DUCT	1	
	J0893	SLEEVE, HUCKBOLT, 1/4"	6	T80120	LT TOP PANEL, BLOWER INTAKE DUCT	1	
	T80125	BOTTOM RIGHT PANEL, BLOWER DUCT	1	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	25	
	J0536	SCREW,5/16-18,3/4",PLT,GR5,HHWZ	4	J1110	NUT,WHIZ,5/16-13	25	
	J1110	NUT,WHIZ,5/16-13	4	J1007	NUT,RIVET,5/16"-18	9	
6	T80123	BOTTOM CENTER PANEL, BLOWER DUCT	1	J0550	SCREW,5/16-18,1.25,PLT,GR5	8	
7	T80115	FRONT PANEL,BLOWER INTAKE DUCT	1	J4167	KNOB,PLASTIC, 5/16-18 X 3/4"	1	
8	T80116	UPPER MID PANEL, BLOWER INTAKE DUCT	1	J1111	WASHER,FLAT,5/16	16	
9	T80164	DUCTWORK, SUCT COOL DRYER CONNECTION	1	J1010	NUT, LOCK, 5/16-18, PLT	8	
	T80111	TRANSITION TOP PANEL	2	J19	T80219	MOUNTING PLATE, MANUAL CONTROL BOX	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				

THREE-PHASE T15743C DRYER FRONT FAN SUPPORT

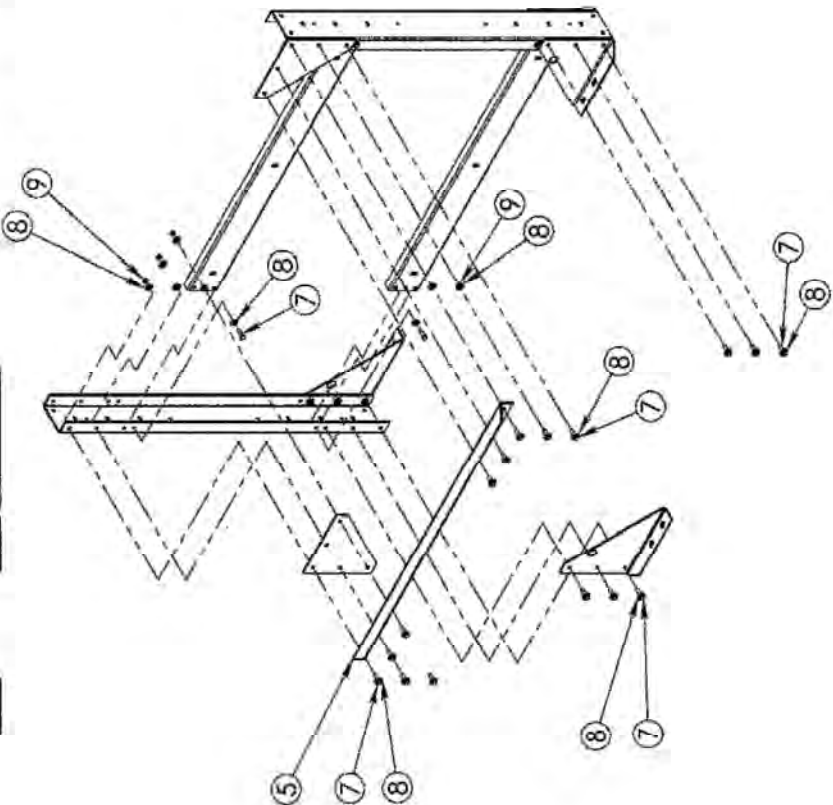
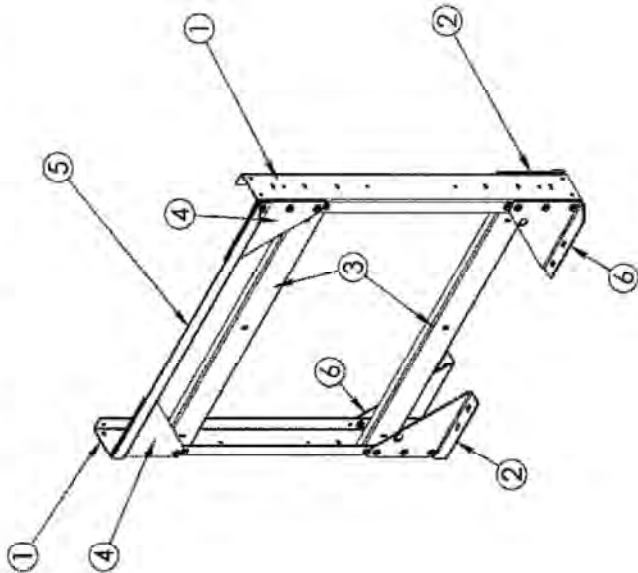
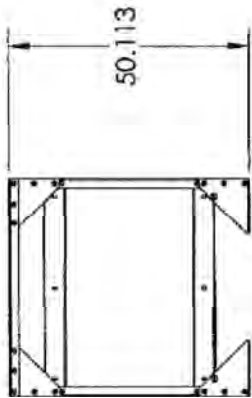


THREE-PHASE T15743C DRYER FRONT FAN SUPPORT



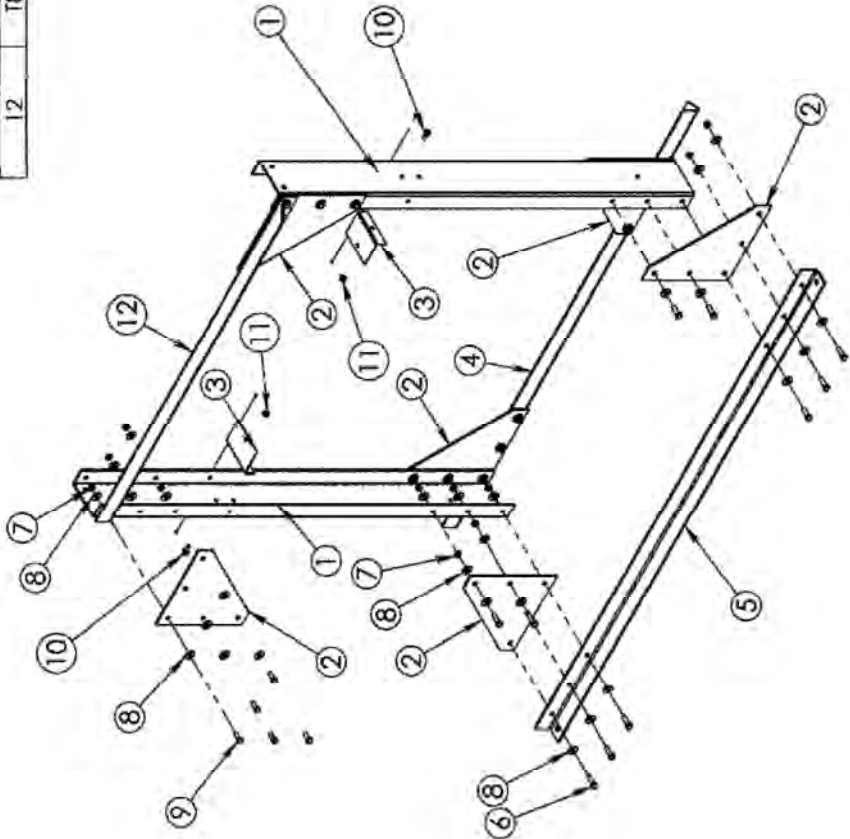
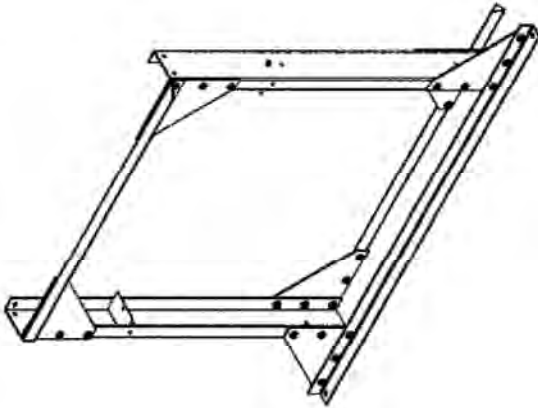
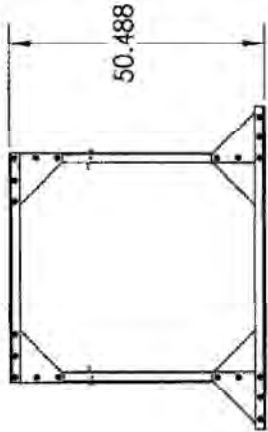
THREE-PHASE
T80160 FRAME FAN SUPPORT, BACK

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



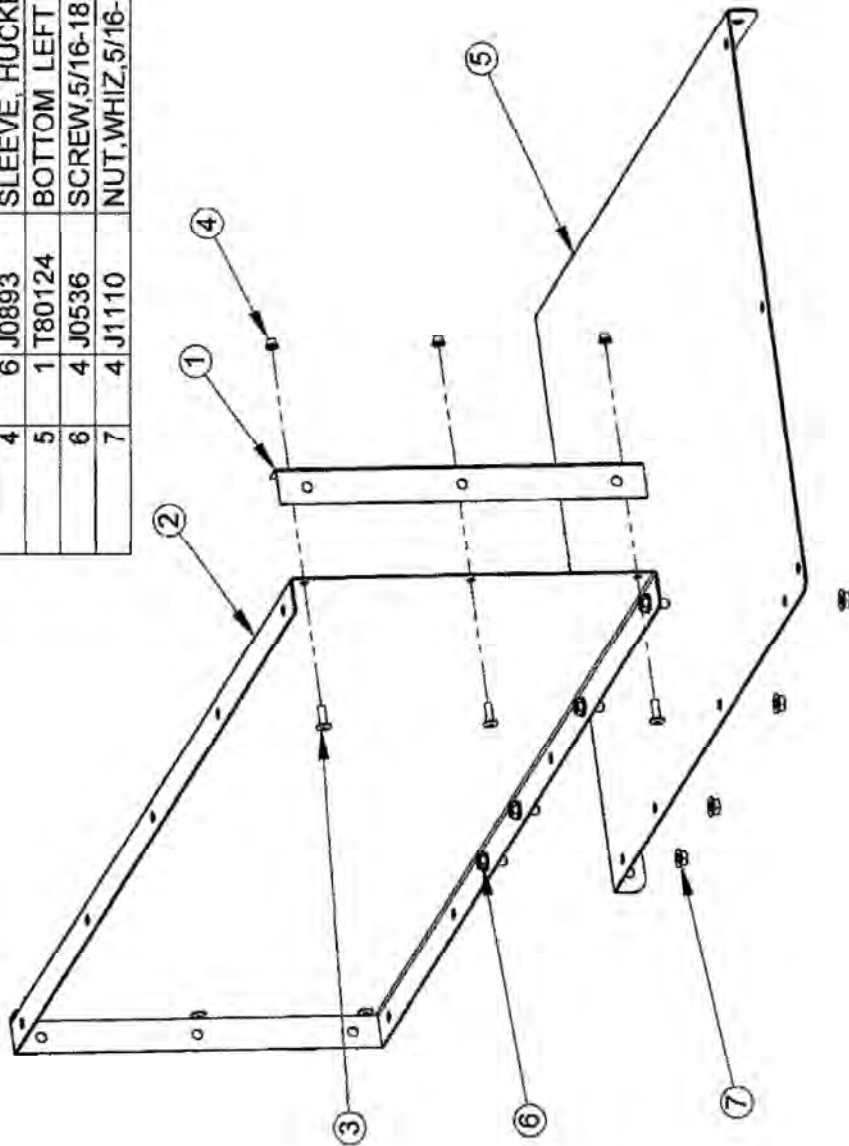
THREE-PHASE
T80161 FRAME FAN SUPPORT, FRONT

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



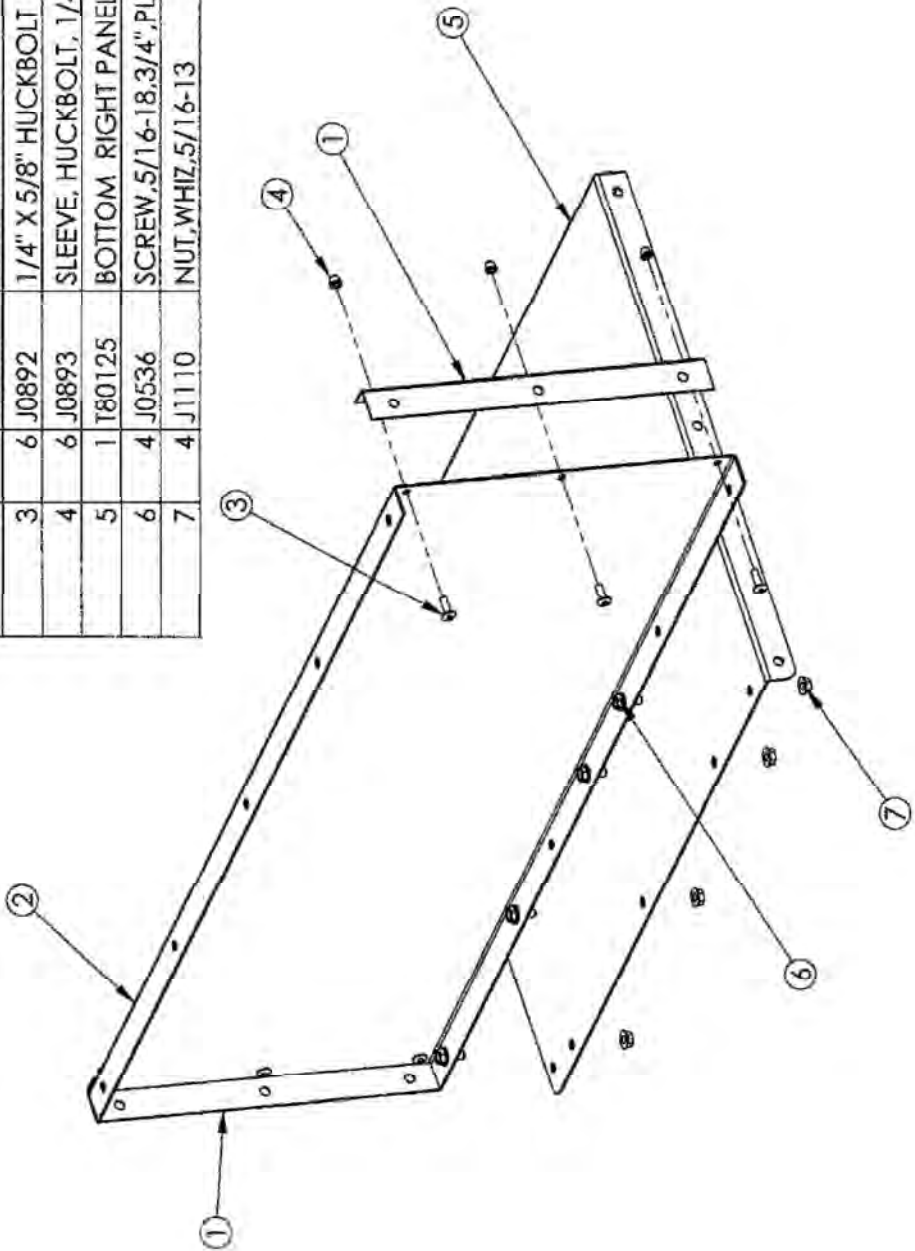
THREE-PHASE
T801052 LOWER PANEL ASSEMBLY, RIGHT

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80107	END FLANGE
2	1	T80106	LOWER PANEL
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



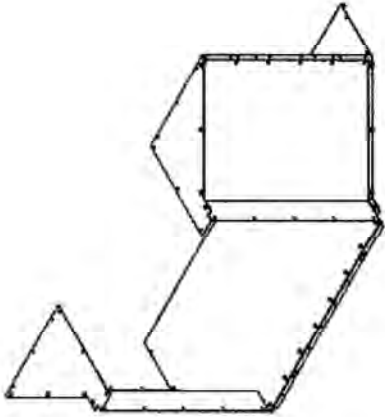
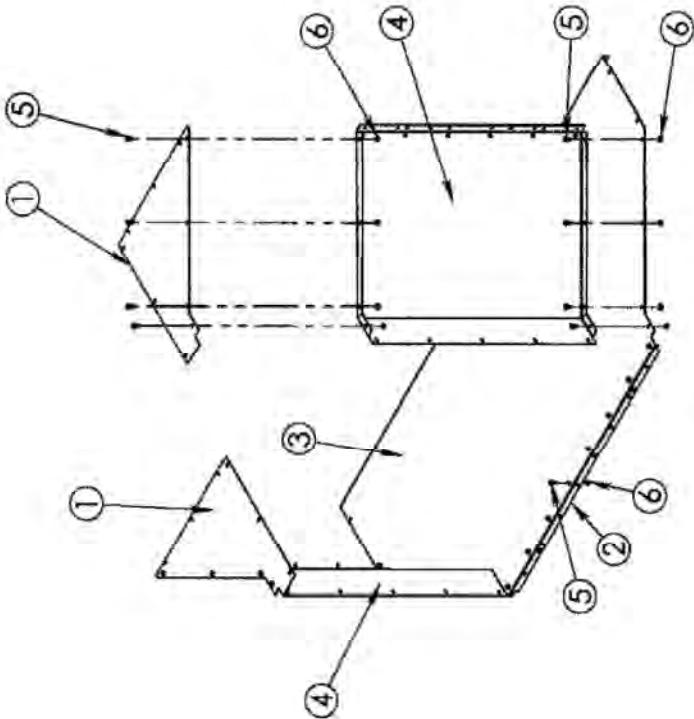
THREE-PHASE
T80105 LOWER PANEL ASSEMBLY, LEFT

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	T80107	END FLANGE
2	1	T80106	LOWER PANEL
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



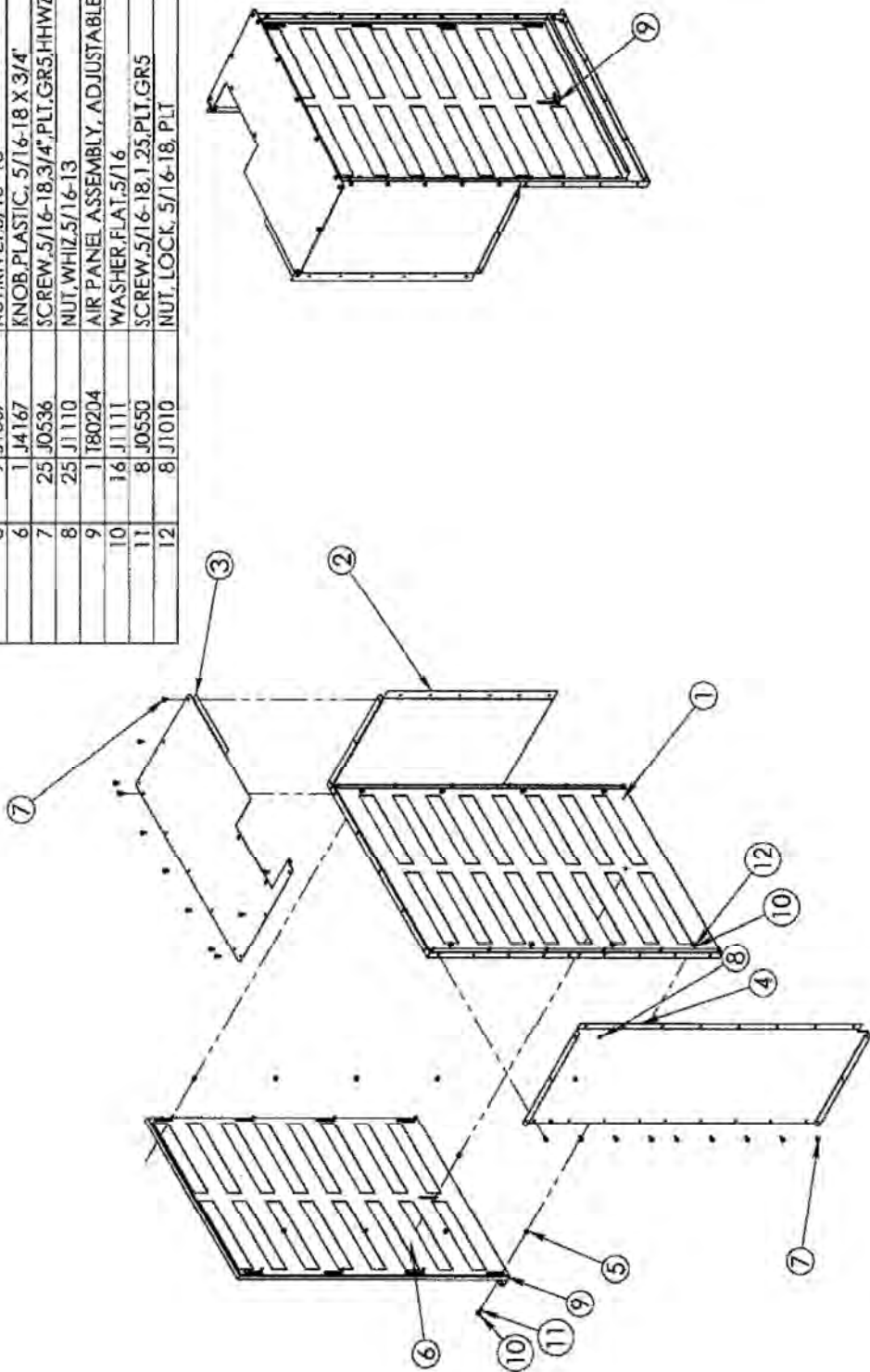
THREE-PHASE
T80164 DRYER FRONT FAN SUPPORT, DUCTWORK, DRYER CONNECTION

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



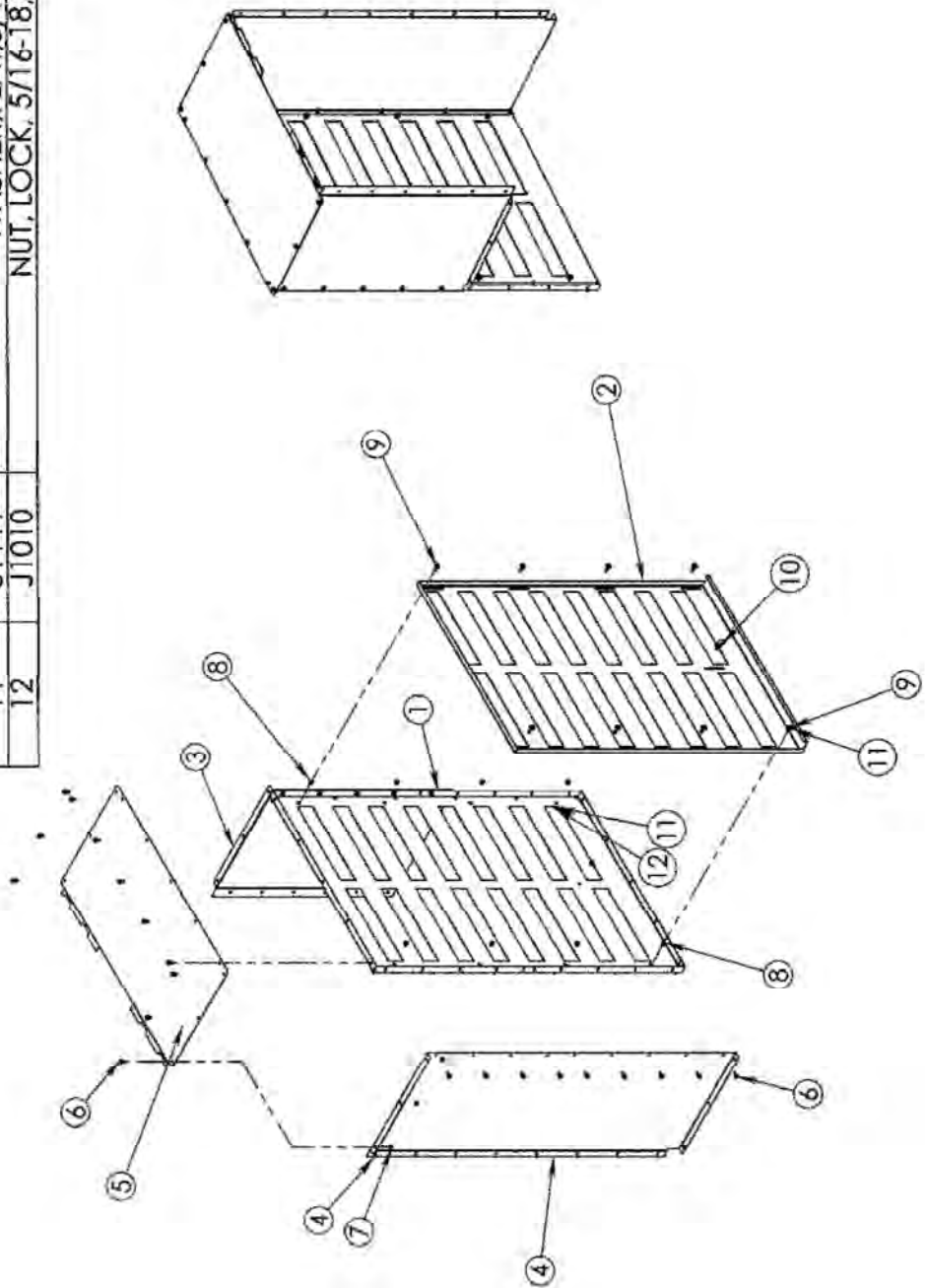
THREE-PHASE
T80163 DRYER FRONT FAN SUPPORT, INTAKE PLENUM, RIGHT

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



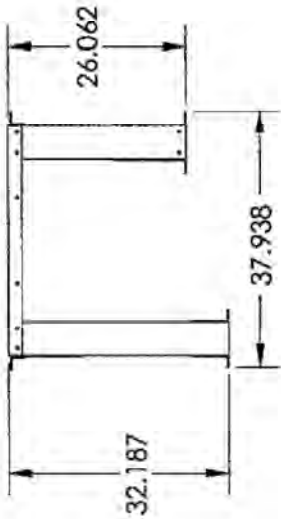
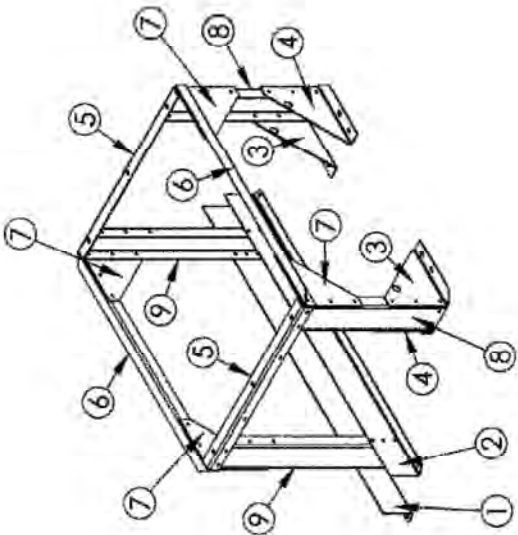
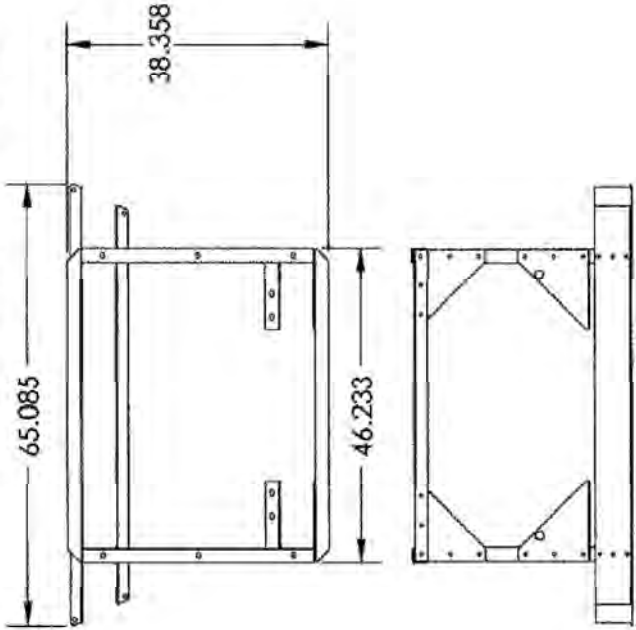
THREE-PHASE
T80162 DRYER FRONT FAN SUPPORT, INTAKE PLENUM, LEFT

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



THREE-PHASE
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



LADDER PARTS

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

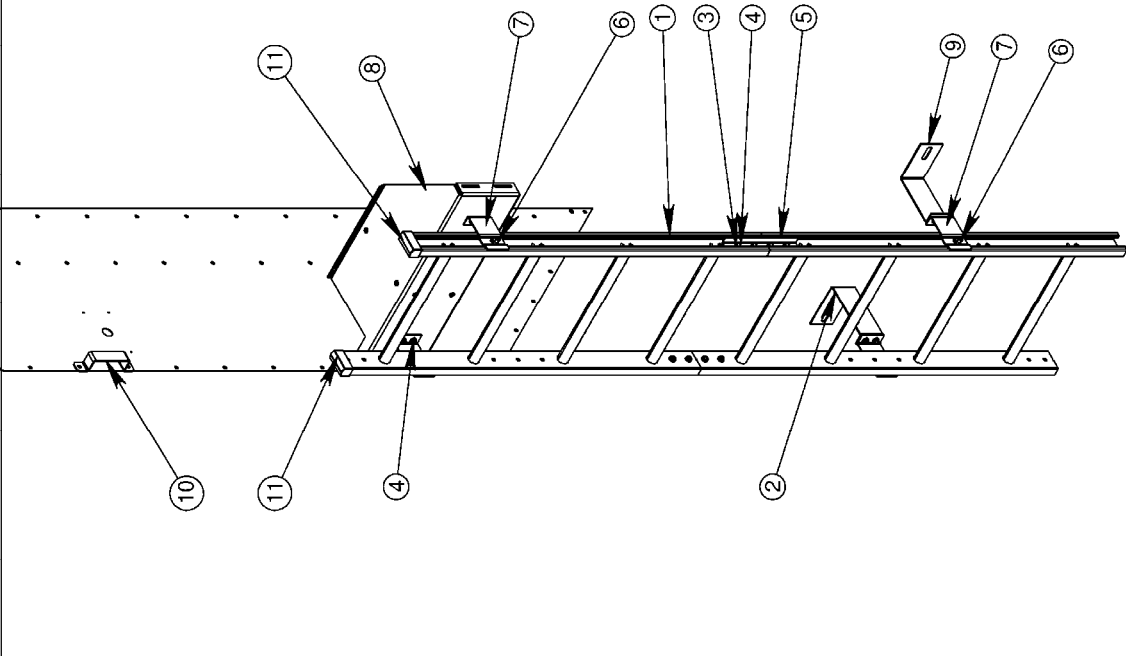


Diagram illustrating the assembly of the ladder parts, showing the ladder structure, brackets, nuts, screws, splice, clip and bolt, rear platform bracket, platform assembly, front stack center dryer bracket, handle, and cap.

TOLERANCE UNLESS SPECIFIED

.X = ± .050

.XX = ± .010

.XXX = ± .005

FRAC = ± 1/32

 = ± 1°

DRAWN BY

DJB

DATE

8-29-08

USED IN ASY OF

DRYER, SUCT COOL

DESCRIPTION

LADDER, FRONT SUCT COOL DRYER

SUKUP MFG. CO.



SUKUP PARKWAY

SHEFFIELD, IA. 50475

RAW MATL NO.

T80224

PART NO.

T80224

WEIGHT

92.00

REF

ENG. ORDER #

BY

DATE

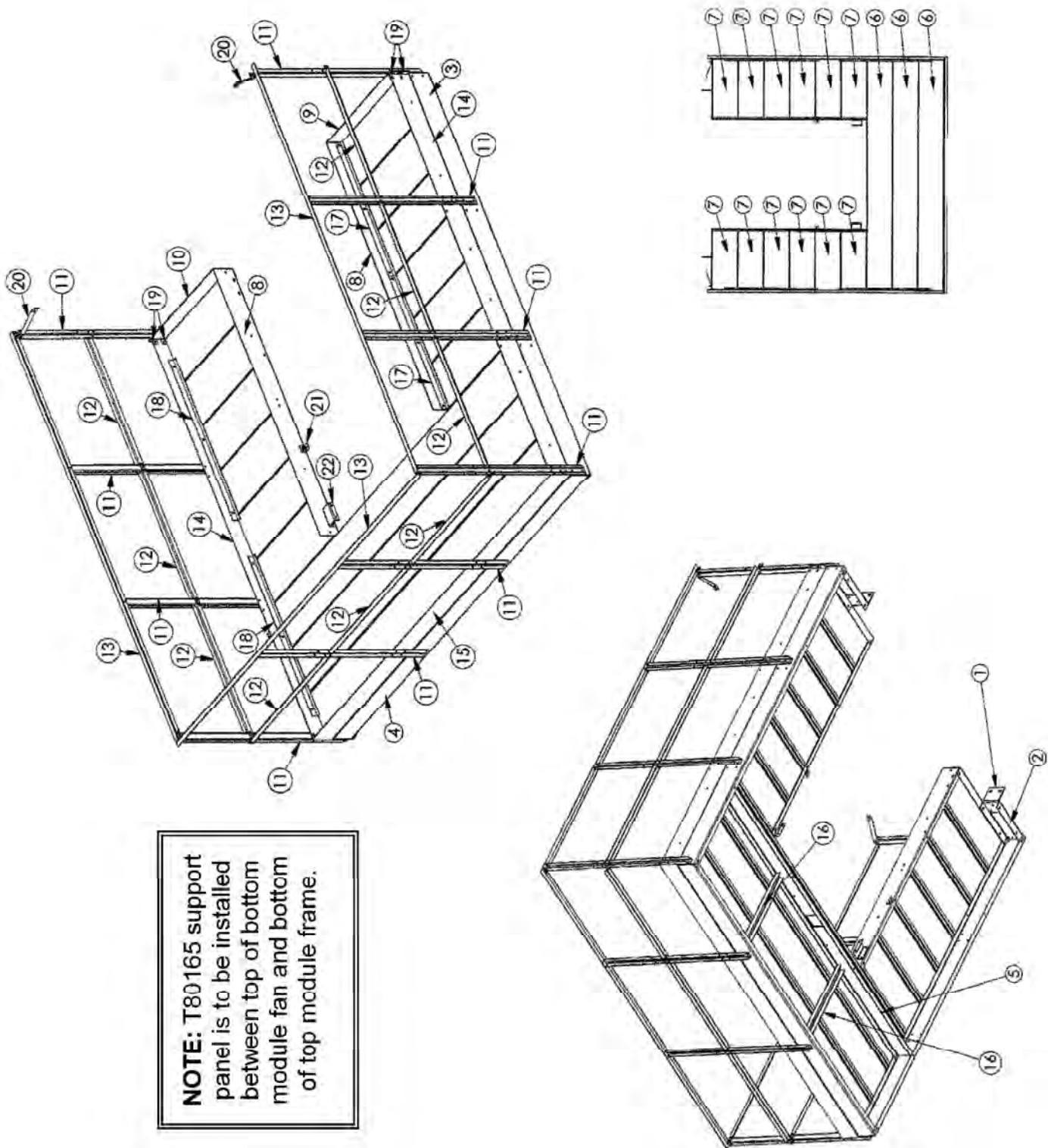
R E V I S I O N

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Centrifugal Dryer Manual

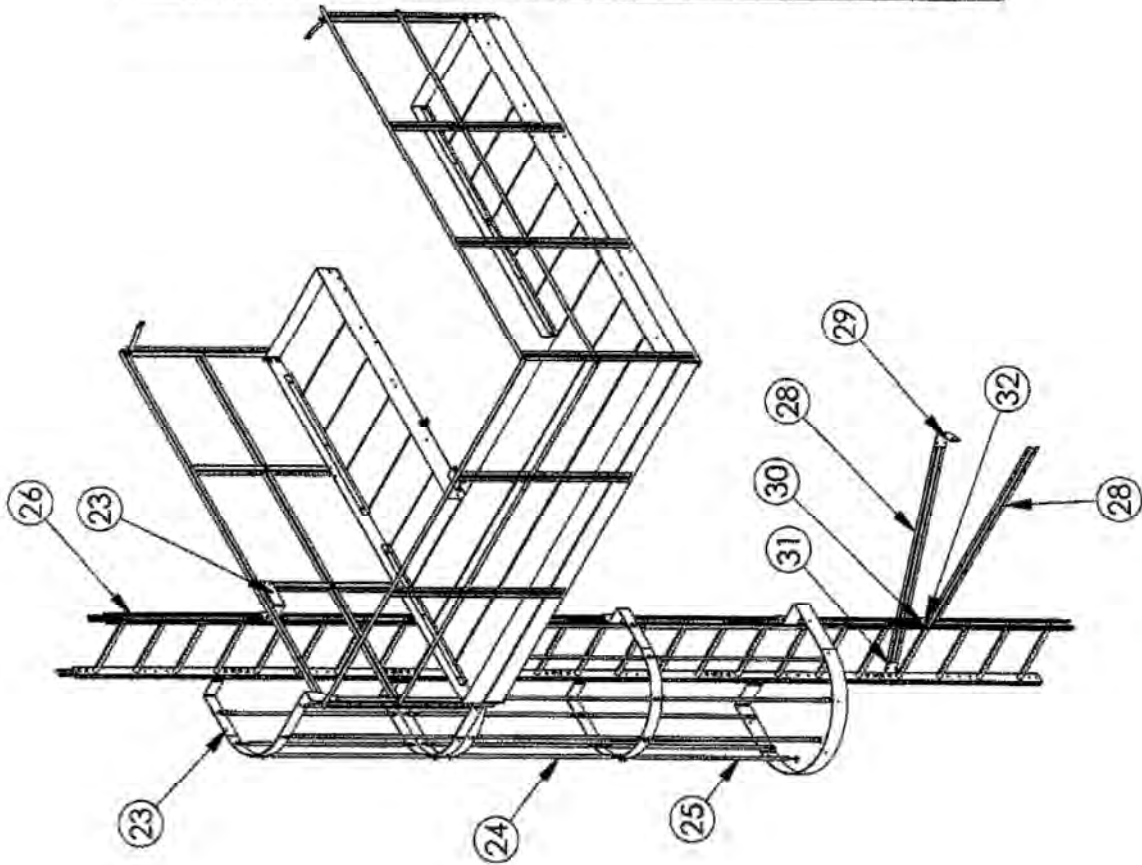
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CENTRIFUGAL STACK DRYER FRONT DECK



CENTRIFUGAL STACK DRYER FRONT DECK

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	T80179	REAR FRAME BRKT, DECK	2
2	T80175	OUTER REAR FRAME RAIL, DECK	2
3	T80176	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	T80178	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	T80177	SIDE TOE KICK, DECK	2
15	T25461	KICK, TOE FRONT, DECK STACK DRYER	1
16	T80180	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	T80181	RAILING TIE-IN STRAP, DECK	2
21	T80183	FRAME L BRACKET, DECK	2
22	T80182	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	T80165	SUPPORT, UPPER FRAME (NOT SHOWN)	1
28	T80207	SUPPORT FRAME, LADDER BASE	2
29	T80208	ANGLE, LADDER BRACE MNT	1
30	T80209	ANGLE, LADDER BRACE MNT	1
31	T80210	ANGLE, LADDER BRACE MNT	1
32	B5008	CLIP & BOLT LADDER	2
33	T25545	SPLICE, LADDER	12
34	J0536	SCREW, 5/16-18, 3/4" PLI, GR5, HHWZ	48
35	J1110	NUT, WHIZ, 5/16-18	48



COMMON PARTS FOR SUKUP DRYERS

QuadraTouch dryers only

PART #	DESCRIPTION
T121912	ACTUATOR W/ WIRES, 28"
T121911	ACTUATOR W/ WIRES, 38"
J6848	DRIVE UNIT,VFD,AC,3HP 230V 1P
J6851	DRIVE UNIT,VFD,AC,3HP 460V 3P
J8707	HMI,TOUCHSCREEN,PRO-FACE
F60337X	MOISTURE SENSOR, YELLOW
H1143	MOTOR, 1HP, 3PH,METERING ROLLS
J8700	PLC,PHOENIX,ILC150
J4493	PROXIMITY SWITCH 2009 – (all dryers with QuadraTouch)
J8701	SLICE I/O,DI4ME,PHOENIX
J8702	SLICE I/O,DI16ME,PHOENIX
J8703	SLICE I/O,DO4ME,PHOENIX
J8704	SLICE I/O,AI2/SF-ME,PHOENIX
J8705	SLICE I/O,AO2ME,PHOENIX
J8706	SUPPLY,POWER,24VDC,TRIO,PHOENIX

QuadraTouch and all other Sukup dryers

PART #	DESCRIPTION
J48185	3-AMP BREAKER
J5862	AIR PRESSURE SWITCH - CALIBRATED
J4532	COLUMN O/T, 16', 210 F
J4533	COLUMN O/T, 24', 210 F
J4534	COLUMN O/T, 28', 210 F
J5747	FLAME SENSOR
J5772	HEATER HOUSING O/T SWITCH
J5739	IGNITION PLUG
D3948	IGNITION BOARD
D40246	IGNITION WIRE HARNESS
T17028	RTD TRANSMITTER, 1000 OHM
J5642	RTD, AVERAGING, 16' W/ BOX
J5643	RTD, AVERAGING, 24' W/ BOX
J5645	RTD, AVERAGING, 12' W/ BOX
J5646	RTD, AVERAGING, 20' W/ BOX
J6795	PLENUM O/T, 16' 325 F
J6796	PLENUM O/T, 24' 325 F
J67961	PLENUM O/T, 28' 325 F
J6019	SCREEN FOR AIR PRESSURE SWITCH
J4440	TILT SWITCH – PADDLE AND DISCHARGE CHUTE
T20211	VALVE,ASCO,3/4"VAPOR SOLENOID,W/WRS,44"
J6038	VALVE,SOLENOID,3/4",VAPOR,ASCO
J6257	VALVE,ASCO,SOLENOID,1/2,LIQUID,COIL & VALVE
T20202	VALVE,ASCO,SOLENOID,1 1/2",NG,W/WIRES
J6247	VALVE,ASCO,SOLENOID,1 1/2",NG
J5900	VAPOR O/T SWITCH

QuadraTouch™

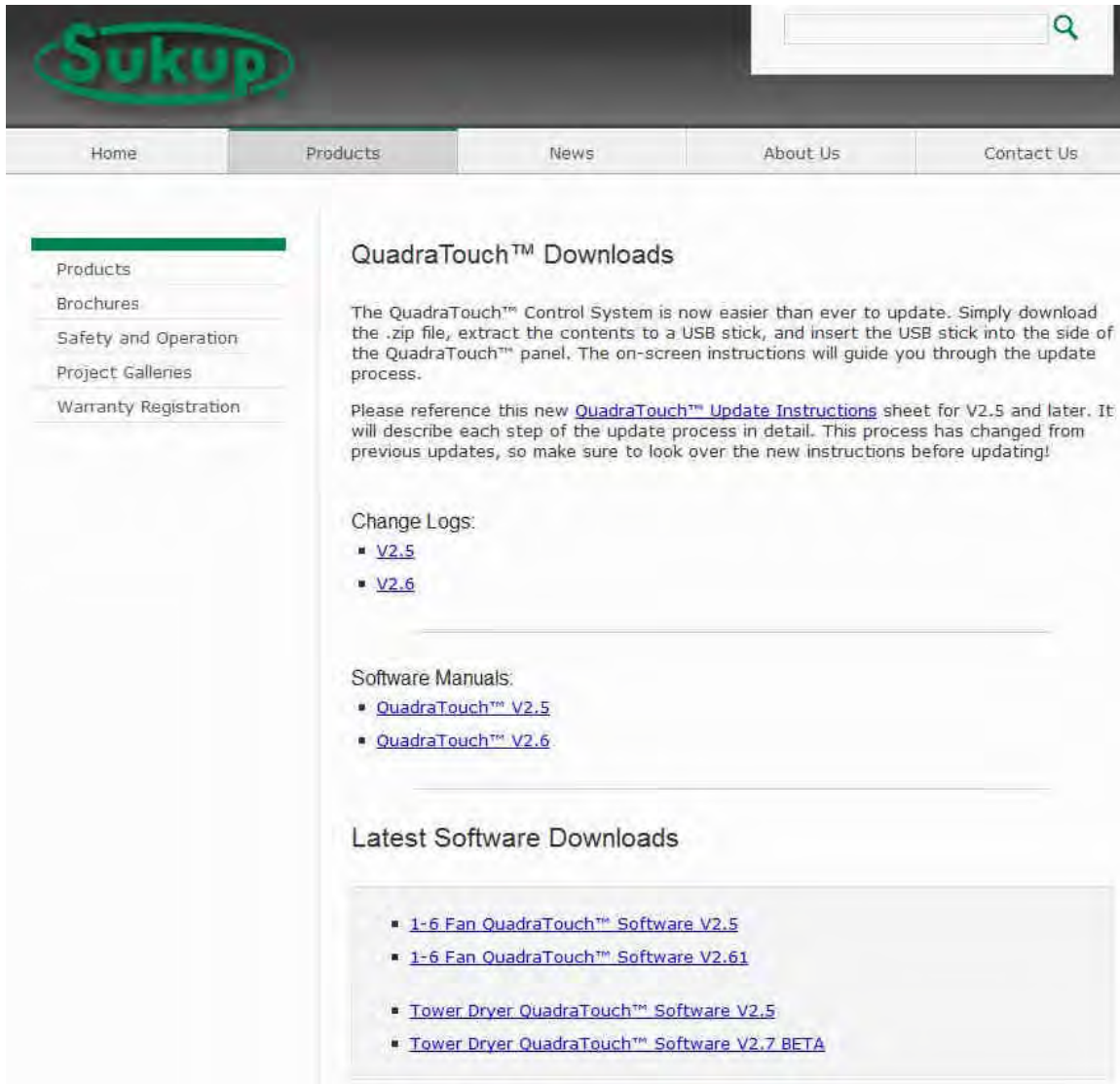


Download & Installation Instructions V2.5 and later

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 'QuadraTouch™ Downloads' page. The header features the Sukup logo and a search bar. The navigation menu includes Home, Products (selected), News, About Us, and Contact Us. A left sidebar lists 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.' Below this, it states: '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!' The page also includes sections for 'Change Logs' with links for V2.5 and V2.6, 'Software Manuals' with links for QuadraTouch™ V2.5 and V2.6, and 'Latest Software Downloads' with a list of specific software versions: 1-6 Fan QuadraTouch™ Software V2.5, 1-6 Fan QuadraTouch™ Software V2.61, Tower Dryer QuadraTouch™ Software V2.5, and Tower Dryer QuadraTouch™ Software V2.7 BETA.

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 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!

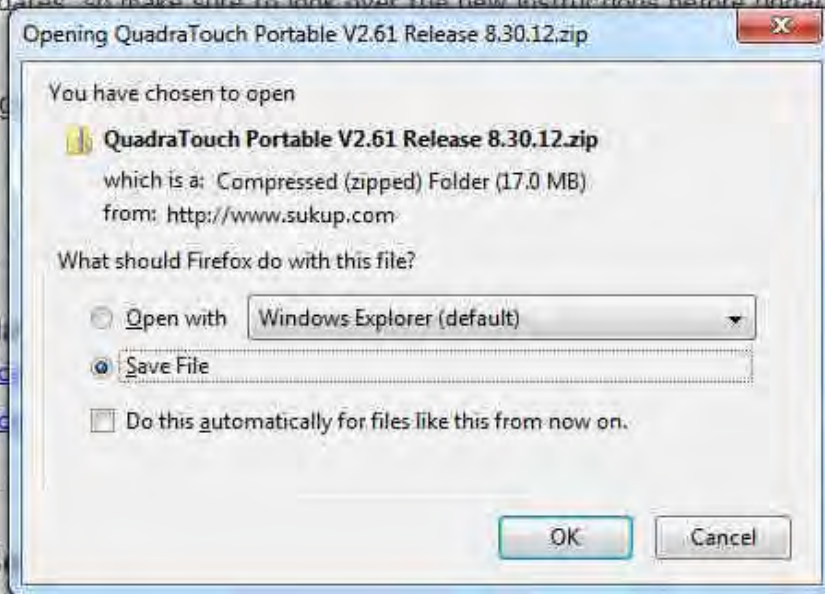
Change Log

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

Software M

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

Latest S

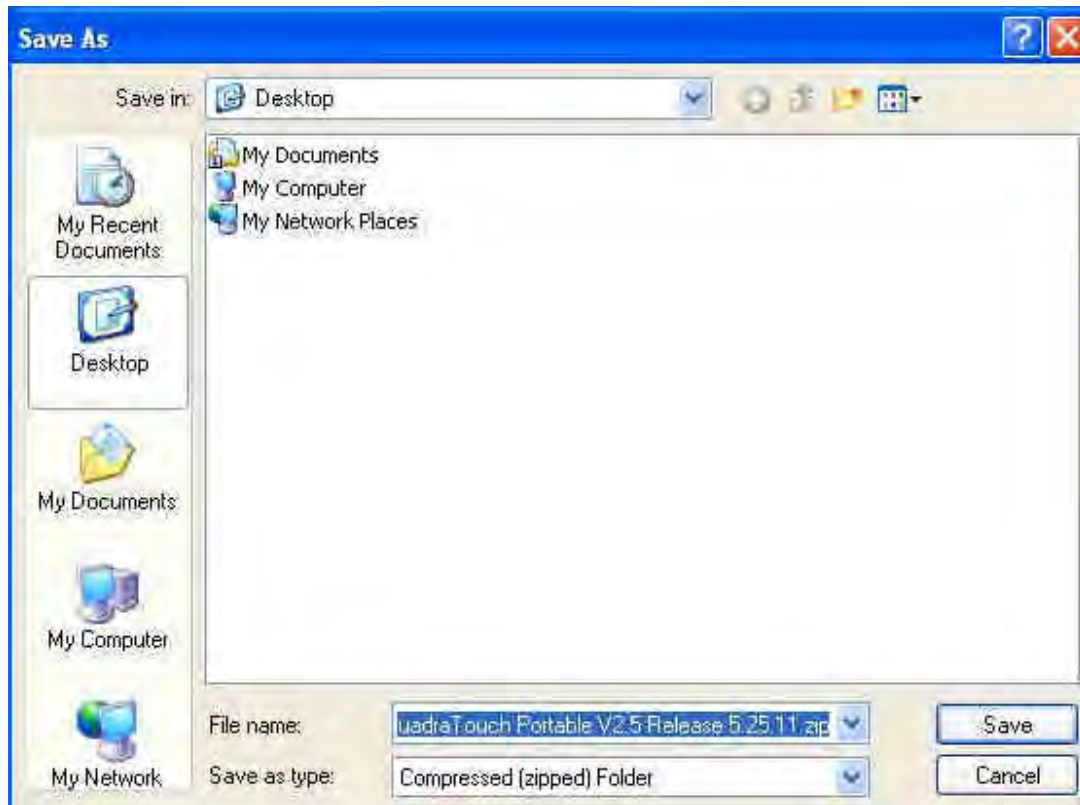


- [1-6 Fan QuadraTouch™ Software V2.5](#)
- [1-6 Fan QuadraTouch™ Software V2.61](#)
- [Tower Dryer QuadraTouch™ Software V2.5](#)
- [Tower Dryer QuadraTouch™ Software V2.7 BETA](#)

A dialog box will appear. Select "Save"

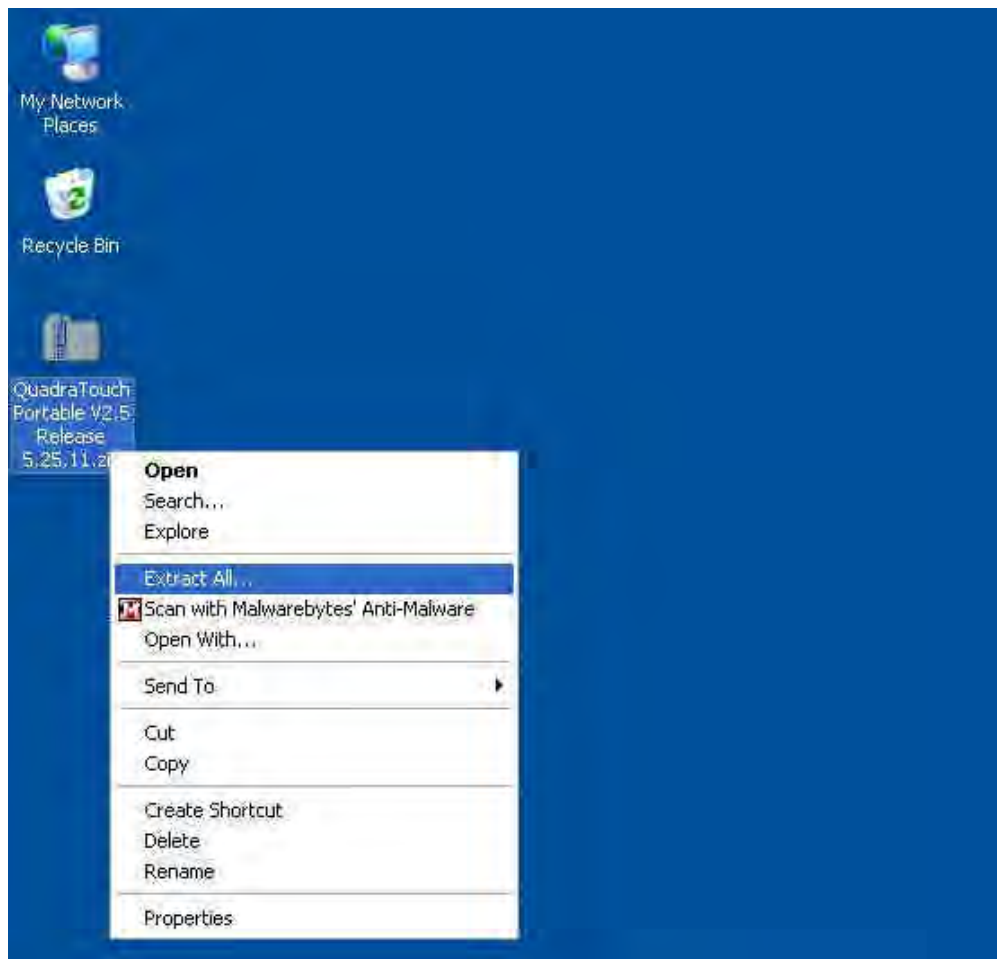
3. Next, another dialog box will appear. This time, it will ask you where you'd like to save the file. Typically "Desktop" is the easiest and preferred selection.

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).

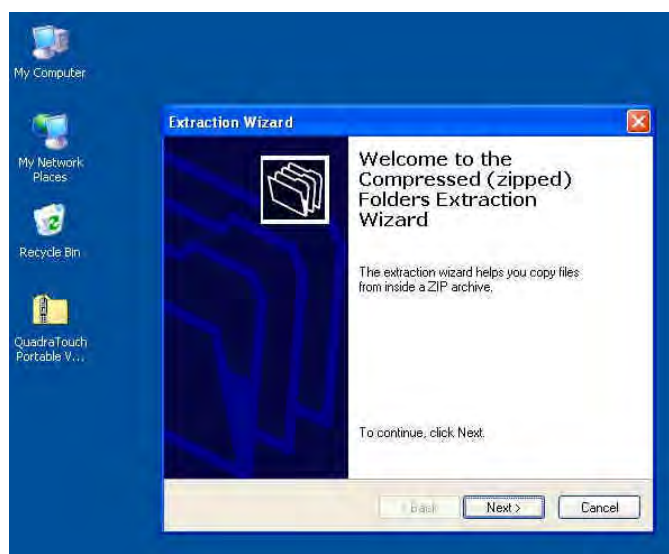


5. "Right Click" on the new program .zip file and select "Extract All"

Windows Vista and 7 users skip to step 8

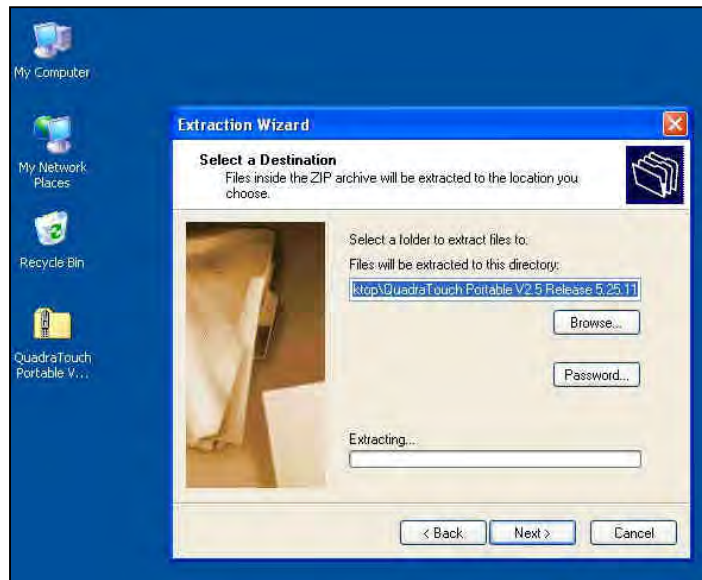
A dialog wizard will pop up.

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"

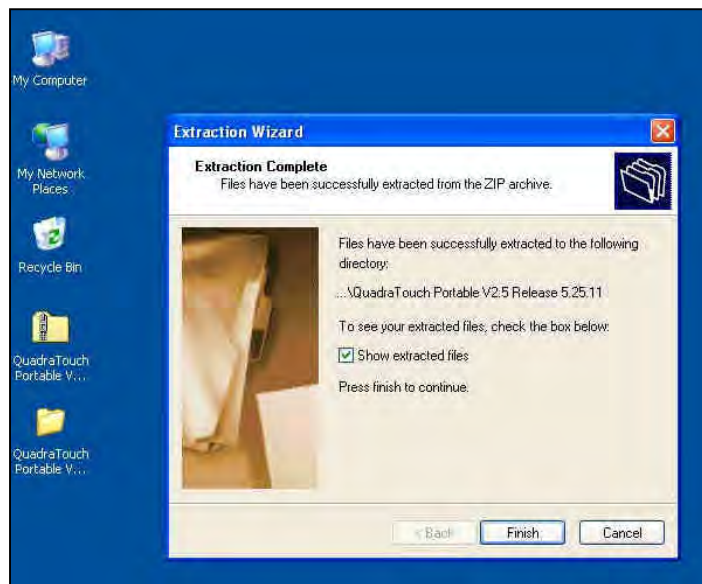


7. You'll notice a folder has been created on the desktop.

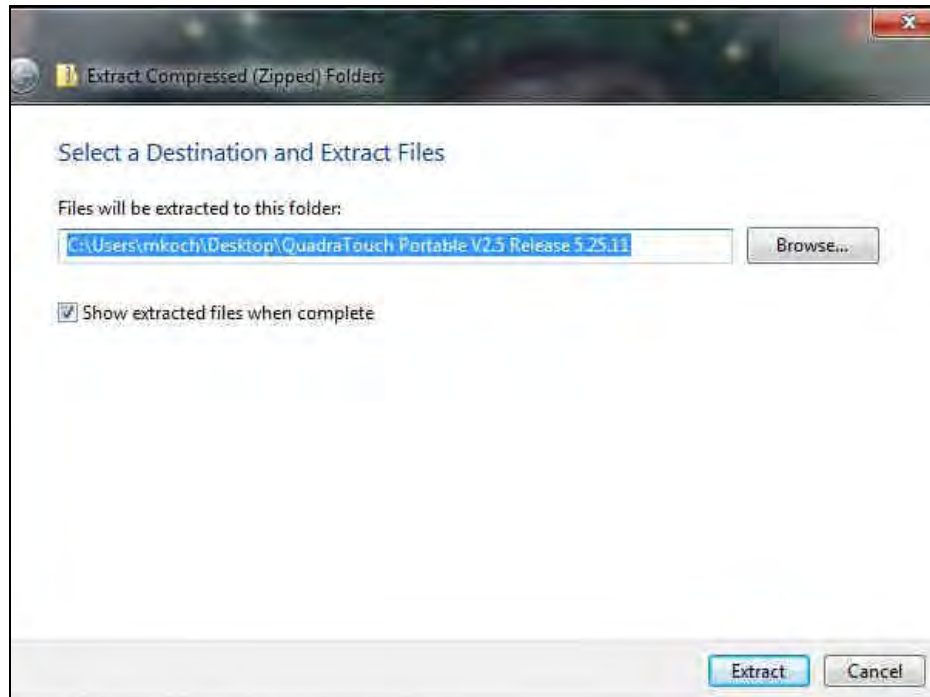
Select the check box for "Show the extracted files"

Select "Finish"

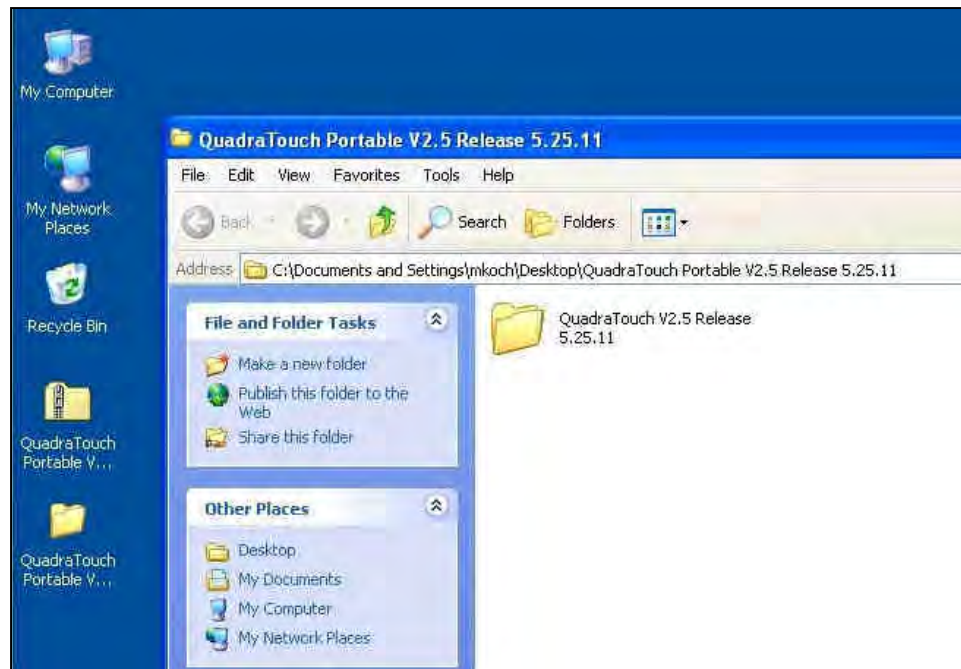
A window will open with the contents of the newly extracted files.



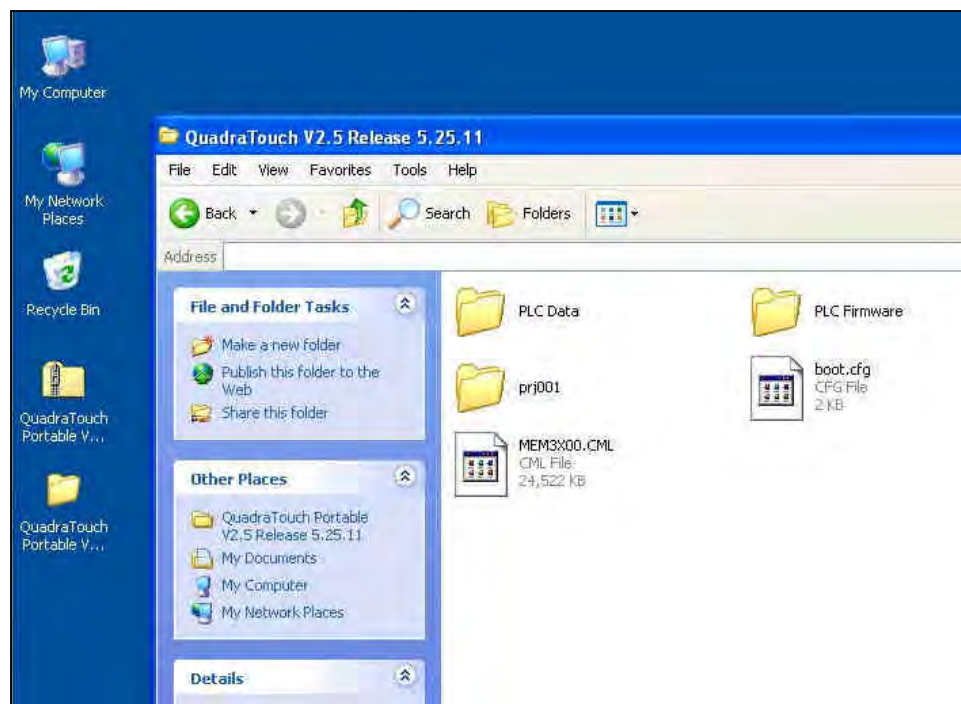
8. Windows Vista and 7 users will see something slightly different, pictured here. Simply choose the “Extract” option.



9. “Double-Click” the folder, and it’s contents will be opened in another window.

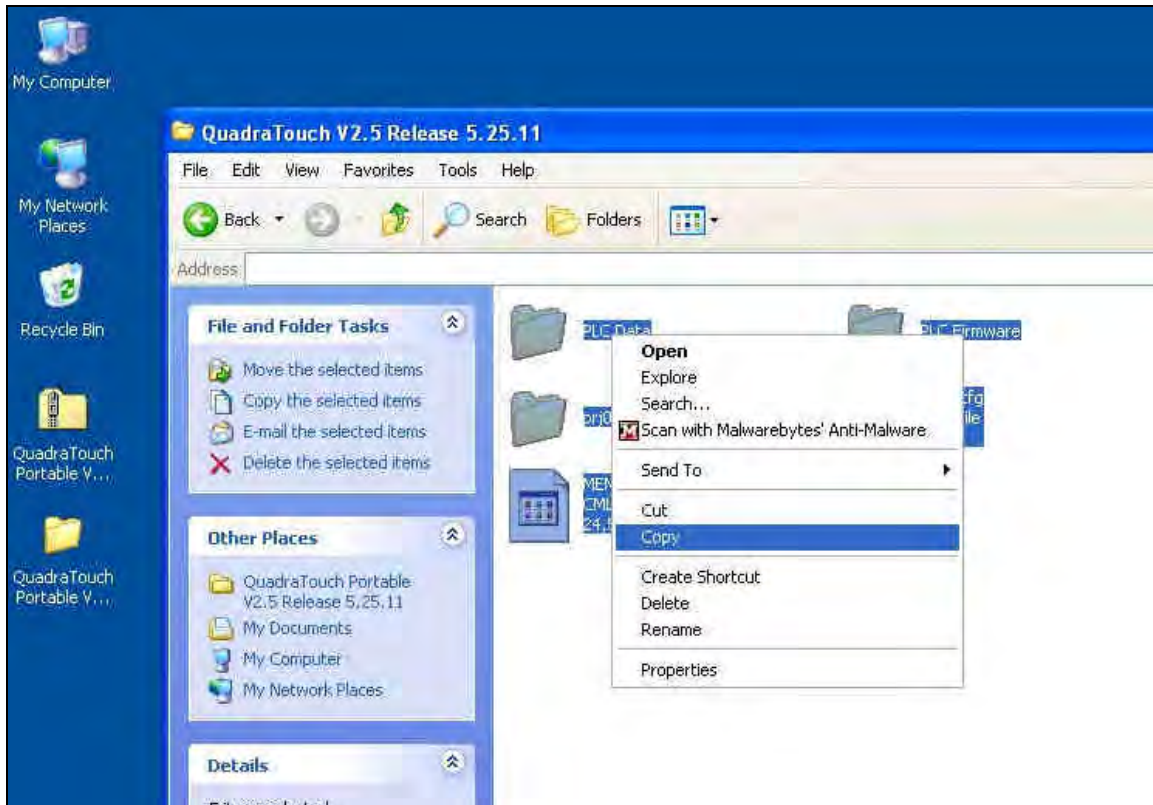


10. You will see this:



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.

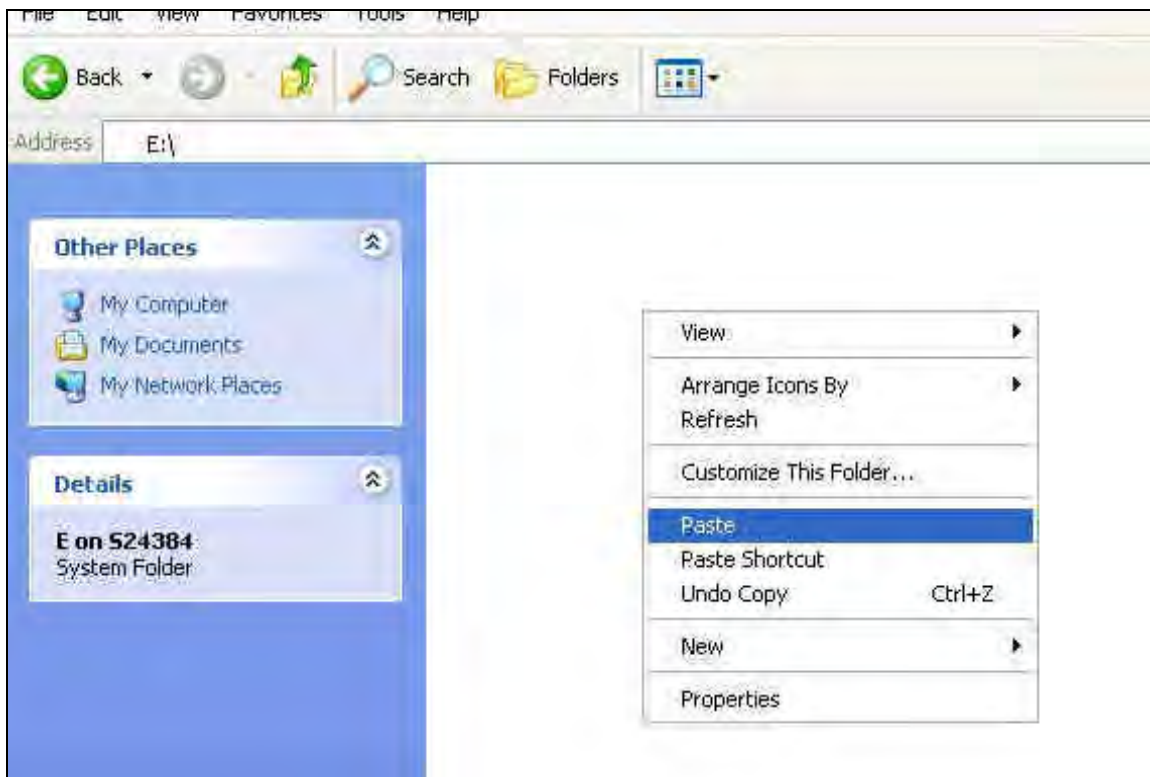
“Right-Click” any one of the selected files and select “Copy”



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.

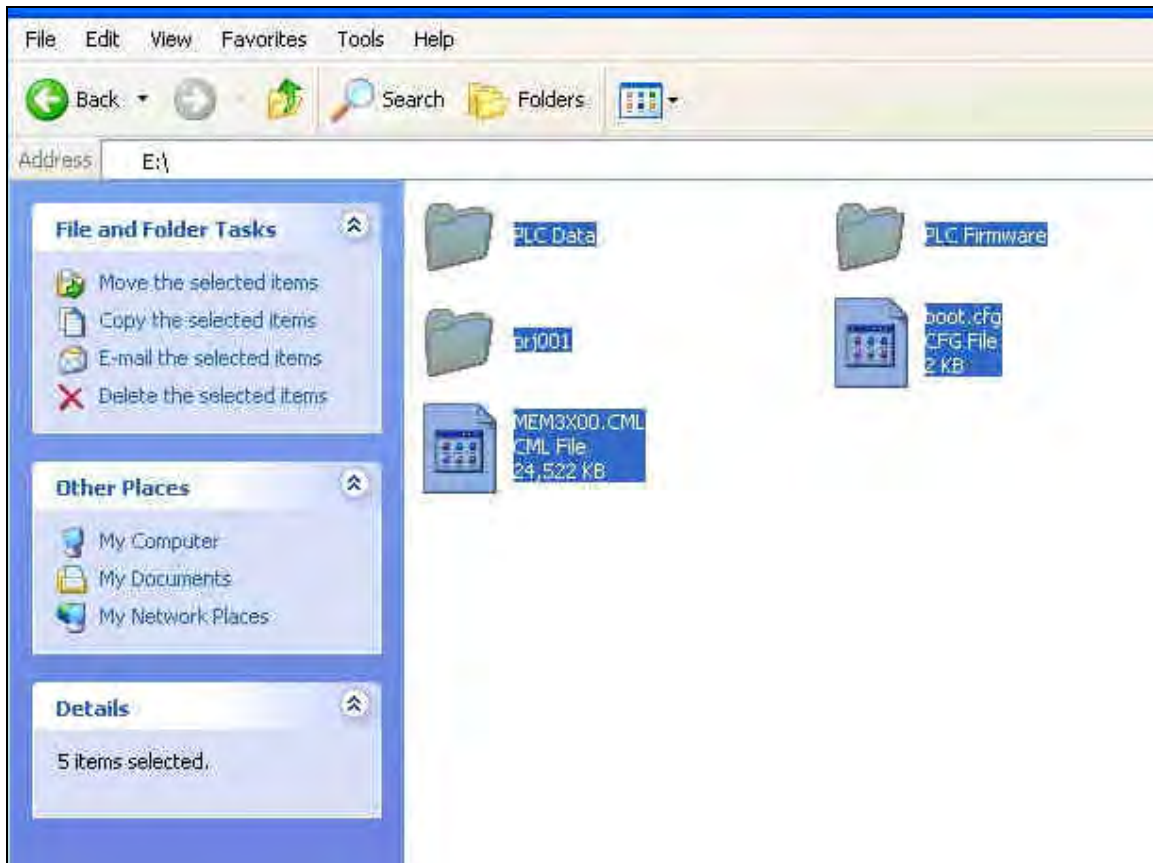
Once the USB stick has been opened, "Right-Click" in the "white, empty folder area and select "Paste"

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”

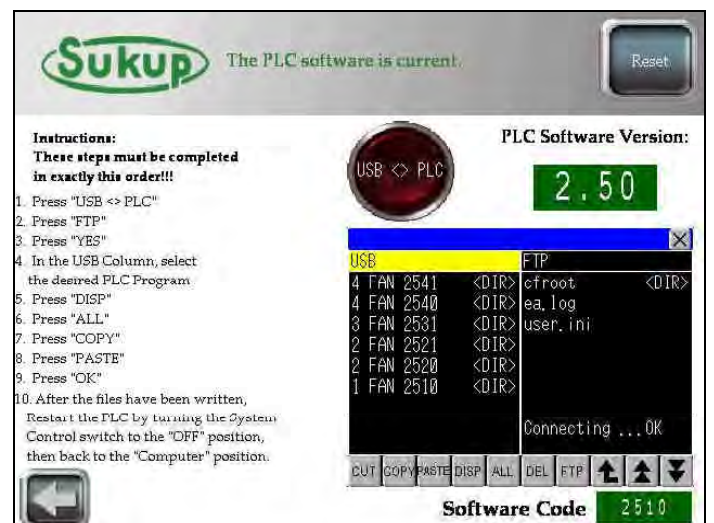
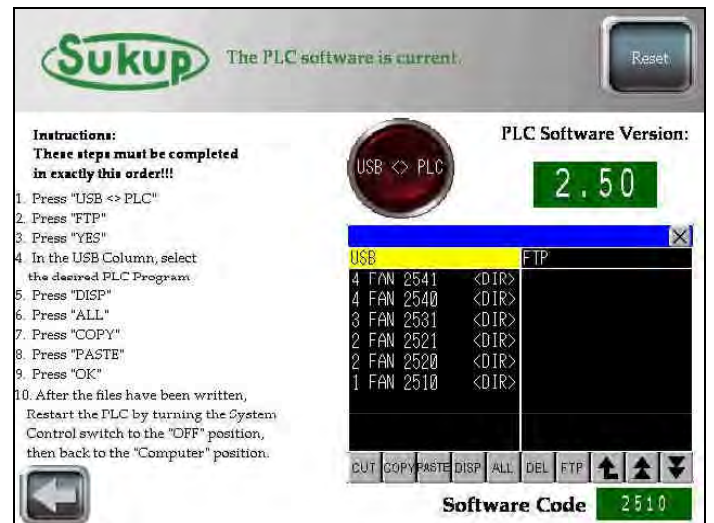
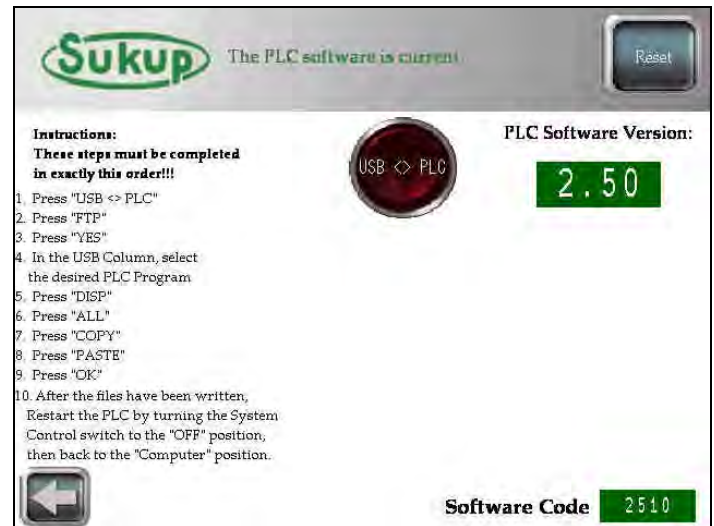
Nicely enough, the directions are right on screen with you, so performing this task should be relatively painless.

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

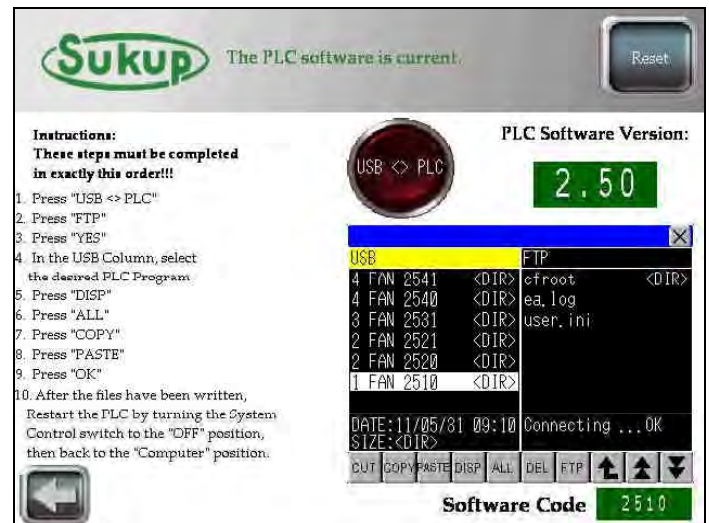
Next, press “FTP”, and a dialog box will pop up. Select “YES”

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

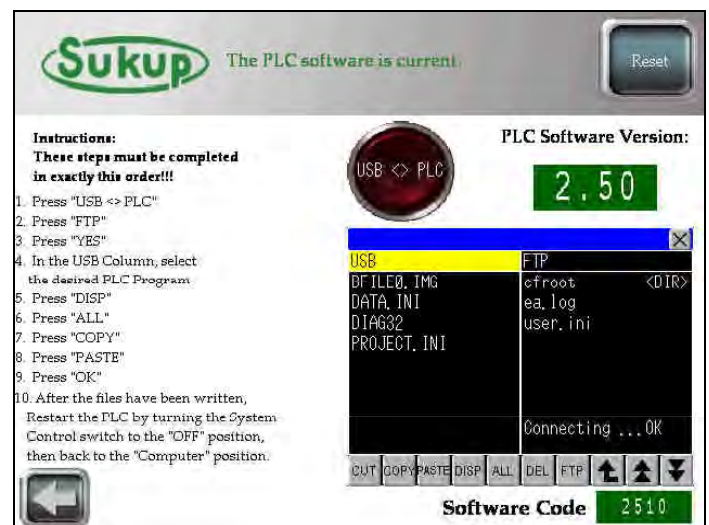
All V2.5 and later software releases will contain all the portable dryer programs. After updating to V2.5, there will also be a software code that appears in the lower-right corner of the screen. The code 2510 means V2.5 software, single-fan program, and no incoming moisture sensor. Similarly, a code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



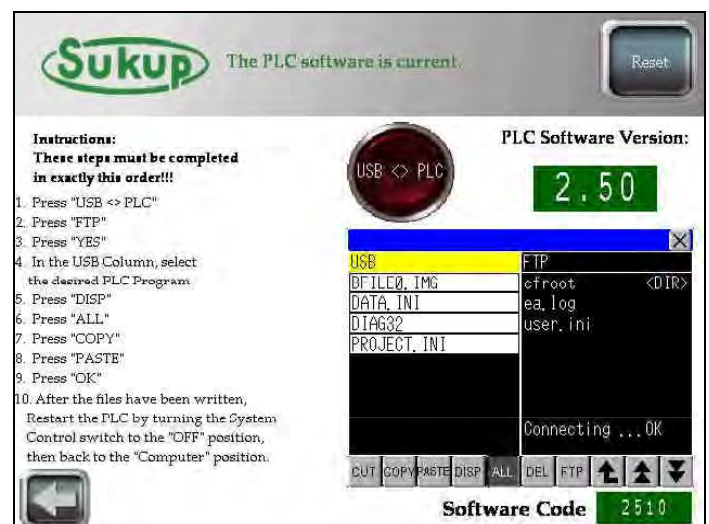
Touch the "DISP" button. The contents of the selected folder will then be displayed in the USB column.



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.

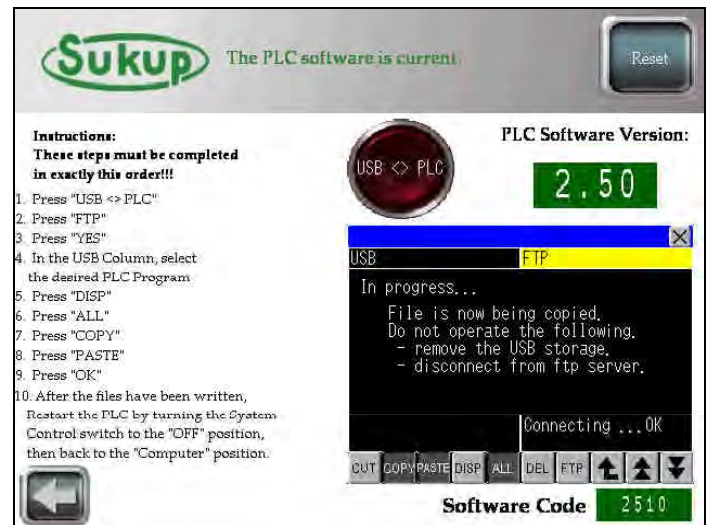
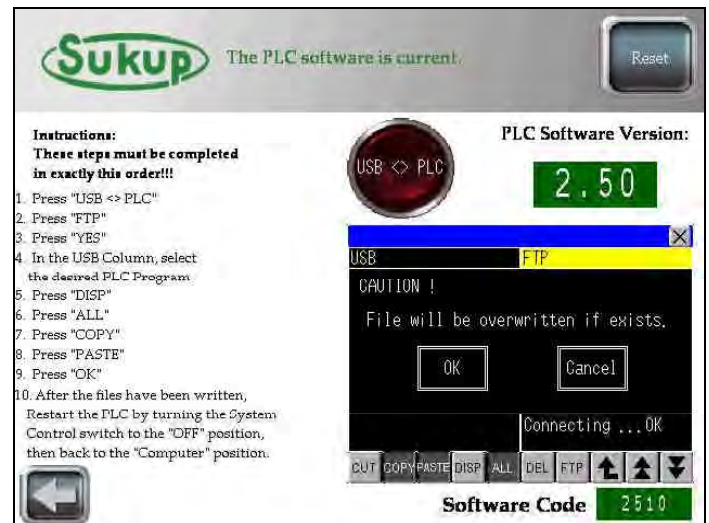
A progress box will open with “In progress” blinking.

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 *****

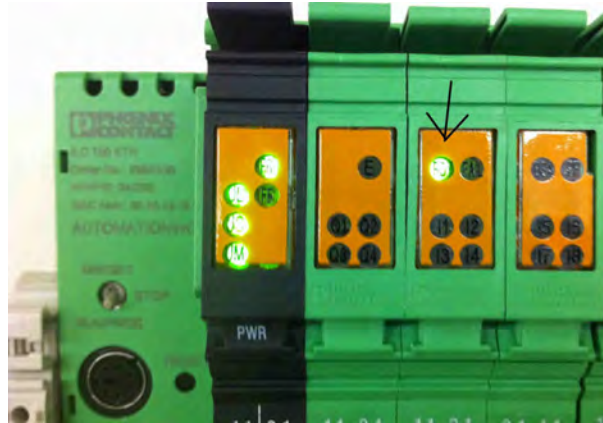
**PLC's with HW/FW 04/205, 04/220, and select 04/354
(found on the left side of the PLC, third line of text)**

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



Software Manual

V2.6 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 faults are clear and all system inputs are functional, this screen will appear upon startup. There are four (4) buttons at the top of screen. In addition, the version number and fan number are shown on the bottom right corner of screen.

You will see a screen with the Sukup logo and any number of buttons throughout entire program.

The “Tools” and “Settings” menus will be explained first.



“Tools” Menu

Pressing the “Tools” button will change screens to the one located at right. (“Bushel Shutdown” and “Bushel Count” will not appear until after bushel counter has been calibrated under “Calibrate Sensors” menu).

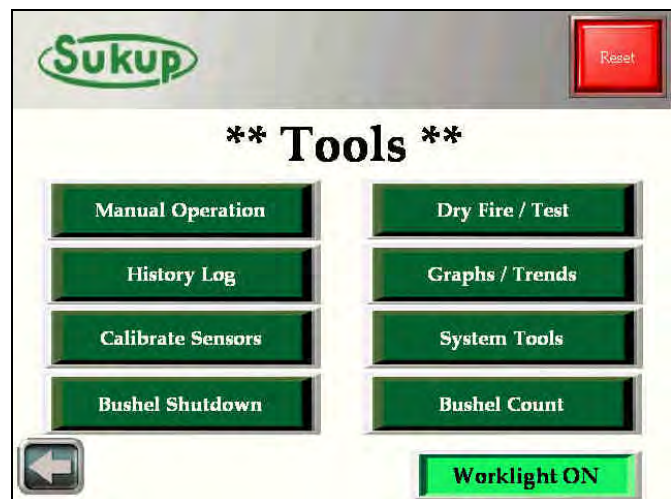
Manual Operation and Dry Fire modes are available in the tools menu.

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 (Resistance Temperature Detector) to better reflect exact values.

There is also a helpful system tools menu that will be explained in the “System Tools” section.



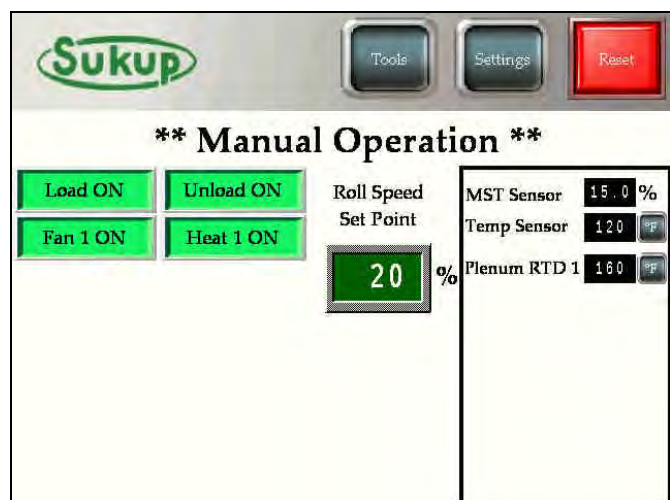
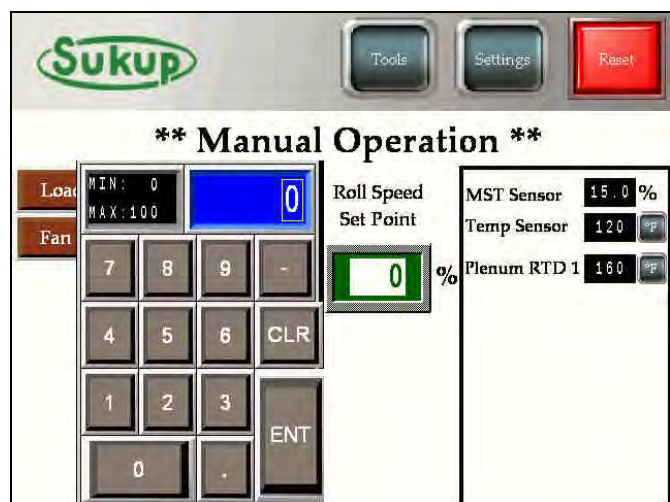
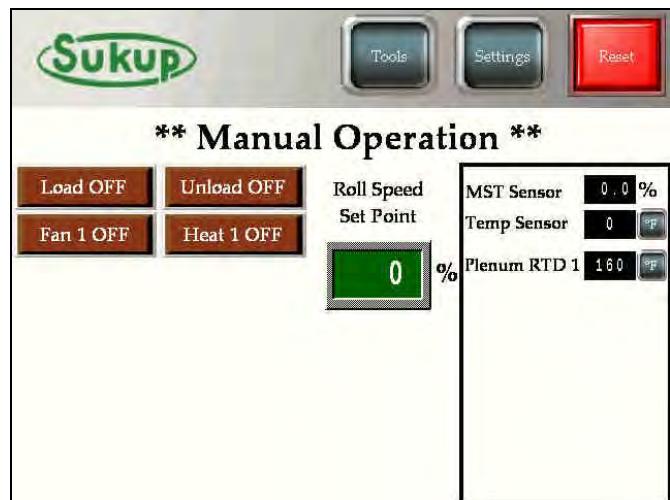
Tools → Manual Operation

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. User is also able to specify a desired meter roll speed. The “Heater” function is interlocked with the “Fan” button. If fan is not running, the heater will not be able to be turned on.

After about 90 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 without the need to shut down 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.

NOTE: All buttons that appear BURGUNDY in color (like the load, unload, fan, and heater buttons in the first image on this page) 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 NEON GREEN color (as in the image at right).



Tools → Dry Fire Mode

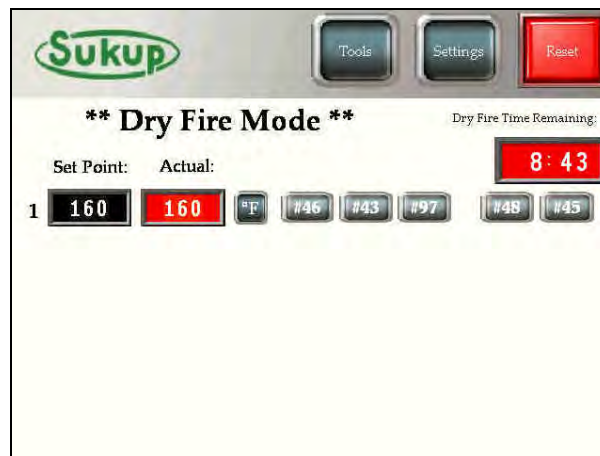
In addition to “Manual Operation,” “Dry Fire” can also be accessed from the Tools menu.

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 timer has expired and the fans and heaters will automatically turn off.



Tools → History Log

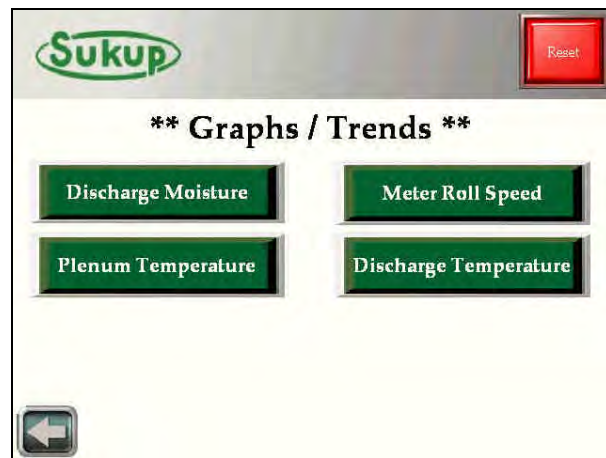
The “History Log” displays events like faults or mode operations, always showing the latest event on top.

To navigate through the history log, touch the “Enable Scroll” button, and the first entry will be highlighted. Select the “Scroll Up” or “Scroll Down” button to move highlighted entry up or down.



Tools → Graphs/Trends

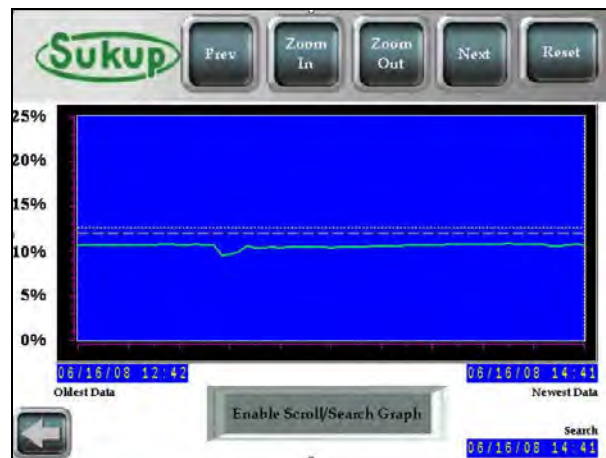
The “Graphs/Trends” button gives you the ability to visualize the progress/performance of the dryer. User can have a visual representation of moisture, plenum temperature, roll speed, and discharge temperature. Each of these graphs is stored independently on the panel’s Compact Flash Card. These features are explained 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 screen and buttons located in the header will be functional.

Each graph will display 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 bottom-right of screen.

Tools → Calibrate Sensors

By selecting “Calibrate Sensors” button, the user can put offsets on the analog inputs of the system. These include moisture sensor, bushel counter and input moisture sensor (if applicable).

NOTE: Read RED-colored box on top of each page very carefully.

Tools → Calibrate Sensors MOISTURE SENSOR

This screen shows the calibration for the moisture sensor. The numbers in BLACK are actual, unadjusted values. The offset is determined by the difference in the GREEN box minus the BLACK box.

If both values are going to be adjusted, adjust the temperature first. Press “Done” and return to this same menu to change moisture calibration. This is because moisture is a function of temperature.

Example: The BLACK box displays 120°F as the recorded temperature. Its value plus the offset is loaded into the GREEN box when this screen is loaded. Since the current offset is zero (0), 120°F is also displayed in the GREEN box. If the number in the GREEN box were changed to 110°F, the offset would be (-10°). Thus, the next time this screen is loaded, the number in BLACK will remain 120°F, but the value in the GREEN box will be 120°F + the offset of (-10°) which gives 110°F.

The image displays four sequential screenshots of the Sukup calibration interface, showing the process of calibrating moisture and temperature sensors.

Screenshot 1: Main Calibration Menu
Title: **** Calibrate Sensors ****
Buttons: Discharge Moisture Sensor, Bushel Counter, Reset (top right), Back (bottom left).

Screenshot 2: Discharge Moisture Calibration
Title: **** Calibrate Sensor ****
Red instruction box: When calibrating both, calibrate Discharge Temperature FIRST! If you have just calibrated the Discharge Temperature, WAIT 1 FULL MINUTE before calibrating the Discharge Moisture.
Buttons: Discharge Moisture, Discharge Temperature, Reset (top right), Back (bottom left).

Screenshot 3: Discharge Moisture Value Entry
Title: **** Calibrate Sensor ****
Subtitle: **** Discharge Moisture ****
Red instruction box: Enter in the DESIRED value in the GREEN box. The new user value should be TEMPERATURE COMPENSATED! If your handheld sensor is already temperature compensated, enter that value into the GREEN box.
Fields: **** Non-Calibrated Moisture Value **** (15.0 %), **** New User Value **** (15.0).
Buttons: Up arrow, Down arrow, Done.

Screenshot 4: Discharge Temperature Calibration
Title: **** Calibrate Sensor ****
Subtitle: **** Discharge Temperature ****
Red instruction box: Enter in the DESIRED value in the green box. The next time this page is loaded, the green box will reflect the offset made now.
Fields: **** Discharge Sensor Value **** (150 °F), **** New User Value **** (150).
Buttons: Up arrow, Down arrow, Done.

Tools → Calibrate Sensors BUSHEL COUNTER

The bushel counter is configurable in two ways – automatic and manual. Read the instructions in RED at 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, dryer **MUST BE UNLOADING GRAIN**.

Simply start the timer, then after a period of time, stop timer and enter number of bushels discharged. The dryer will keep track of the unload speed during unload process and then compute a bushel/hr rating.

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 dryer.

After calibration is completed, options for “Bushel Shutdown” and “Bushel Counter” will appear in the “Tools” menu.

The image displays three sequential screenshots of the Sukup Bushel Counter Calibration interface. Each screen features the Sukup logo in the top left and a red 'Reset' button in the top right.

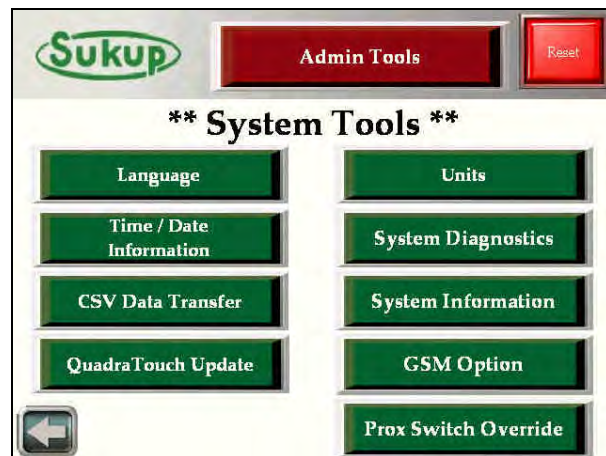
Screen 1: Titled "** Bushel Counter Calibration **", it provides instructions in a red box: "Calibrate the bushel counter two ways. Choose 'User Calibration' to tell the dryer how many bushels/hr it puts out based on a certain unload speed. Choose 'Automatic Calibration' to start a timer during which period the dryer keeps track of its average meter roll speed. After the time is stopped, the system will compute and save the avg bushel/hr. 'Automatic Calibration' mode needs to be done while the dryer is already unloading grain." Below the instructions are two green buttons: "Manual Calibration" and "Automatic Calibration". A back arrow is on the left.

Screen 2: Also titled "** Bushel Counter Calibration **", it shows the "Start / Stop the Calibration Timer" section with "Timer Started" (green) and "Stop Timer" (green) buttons. To the right, the "Number of Bushels Discharged" is shown as "0" in a green box. A "Compute" button is at the bottom. A back arrow is on the left.

Screen 3: Titled "** Bushel Counter Calibration **", it shows the "Bushels / HR" section with the value "2571" in a black box. A "Save / Store" button is at the bottom. A back arrow is on the left.

Tools → System Tools

The “System Tools” menu allows user to visualize and adjust main system settings as well as offer some great diagnostic tools.



Tools → System Tools → Language

Select a system language. V2.6 will have different languages in two different program selections. English, Danish, Russian, Spanish, and French are in the primary release.

Hungarian and Romanian will be in a separate release.



Tools → System Tools → Time/Date

Change Date and Time using the arrow keys.



Tools - System Tools – CSV Data Transfer

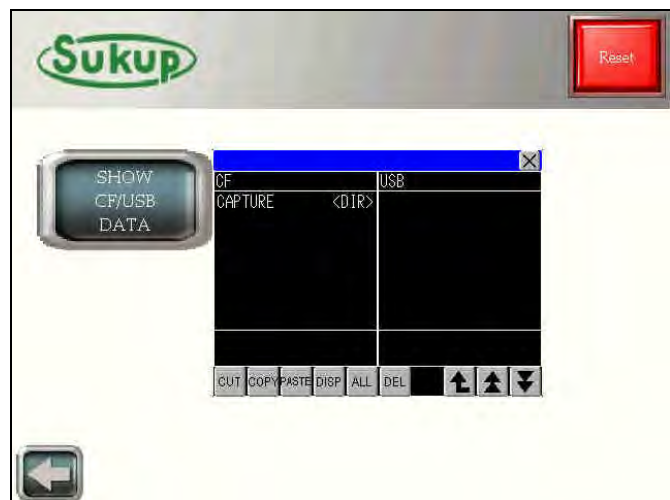
Selecting the “SHOW CF/USB DATA” displays the BLACK directory window. This window shows all the folders and files available on the Compact Flash Card and USB storage devices plugged into the panel.

NOTE: If user already has a CF card reader for their computer, they can simply remove the CF card from the back of the touch-panel and insert it into their card reader.

If user has no CF card reader, the data can be transferred over to a USB flash drive using this feature.

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 “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. This feature can be used to copy data from the card for backup purposes and/or to graph the data on a computer.



Tools → System Tools → Units

Change between Fahrenheit and Celsius.

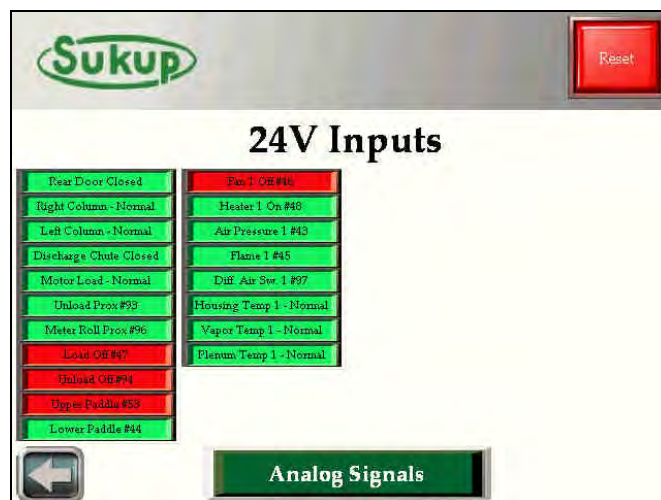
This page allows user to press the button and change units from °F to °C or vice versa.

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.



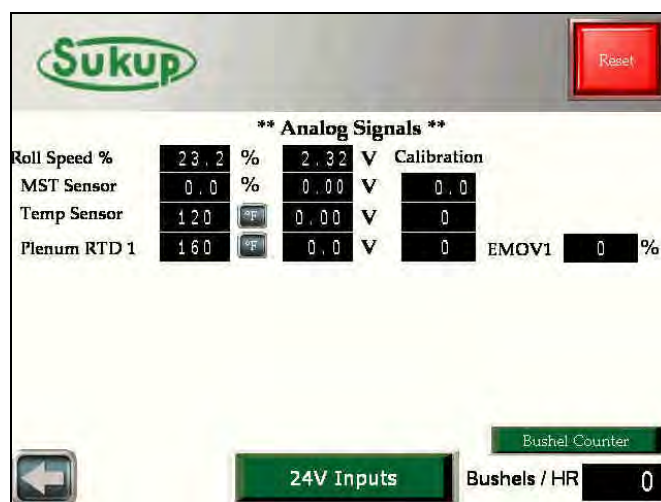
Tools → System Tools → System Diagnostics

The “System Diagnostics” feature is a very useful tool. The image at right shows 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 analog inputs and outputs. These are especially helpful when troubleshooting problems.

NOTE: Pressing and holding the SUKUP logo on the top left of every screen will take user 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.



Sukup Reset

**** System Information ****

PLC Software Version: 2.60

HMI Software Version: V2.6 BUILD 6/9/2012

Fan Setup: Single Fan

Fan Selection

Tools → System Tools → GSM Option

If equipped with the T24999 GSM kit, the dryer will automatically contact the programmed number on the GSM Option 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.

For more information, see the GSM modem operation instructions in Appendix C, page 14.

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.



Sukup Reset

GSM Option

The GSM modem will text message this number in the event of a fault condition. Enter the 10 digit mobile number below.

000 - 000 - 0000

International Dialing



Sukup Reset

GSM Option

Country Code + 1

Total Number of Phone Digits NOT including Country Code 10

Phone Number 0 0 0 0 0 0 0 0 0 0

Preview + 1 0 0 0 0 0 0 0 0 0

Band 3

! HELP

North America Dialing

Tools → System Tools → Prox Switch Override

Sometimes it may become necessary to ignore the system's two (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.

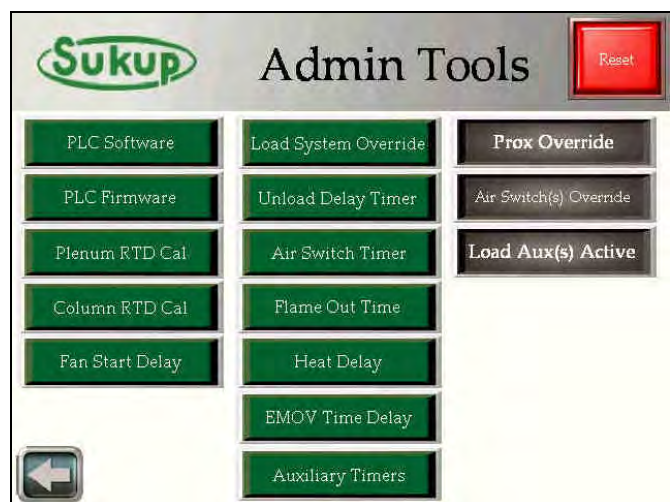


Tools → System Tools → Admin Tools

The Admin Tools menu allows you to customize your dryer in order to best 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 to the dryer if the settings are used improperly.**

SUKUP MANUFACTURING DOES NOT RECOMMEND BYPASSING SAFETY CIRCUITS AND SENSORS FOR ANY PERIOD OF TIME. USE THESE SETTINGS ONLY 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 one to five (1-5) minutes.



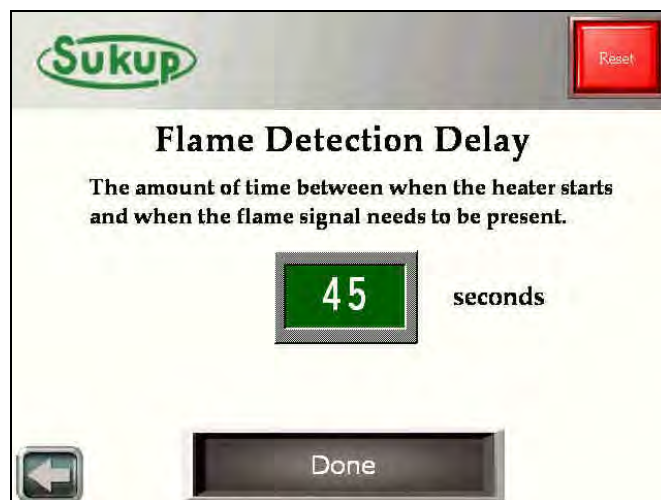
**Tools → System Tools →
Admin Tools → Air Switch Fault Timer**

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**

Should the Electronic Mod Valve (EMOV) butterfly valve stem ever need to be adjusted, this is a convenient way to do it. This function allows you to lock the EMOV stem in its low-fire position for up to four (4) minutes. At factory settings, the EMOV will open to 25%, which should read 5-lbs 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 5-lbs of pressure. After the Timer delay, the valve will start actuating like normal.



Tools → System Tools → Admin Tools → Aux Timers

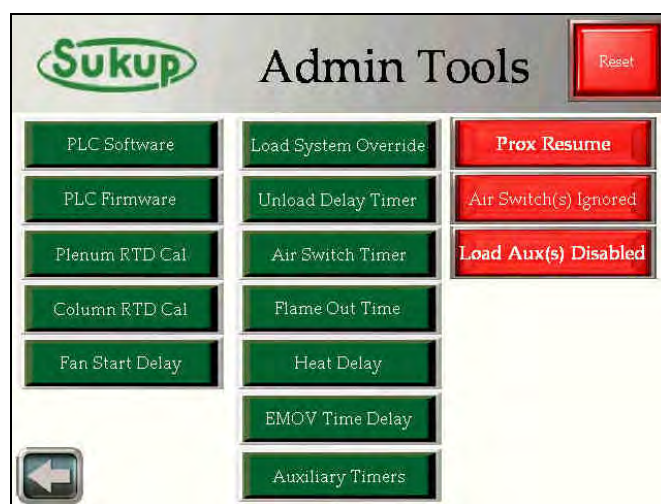
Because everyone's dryer setup is different, it may be necessary or helpful to change the factory delay settings on the auxiliary load devices. This will allow a longer or shorter delay between when the load auger, auxiliary 1, and auxiliary 2 start.



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 side 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 BYPASS the Auxiliary Load devices. This can be a nice feature when you are transferring grain through the dryer and bypassing the wet bin.



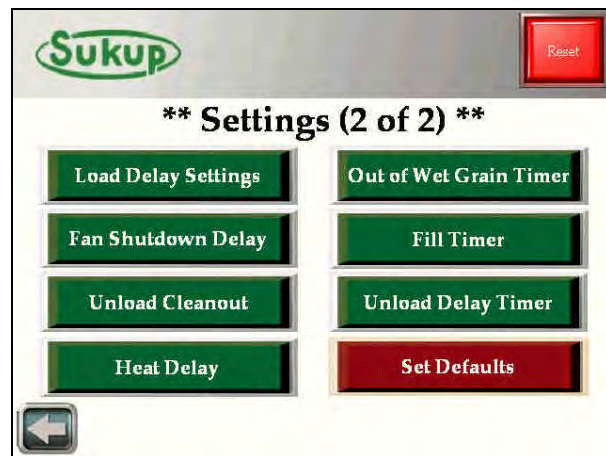
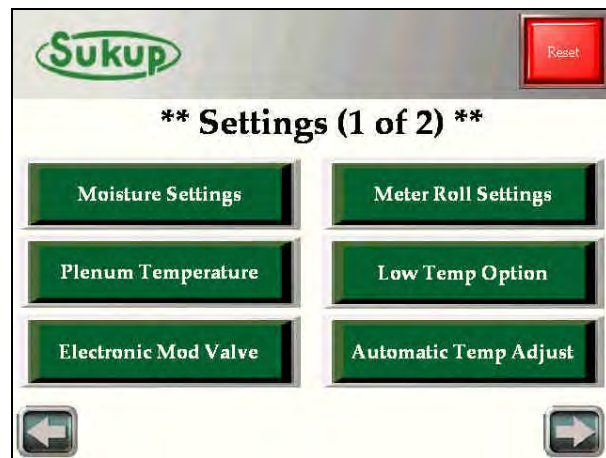
“Settings” Menu

The “Settings” menu allows the operator to specify optimal settings for grain drying.

The “Settings” menu is broken up into two (2) 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.

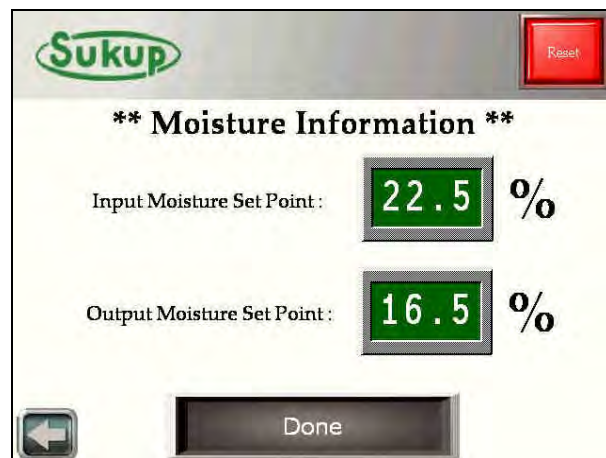
NOTE: As before, the BURGUNDY and light NEON GREEN buttons have press-and-hold features.

Each button opens a new screen where user will specify their desired values. Each setting is factory set before the unit leaves Sukup Manufacturing Co.



Settings (1 of 2)→ Moisture Settings

Specify the input and desired output set points.



Settings (1 of 2)→ Meter Roll Settings

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 set point.

The default setting for the “Meter Roll Gain” is “2.” The scale goes from 1 to 10 where “2” is normal reacting and “10” is very fast reacting.

A setting higher than “4” will rarely ever need to be used.

The minimum and maximum metering roll speeds can be set with this screen.

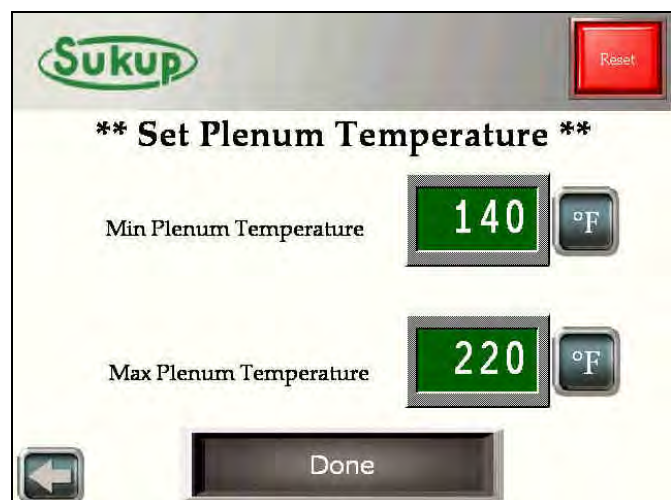
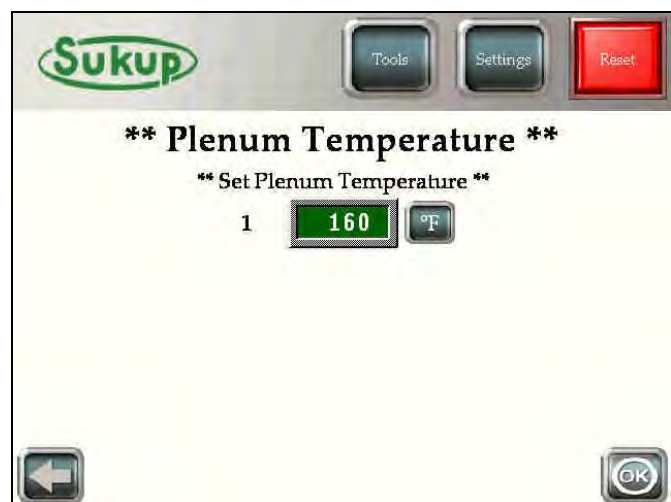
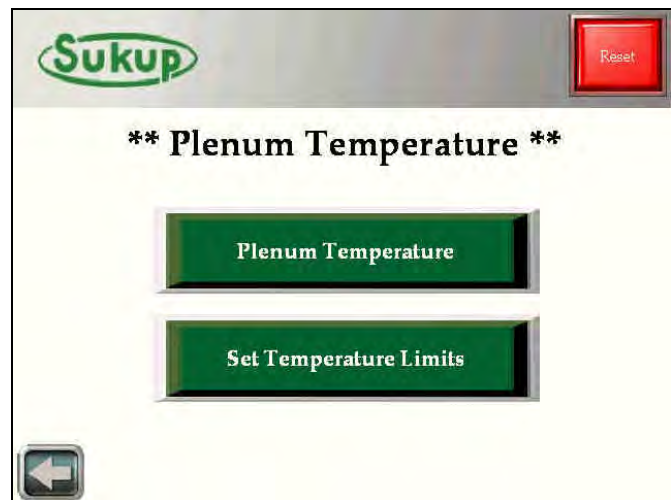
The Deadband zone is a great feature to keep the dryer from swinging around a set point. The Deadband settings can be changed according to user preference. With a default setting of 2 (tenths) above and 2 (tenths) below, the meter roll speed will stay at a constant speed while the discharge moisture remains between 2 (tenths) above and 2 (tenths) below the set point.

The image displays four sequential screenshots of the Sukup control interface, each showing a different settings screen. Each screen has a header bar with the Sukup logo, a 'Tools' button, a 'Settings' button, and a 'Reset' button. A back arrow is located at the bottom left of each screen.

- Meter Roll Settings:** This screen is titled "** Meter Roll Settings **". It contains three large green buttons: "Multiplier", "Min / Max Limits", and "Deadband Settings".
- Meter Roll Gain:** This screen is titled "** Meter Roll Gain **". It instructs the user to "Select the desired Meter Roll Gain (1=Slowest, 10= Fastest)". A large green button displays the value "2".
- Roll Speed Limits:** This screen is titled "** Roll Speed Limits **". It has two input fields: "Set Minimum Roll Speed:" with a value of "10 %" and "Set Maximum Roll Speed:" with a value of "50 %". A "Done" button is at the bottom.
- Deadband Settings:** This screen is titled "** Deadband Settings **". It provides an example: "Example: The output MST setpoint=16%, Pts above=1, Pts below=5. Thus the zone of meter roll speed is 16.1% to 15.5%. When the discharge grain is between these two numbers, the speed of the meter rolls remains unchanged." Below this, there are two input fields: "Amount of points above the setpoint before a change is made to meter roll speed. (Tenths)" and "Amount of points below the setpoint before a change is made to meter roll speed. (Tenths)". Both fields display the value "2".

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.

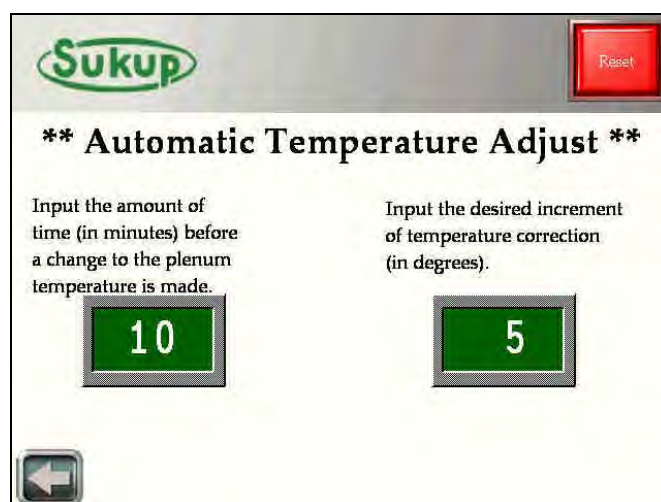
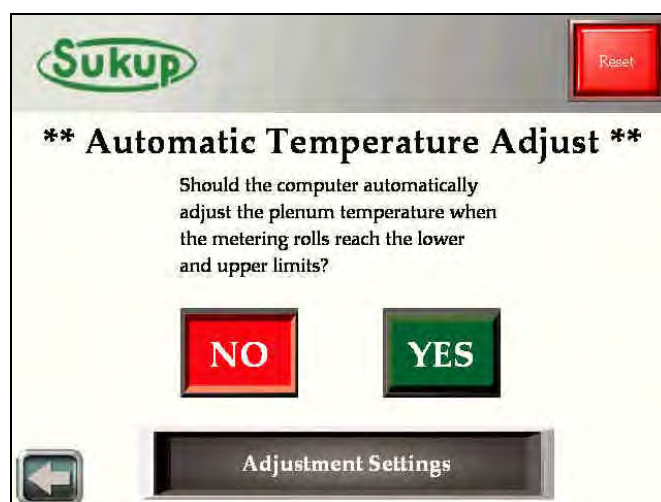
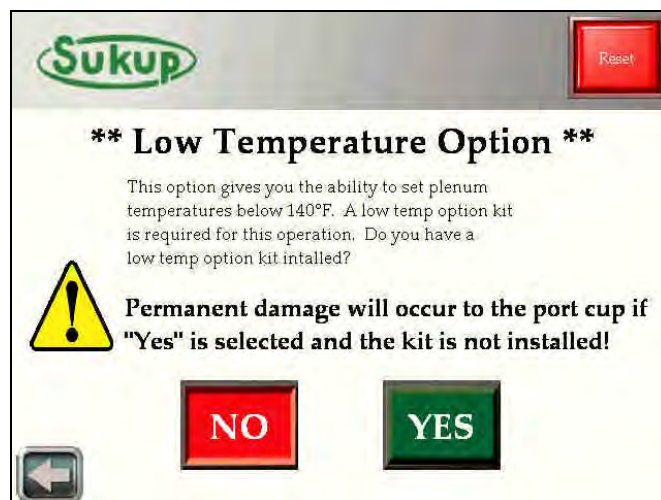
Settings (1 of 2)→ Automatic Temp Adjust

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 set point 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.



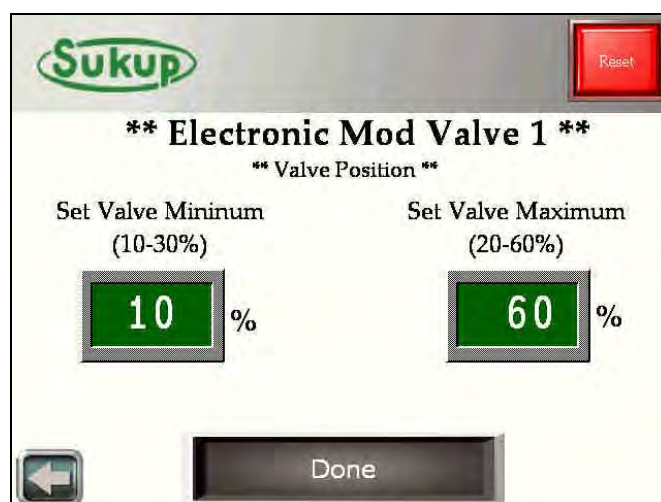
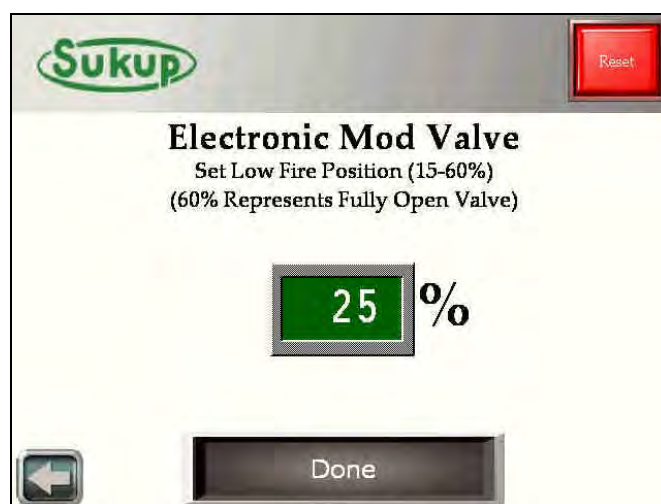
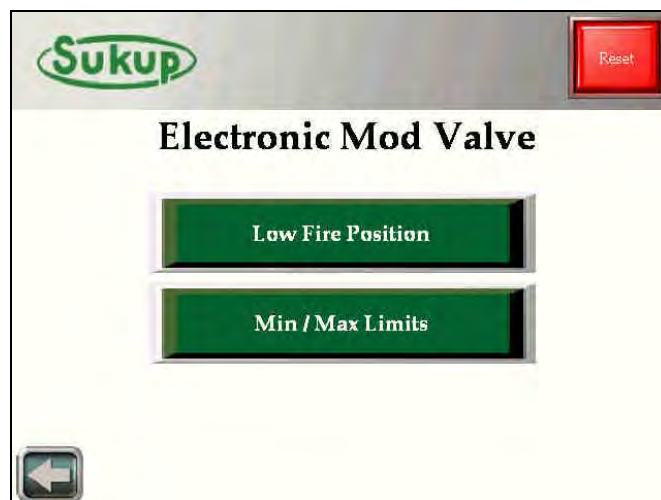
Settings (1 of 2)→ Electronic Mod Valve

This menu gives the user the option of specifying a low fire position (the position to which the valve is opened 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 Co. finds that at 25% opening, the pressure gauge should read 5-lbs. of pressure (+ or – ½ 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%.

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 too 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 user the option of waiting a set period of time (0-240 seconds) in addition to the five- (5) and ten- (10) second timers before the auxiliary load motors start. This is especially helpful when the loading system is oversized for the dryer to which it is attached. Constantly turning on and off is tough on motors. Putting a delay in allows time for the dryer to unload slightly more than usual and allows the auxiliary load motors to stay on for longer periods of time. The default setting is zero (0) seconds.

The Fan Delay timer allows the fan to run for up to ten (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 Time 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 power to the dryer is unstable or inadequate.

The Unload Delay Timer allows the unload auger to be paused for up to five (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-set from two (2) to 15 minutes. Its default value is ten (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 five (5) to 30 minutes. Its default value is 15 minutes. During the unloading process, the dryer has between five (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.

The image displays four sequential screenshots of the Sukup control interface, each showing a different delay setting. Each screen features the Sukup logo at the top left, a 'Reset' button at the top right, a back arrow at the bottom left, and a 'Done' button at the bottom center.

- Heat Delay:** The title is 'Heat Delay'. The description reads: 'The amount of time between when the fan starts and power is applied to the heater relay coil.' The value is set to '0' seconds.
- Unload Delay Timer:** The title is 'Unload Delay Timer'. The description reads: 'The amount of time the unload can be paused during a run cycle. (1-5 Min)'. The value is set to '2' minutes.
- Out of Wet Grain Timer:** The title is 'Out of Wet Grain Timer'. The description reads: 'The Out of Wet Grain Timer starts counting when the dryer is loading and unloading, but the lower paddle switch has not been satisfied with grain. (2-15 min)'. A green status bar indicates 'Out of Wet Grain Timer Enabled'. The value is set to '10' minutes.
- Fill Timer:** The title is 'Fill Timer'. The description reads: 'The Fill Timer is a fault timer that starts counting when the dryer is unloading, but the lower paddle switch has yet to drop into its "OFF" position. (5-30 min)'. A green status bar indicates 'Fill Timer Enabled'. The value is set to '15' minutes.

BASIC OPERATION

From the “Main Screen” touch the “Start” button.

The “Choose Operation” menu will come up.

There are four (4) automatic modes in which the dryer can operate. Each operation sequence will be shown below.

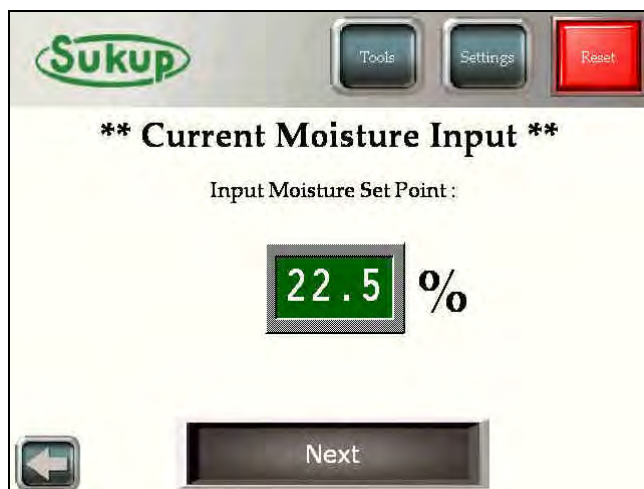


Continuous Flow Mode → Initial Dry

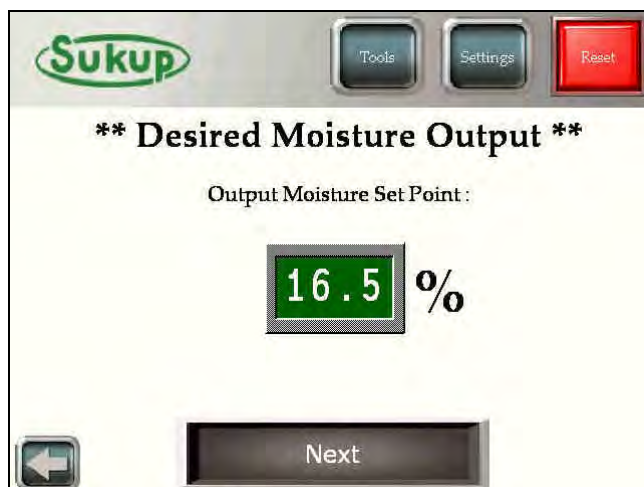
After selecting “Continuous Flow” from the “Select Operation” menu, choose the “Initial Dry” option.



The next screen to appear is the “Current Moisture Input” screen. Using the pop-up keypad, 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.

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.

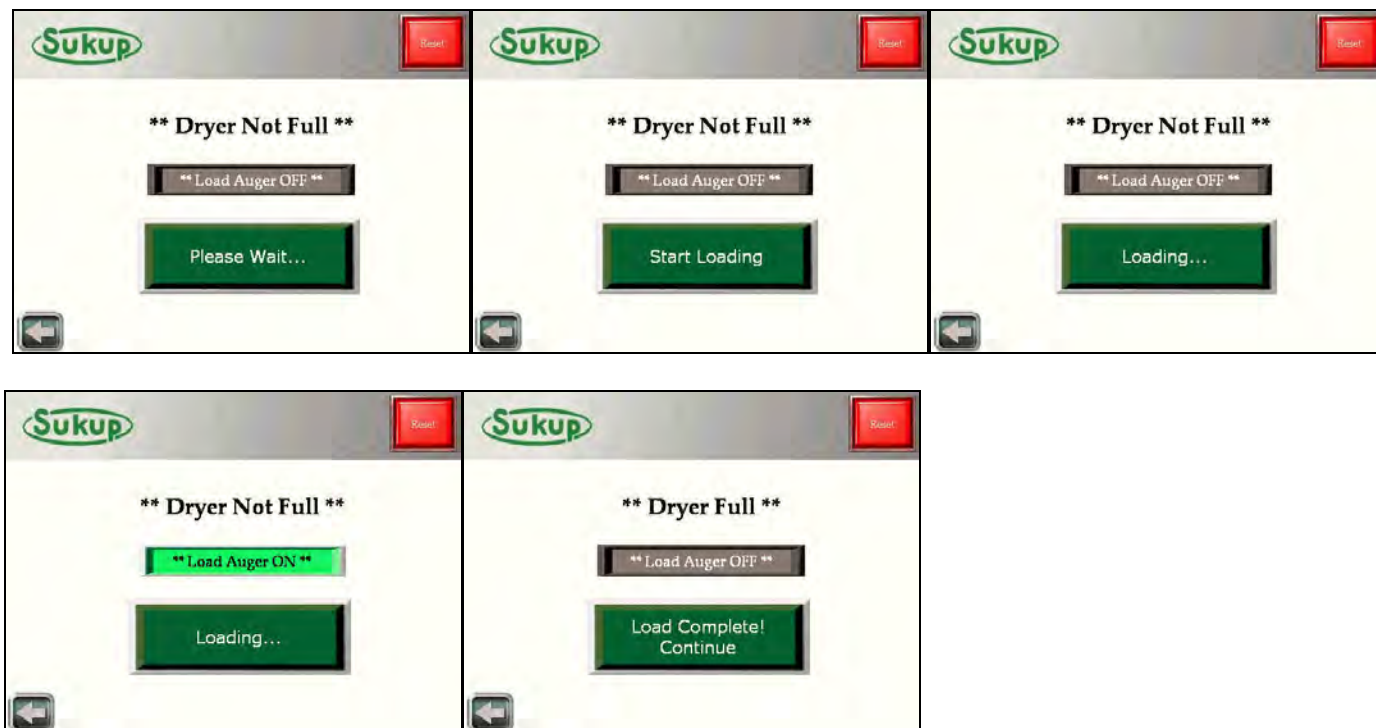


When “Next” is pressed, the “Loading Sequence” begins.



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.

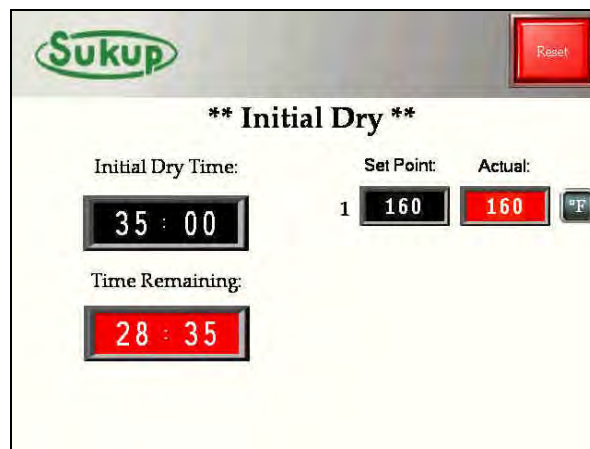


INITIAL DRY

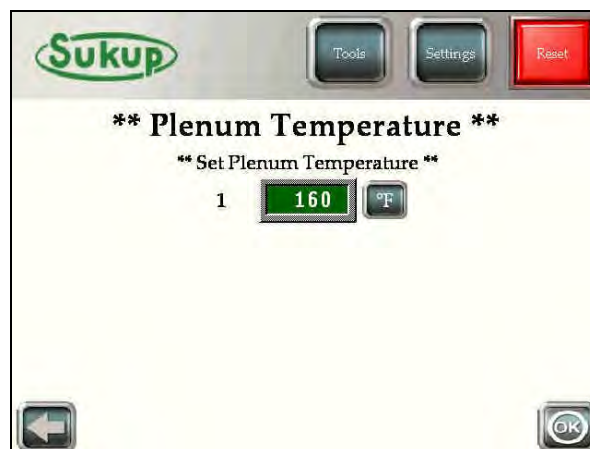
After the fans and heaters have been started, the “Initial Dry” timer will begin.

Initial Dry Time is determined by 6 min/pt (+) or (-) 1 min/pt per 20°F difference from 160°F

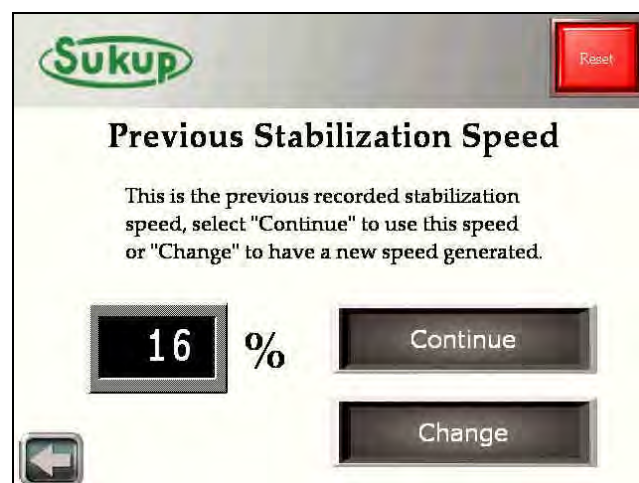
Example: Input MST = 22%, Desired MST = 16% → 6 pt removal. 6 min/pt at 6 pts @ 160°F = 36 min.



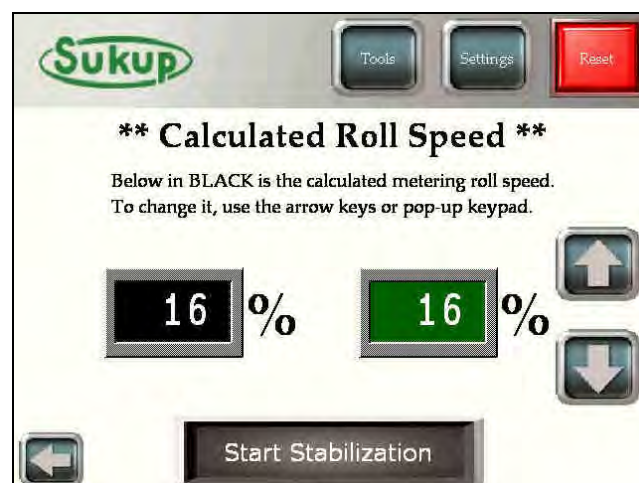
After the “Initial Dry” timer has expired, the operator will have the opportunity to specify a stabilization temperature and the computer will determine an unload rate based upon that temperature.



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, an error message will pop up and give you the option of changing 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 grain.

Ten (10) seconds after the “Stabilization” mode has started, the unload process will begin.



Continuous Flow

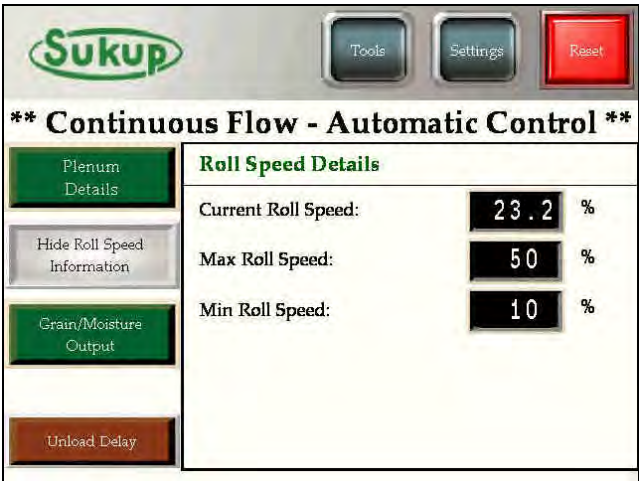
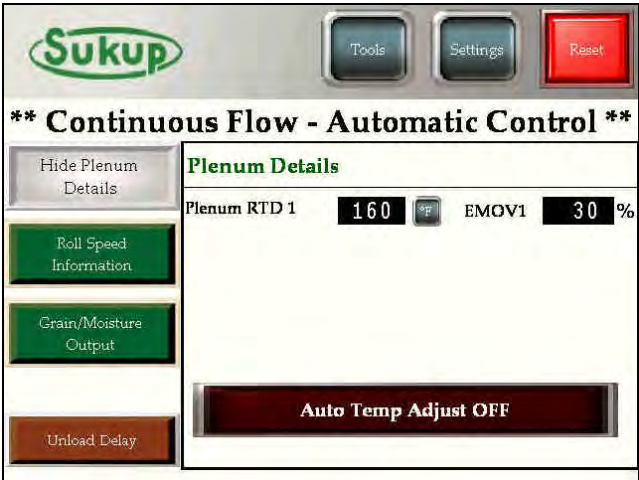
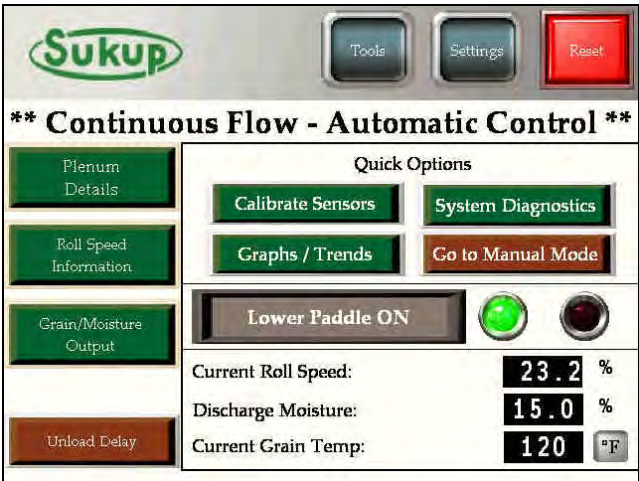
After the “Stabilization” timer ends, the “Continuous Flow” mode begins. During this mode, the dryer constantly monitors the outgoing moisture and makes corrections to roll speed and plenum temperature (optional). The buttons along the left side of the screen allow the user to keep track of all relevant drying information.

The paddle switches are visually represented by the two lamps next to the Load Auger status.

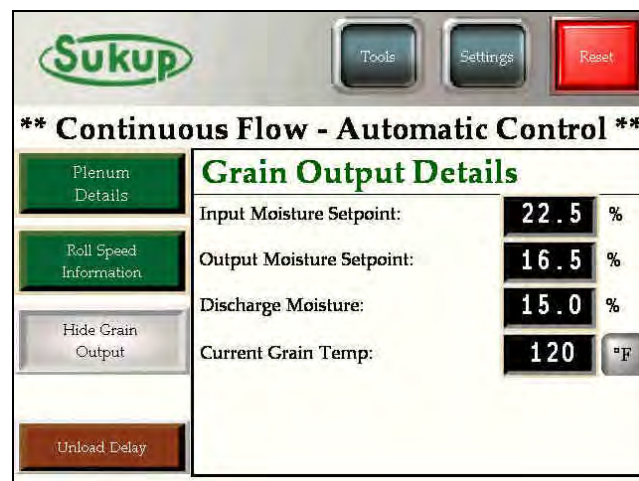
Pop-up menu for “Plenum Details” will show plenum temperature(s) and corresponding electronic mod valve position(s).

Pop-up menu for “Roll Speed Information” will show all the corresponding unload speeds and their limits.

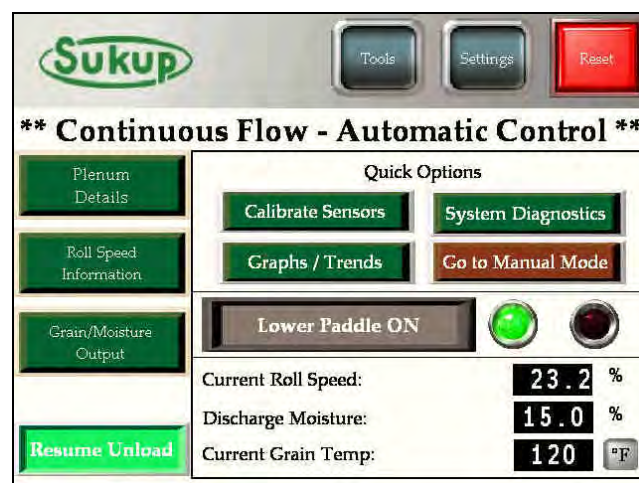
After the bushel counter has been calibrated, it will show up on this menu as well.



Pop-up menu for “Grain/Moisture Output”
This menu will show all the set points and actual moisture levels of the grain.

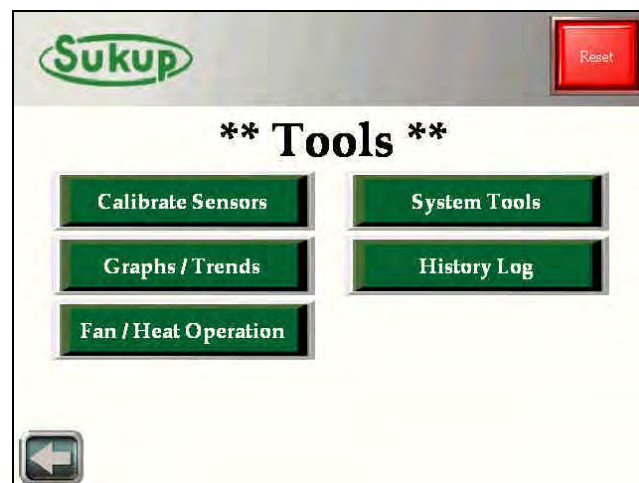


During operation, it sometimes becomes necessary to stop the unloading process for a brief period to clean the sensor or switch storage bins. Using the press-and-hold “2 Minute Unload Delay,” the dryer will stop its unloading system for two (2) minutes. The system will not re-engage the unload system 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 two (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 is due to a fault condition, the time and date will be stored and displayed on the screen.

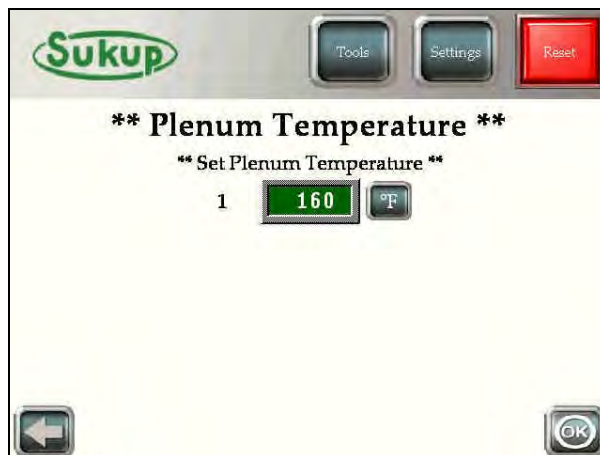
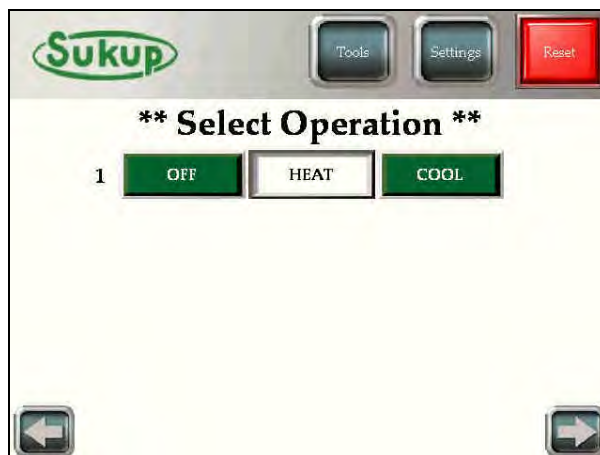
Choose either “Restart With Stabilization” or “Restart Without Stabilization”

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 extremely 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.

The screenshot shows the 'Sukup' logo at the top left. To the right are three buttons: 'Tools' (blue), 'Settings' (blue), and 'Reset' (red). The main title is '** Current Moisture Input **'. Below it is the label 'Input Moisture Set Point :'. A large green digital display shows '22.5' followed by a '%' symbol. At the bottom left is a back arrow button, and at the bottom right is a 'Next' button.

The screenshot shows the 'Sukup' logo at the top left. To the right are three buttons: 'Tools' (blue), 'Settings' (blue), and 'Reset' (red). The main title is '** Desired Moisture Output **'. Below it is the label 'Output Moisture Set Point :'. A large green digital display shows '16.5' followed by a '%' symbol. At the bottom left is a back arrow button, and at the bottom right is a 'Next' button.

The screenshot shows the 'Sukup' logo at the top left. To the right are three buttons: 'Tools' (blue), 'Settings' (blue), and 'Reset' (red). The main title is '** Maximum Roll Speed **'. Below it is the label 'Maximum Roll Speed Set Point:'. A large green digital display shows '50' followed by a '%' symbol. At the bottom left is a back arrow button, and at the bottom right is a 'Next' button.

After the user has selected 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”



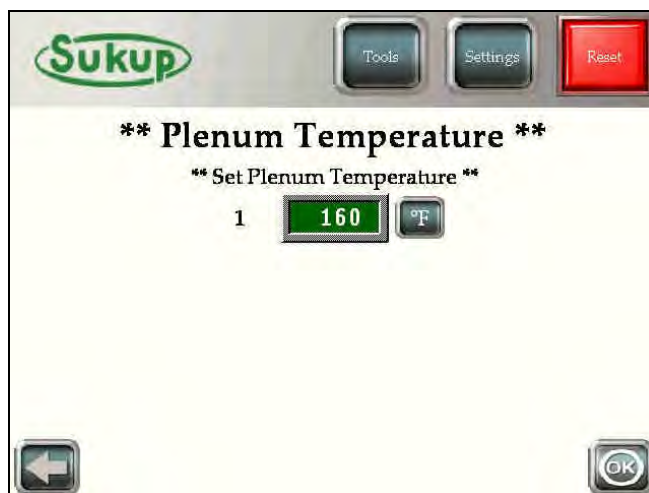
If the user is resuming a previous batch, the “Resume” button will start the batch immediately using the past temperature and timer set points.

The batch number is incremented each time a load is discharged.

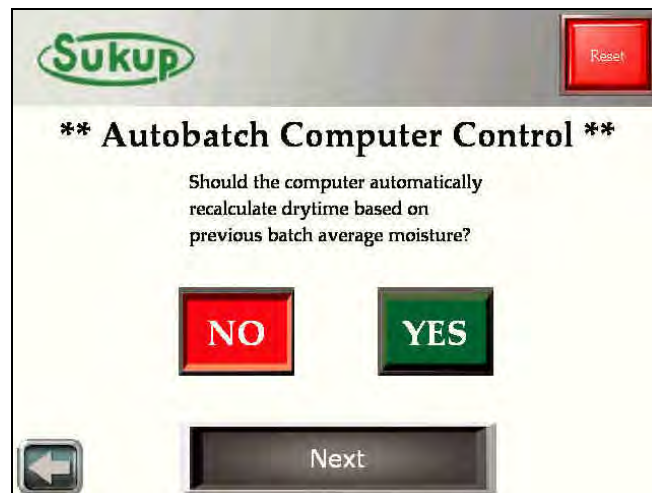
If a new batch is desired, the “New Batch” button is offered and the user will be able to set drying temperature and dry cycle timers.



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)



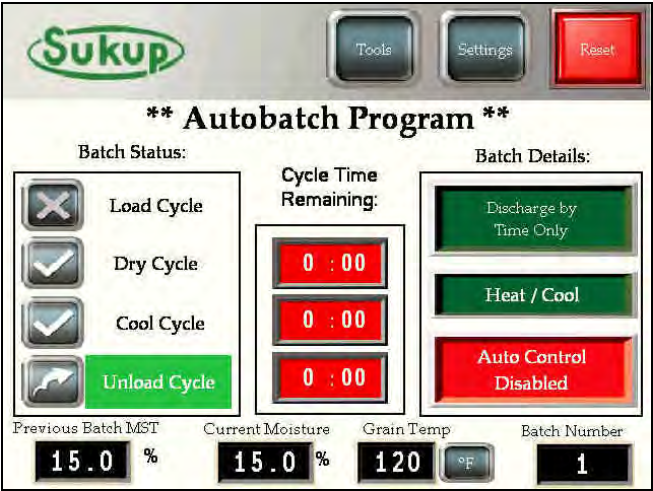
After selecting "Time Based Control" the computer will calculate a recommended dry time based upon the user's set points. That number is placed in the BLACK box. It is automatically loaded into the GREEN box, which is user-selected.



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 time remaining in each highlighted section, and the “Batch Details” section shows 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 be able 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.

In V2.6, Grain Transfer gives you the option of using the fans during transfer operation.

This screen will show up for the entire “Grain Transfer” process. It shows the discharge moisture, grain temp, and unloading speed.

The interface consists of four sequential screens, each with a 'Sukup' logo and a 'Reset' button in the top right corner.

- Screen 1: Maximum Roll Speed**
Title: **** Maximum Roll Speed ****
Text: Maximum Roll Speed Set Point:
Value: **50 %**
Navigation: Back arrow and 'Next' button.
- Screen 2: Grain Transfer - 30 min timeout**
Title: **** Grain Transfer ****
Text: Would you like to use a 30 min out of wet grain timeout?
Options: **Yes** and **No** buttons.
- Screen 3: Grain Transfer - Fan(s) option**
Title: **** Grain Transfer ****
Text: Would you like to use the fan(s) during Grain Transfer?
Options: **Yes** and **No** buttons.
- Screen 4: Grain Transfer - Real-time Data**
Title: **** Grain Transfer ****
Data:
 - Discharge Moisture: **15.0 %**
 - Current Grain Temp: **68 °F**
 - Max Roll Speed: **50 %**

 Pressing "Reset" will stop the transfer, turn off all augers, fan(s), and return to the start screen.

“Final Dry” Mode

After selecting “Final Dry” from the “Start” menu, the user will specify current moisture of remaining grain in the dryer. This mode allows remaining grain to be dried and unloaded without 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 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-second 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” time. 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.

The image displays four sequential screenshots of the Sukup dryer control interface, illustrating the 'Final Dry' mode process.

Screen 1: ** Current Moisture Input **
Input Moisture Set Point :
22.5 %
Buttons: Tools, Settings, Reset, Next

Screen 2: ** Final Dry Time **
Below in BLACK is the recommended Final Dry time.
To change it, use the arrow keys or pop-up keypad.
18 minutes (black box) 18 minutes (green box)
Buttons: Tools, Settings, Reset, Start Final Dry

Screen 3: ** Final Dry **
Dry Time Remaining: 0 : 00
Unload Time Remaining: 28 : 30
Buttons: Plenum Details, Roll Speed Information, Grain/Moisture Output, Reset

Screen 4: Final Dry Complete!
If grain is still inside the dryer, use the manual unload feature to unload it.
Main Menu
Buttons: Tools, Settings, Reset

Fault Screens and Error Messages

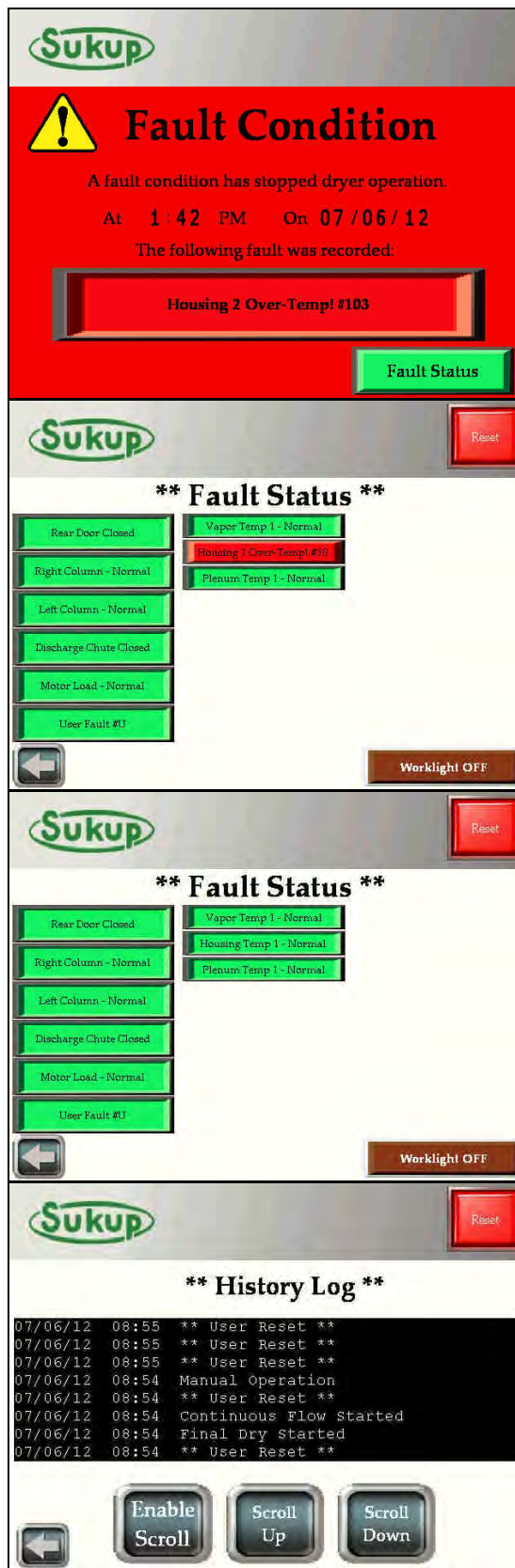
There are many safety switches and relays on the dryer that are constantly monitored. Sukup Manufacturing Co. uses these fault devices to ensure the safety of our customers and the product.

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 down all dryer function. It also contains the wire number of the fault in question.

The images to the right show an example of the Housing #1 Over-Temp safety circuit. When the fault occurs, the PLC 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 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 work light will automatically turn off. If the user needs to turn on the work light 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 corner of the screen.)

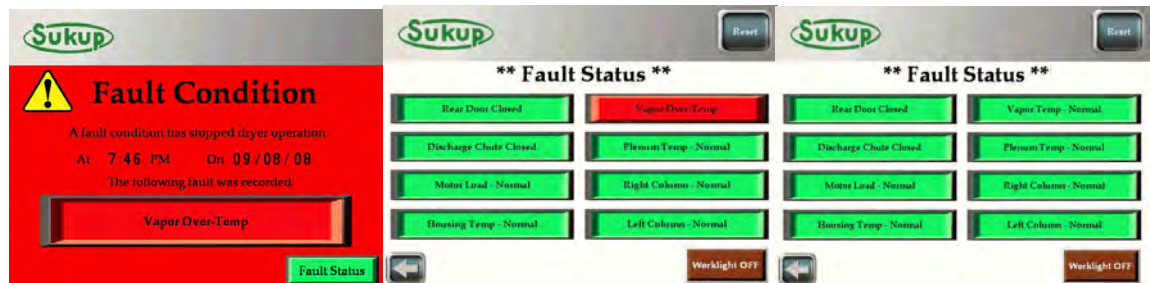
When a fault occurs or a drying mode is selected, it is recorded in the “History Log”



Shutdown Faults

In the event of a fault, the system will automatically shut down all fans, heaters, load, unload, and auxiliary devices. Each time a fault occurs, the system will display a red screen with the time, date, and cause of shutdown.

When a fault occurs, the user will have the option of touching the “Fault Status” button on the bottom right corner of the screen. This will show the user if a fault still exists in the system. It will be denoted by a red color. When the fault is cleared, it will turn from red to green.



WARNING:

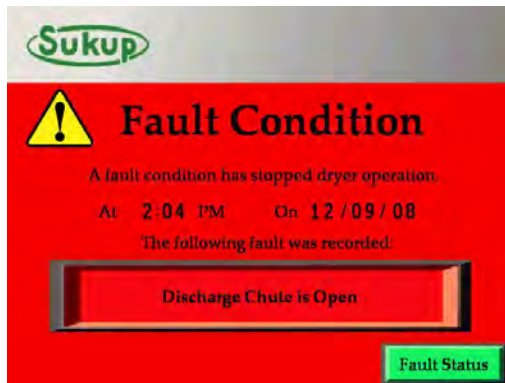
If necessary, when a fault occurs, power must be disconnected from the dryer and gas must be turned off before correcting the fault. If at all unsure, contact your Sukup dealer. Be cautious of other people or objects around the dryer.

If delay timers are programmed under the second page of the settings menu, the fan/unload motors may continue to run after some fault conditions.

Example: In the second page of the settings menu there is a Fan Delay Option. This option allows the fan to run in the event of a user shutdown or a fault shutdown that isn't related to the fan. This is also true of the unload cleanout timer setting.

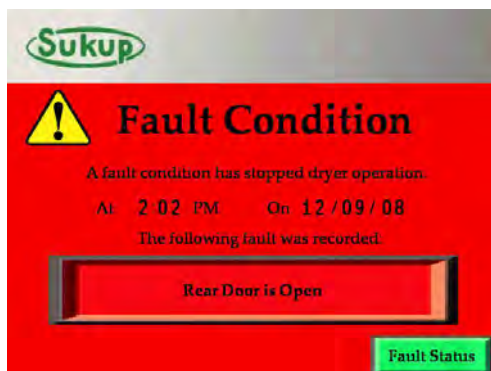
All fault messages are latched, meaning they will remain on screen until the operator acknowledges the message by pressing the “Fault Status” button followed by the “Reset” button. This is useful in the event of a nuisance trip that may have otherwise reset by the time the operator realizes that the dryer has shut down. The following pages show the system shutdown faults and give a description of possible problems and their solutions.

Grain Discharge Chute/Unload Auger Warning



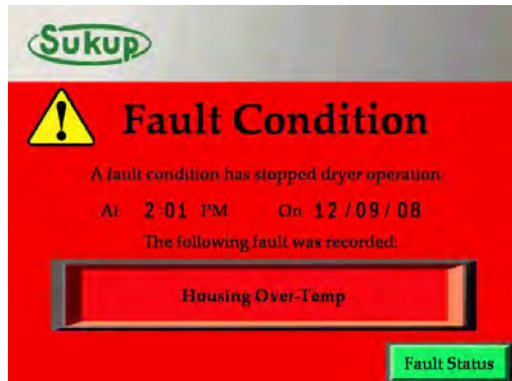
Possible Problems	Possible Solutions
Grain Discharge lid opened	✓ Return lid to a closed position
Grain overflow of discharge	✓ Slow maximum roll speed. (Grain may over-dry) ✓ Ensure that take-away system is operating properly. ✓ Lower plenum temperature, (if necessary) to prevent grain from over-drying. Maximum roll speed is indicated by an asterisk on screen following roll order %.
Broken or jammed unload auger	✓ Check unload auger for broken flighting or foreign material. ✓ Check motor and belts.

Rear Access Door Open



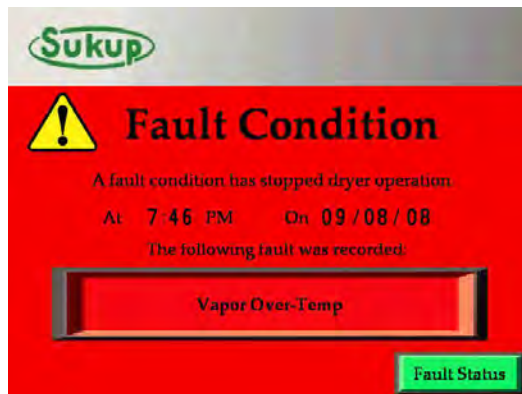
Possible Problems	Possible Solutions
Rear door is open or push-button switch is not being depressed.	✓ Check rear door for door/switch contact.

Housing High Temperature Alarm



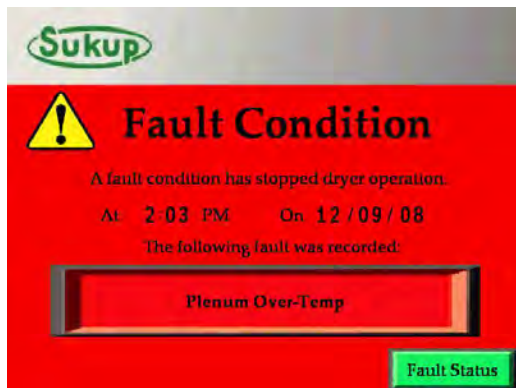
Possible Problems	Possible Solutions
Housing temperature has exceeded 200°F	✓ Manually reset switch in heater box of proper heater after temperature has gone down. Refer to heater operation section. ✓ Check condition of fan blade and for proper rotation. ✓ Check for plugged fan grill. ✓ Check for defective MOD valve.

Vaporizer High Temperature Alarm



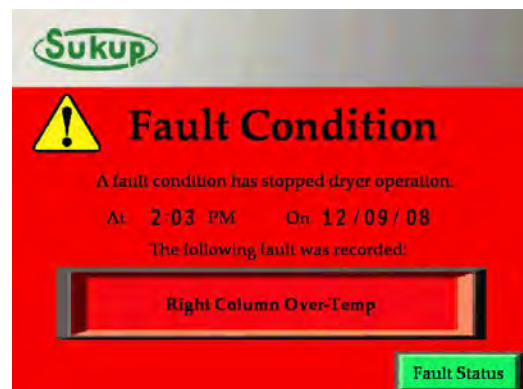
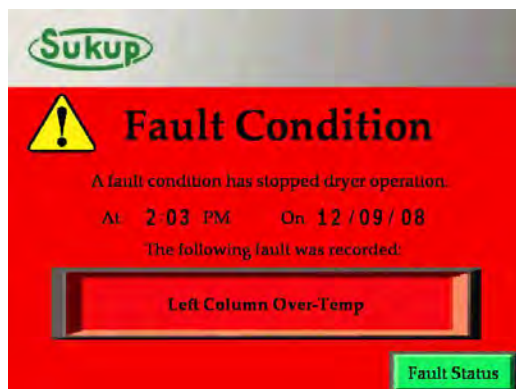
Possible Problems	Possible Solutions
Vapor coil exceeded 140°F	✓ Supply tank may be low. Fill tank. ✓ Vaporizer misadjusted. Readjust and refer to the heater operation section. ✓ Fan airflow obstructed. Check for obstructions.

Plenum High Temperature Alarm



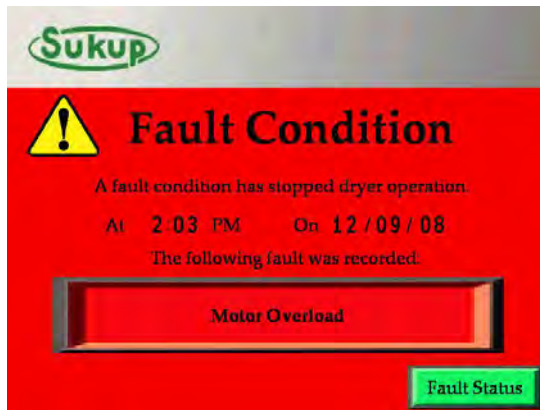
Possible Problems	Possible Solutions
Temperature exceeded 325°F for capillary	✓ Check plenum by placing back of hand near rear door, checking for heat. If ok, enter the plenum and assess problem. ✓ Plenum temperature set too high (adjust setting). ✓ The electronic mod valve malfunctioned and/or needs to be re-adjusted.

Grain Column High Temperature Alarms



Possible Problems	Possible Solutions
Column temperature exceeds 210°F	✓ Check for stagnant column that has overheated. Unplug if necessary. ✓ Lower the plenum temperature if no columns are plugged. ✓ Unload dryer and check for restrictions, plugging or slow columns.

Motor Thermal Overload Alarm



Possible Problems	Possible Solutions
Motor overload occurred for fan, load or unload auger, or auxiliary device.	✓ Check starter protectors, breakers and thermal overloads in power and auxiliary box for a trip. Check faulted device for possible overheating conditions caused by an obstruction in the auger or a bad bearing in the motor or auger.

Analog Sensor Not Found



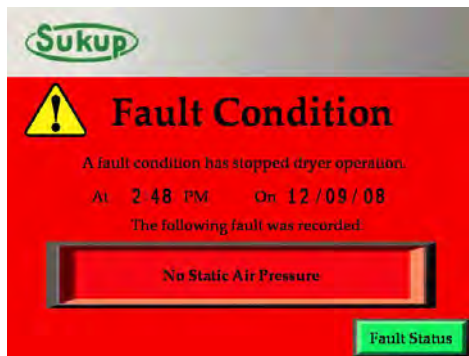
Possible Problems	Possible Solutions
The analog sensors (Moisture Sensor and Plenum RTD transmitters) are not transmitting the correct voltages back to the PLC.	✓ This means a break in the connection between the device and the PLC. To correct the problem, start near the device with a voltmeter and check each connection down the line. If a "Grain Temp Sensor Not Found" fault occurs, check the junction box at the rear of the dryer for voltage between 95 (ground) and D3 (blue wire). The voltage will read from 0-3VDC. 1 VDC = 100°F ✓ Check if sensor is placed in operating position.

Meter Roll Failure



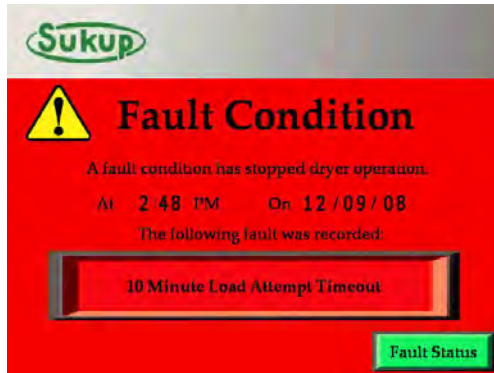
Possible Problems	Possible Solutions
Meter rolls have stopped turning	✓ Check for obstruction in meter rolls. ✓ Check chain linkage for broken chain. ✓ Check proximity switch adjustment. ✓ Check for motor rotation or voltage.

Low/No Static Air Pressure



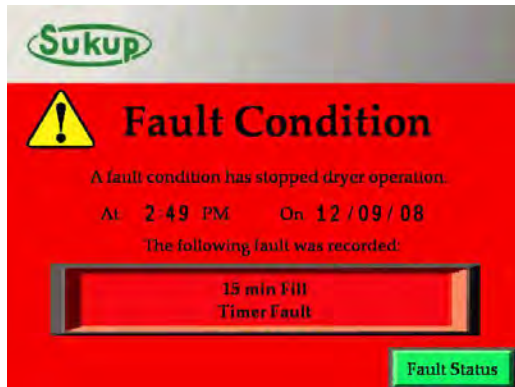
Possible Problems	Possible Solutions
Internal plenum pressure could not be reached upon start-up.	✓ Dryer is not filling. Check load auger for proper operation.
Internal plenum pressure was lost during operation. This will occur when the fan is started and static air pressure is not detected within five (5) seconds.	✓ Wet bin has run out of grain and allowed the plenum to release air pressure before out of wet grain timeout occurs.
Air switch out of calibration	✓ Refer to Component Calibration section of manual.

10 Minute Out of Wet Grain – (Dryer is not full)



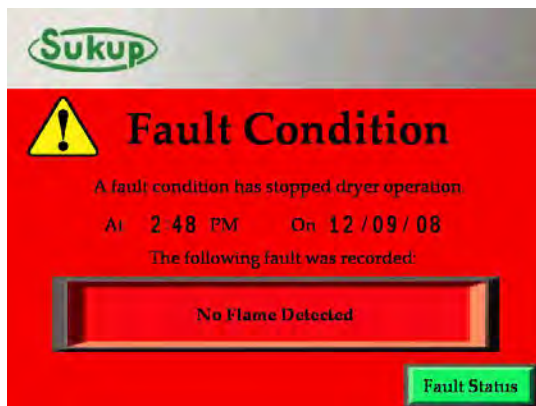
Possible Problems	Possible Solutions
Paddle switch not satisfied in under 10 minutes.	✓ Supply more grain to dryer.
Wet bin has been emptied.	✓ Run Final Dry if end of season
Fill device has failed.	✓ Check all fill devices
Dryer unloading faster than filling	✓ Make sure the load delay setting is set to "0" seconds.

15 Minutes (Without) Fill Timer Fault— (Dryer is full)



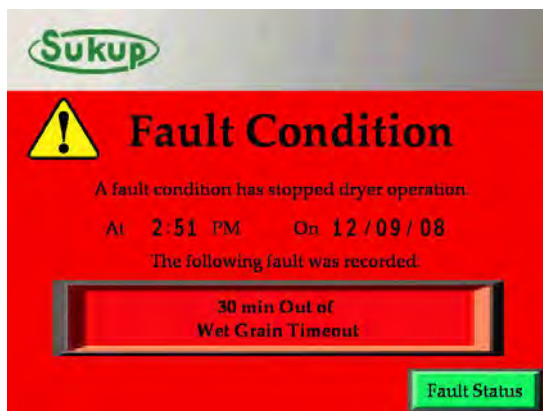
Possible Problems	Possible Solutions
Dryer must fill at least once every 15 minutes when unloading for Continuous Flow. The paddle switches contained in the grain level switch are stuck in the "On" position.	✓ Broken unload auger/belt or meter roll chain. ✓ Make sure grain level indicator can move freely.

Heater Fault



This will occur if the flame rod does not sense flame within 45 seconds of heater ignition.

30 minute Out of Wet Grain timeout



During Grain Transfer mode, if the paddle switches are not satisfied in 30 minutes, a fault shutdown is initiated.

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, the messages located to the right will appear.

Examples are errors from a Single Fan Dryer. More error messages are possible in multiple-fan models.

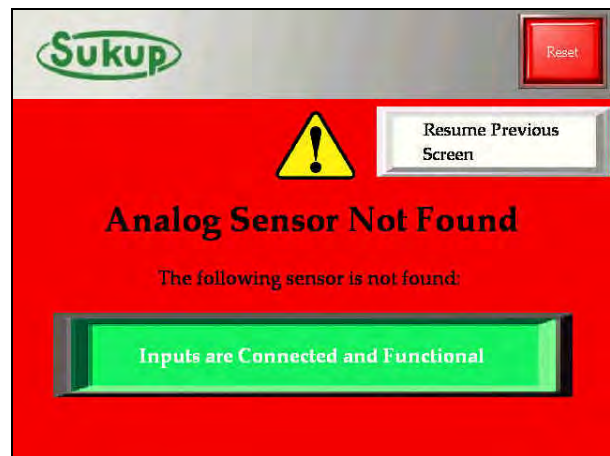
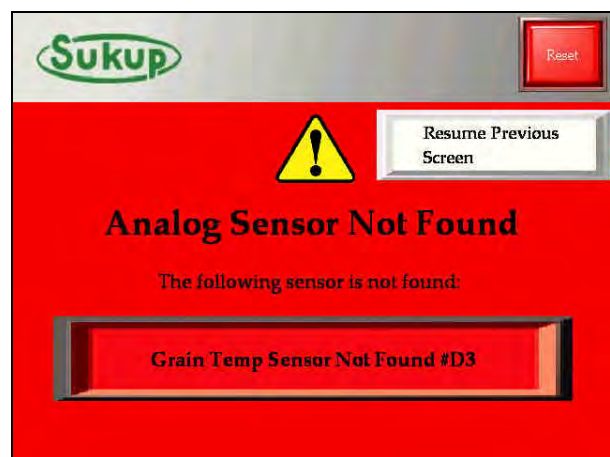
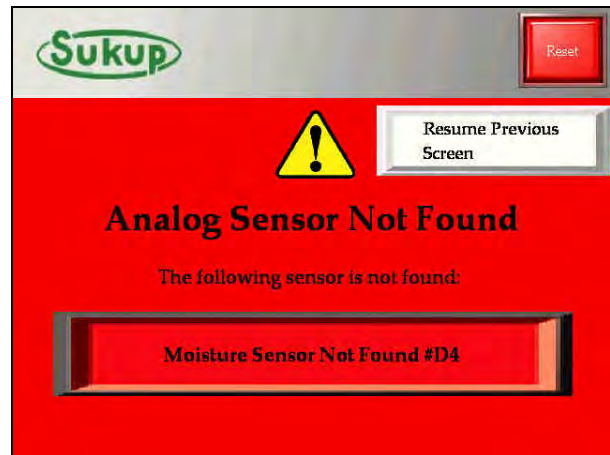
Each fan and heater has its own Plenum RTD (Resistance Temperature Detector) sensor. Therefore, a Two Fan Dryer will have an additional Plenum RTD error message.

Diagnosing a Problem:

Each sensor is monitored for voltage. If less than .05VDC is read by the PLC, this error will appear. This either means that the individual sensor is bad or the connection between the PLC and the sensor needs to be checked. Use a voltage meter to check for voltage and continuity between the PLC, the connection terminals, and the device itself.

NOTE: This error message is NOT a FAULT. Dryer will NOT shut down unless the Reset key is pressed.

Pressing the “Resume Previous Screen” button will allow 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-selected.

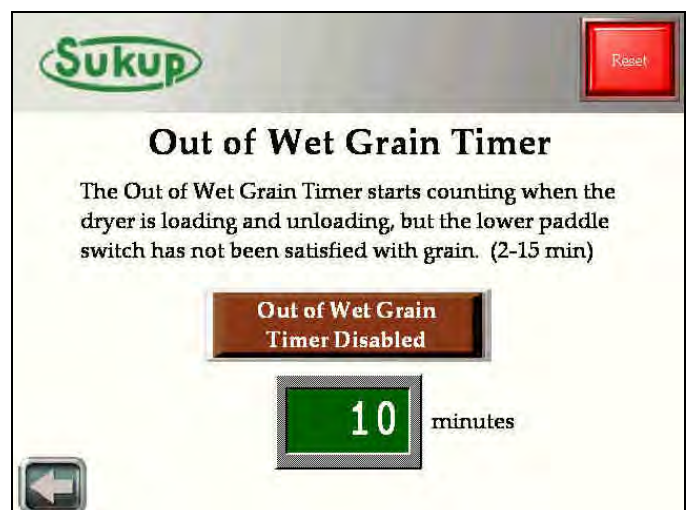
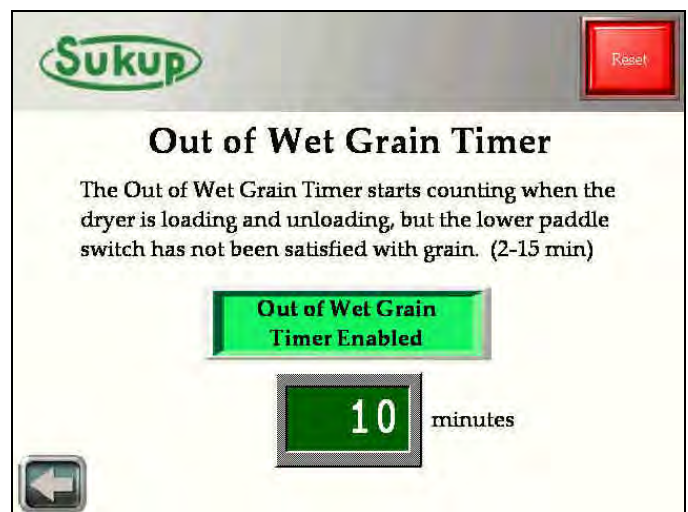
Also available on each screen is a **RESET** key located in the top right corner. If the **RESET** key is pressed at any time, the dryer will shut down all fans, heaters and augers and return to the main screen. **The RESET key is never used for program navigation.**

If the user is able to return to the previous screen, a back arrow is placed in lower left 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) require user 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 image to the right).

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 (their “OFF” state as in the image to the right). If user wishes to turn them on, BURGUNDY button can be pressed and held until it turns NEON GREEN.



Appendix H

Electrical Drawings

Wire numbers and uses

Single-fan drawings

Two-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

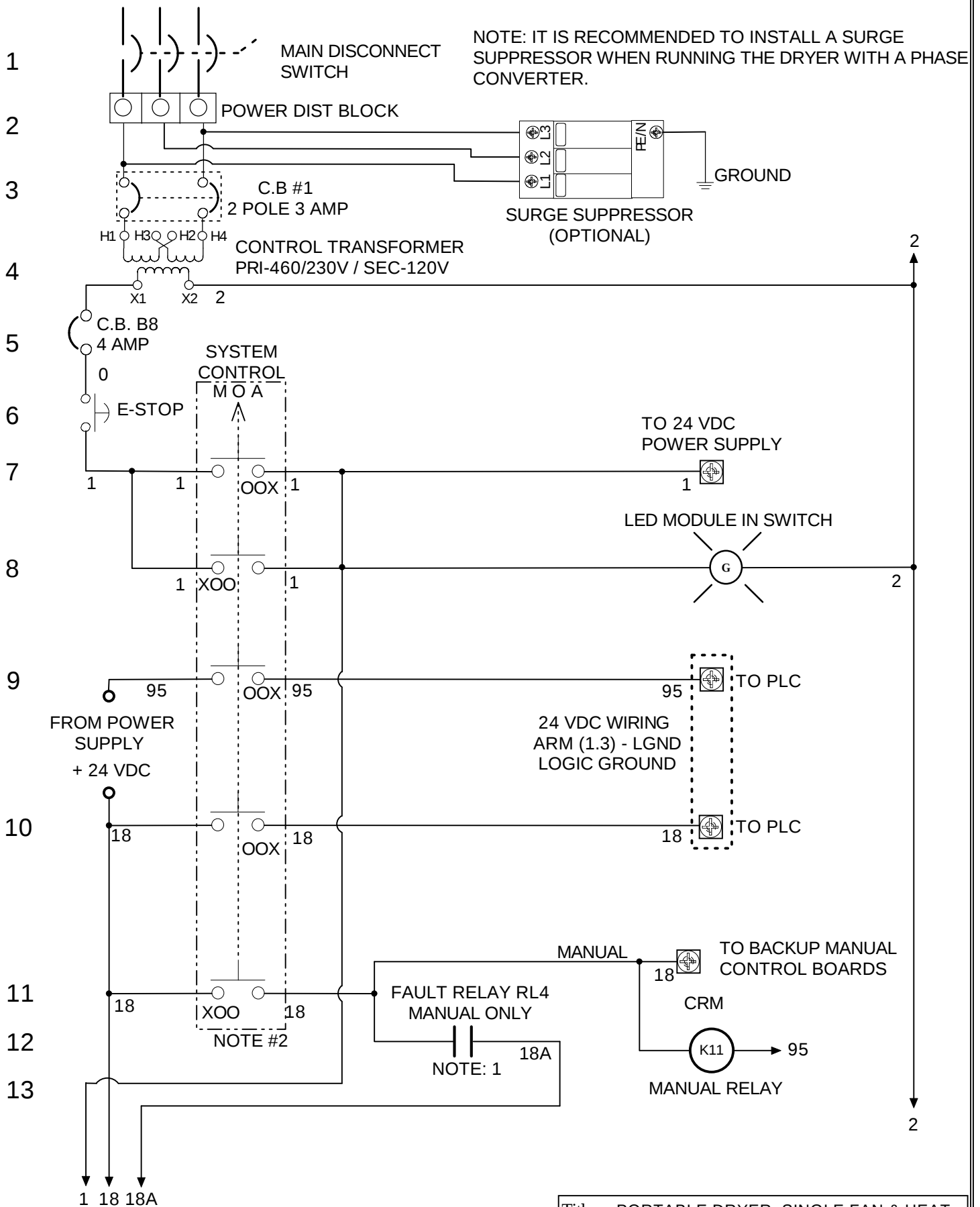
Wire Numbers and Uses, continued

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

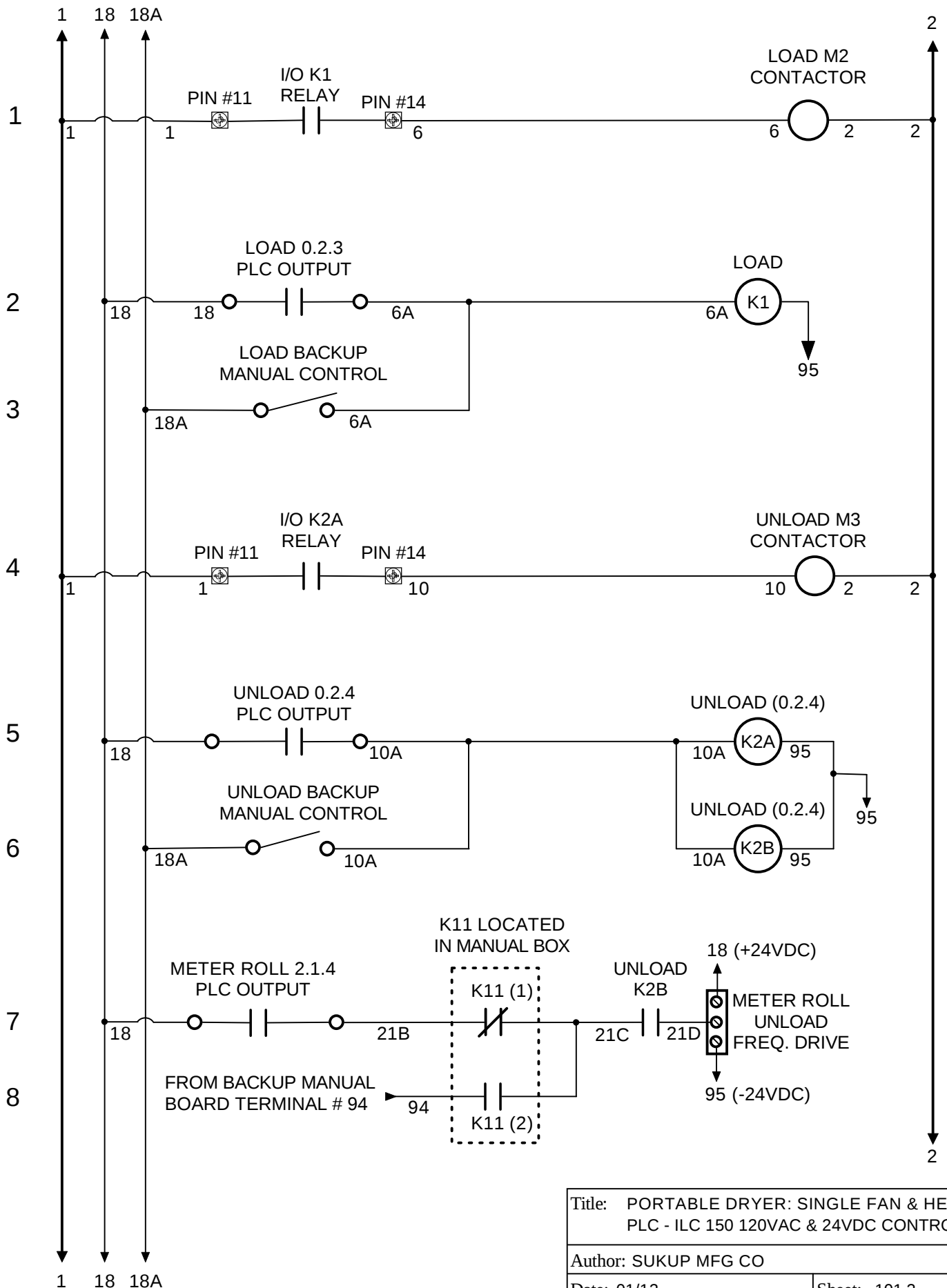
Wire Numbers and Uses, continued

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

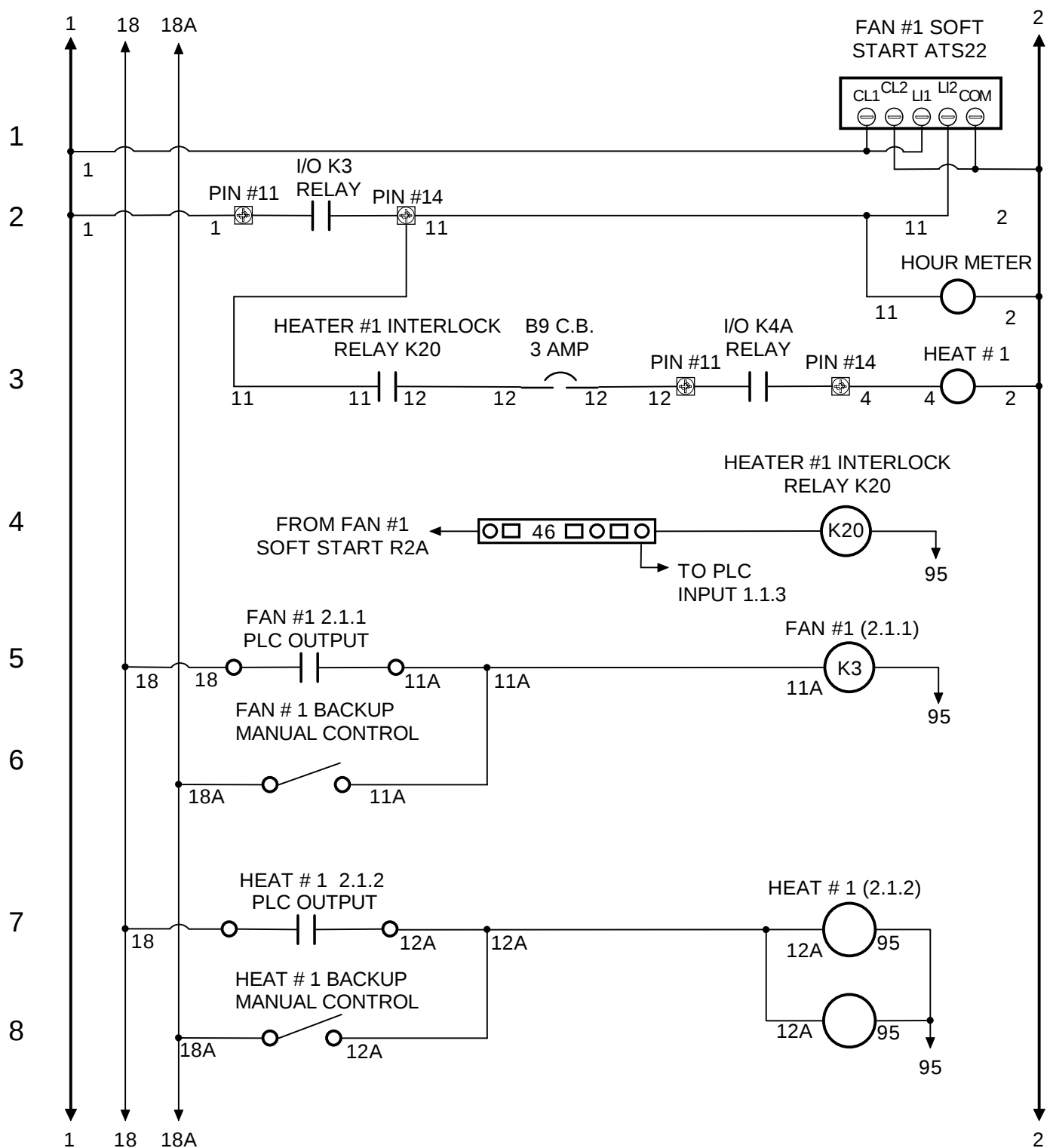
2012
ELECTRICAL DRAWINGS
SINGLE FAN & HEAT
WITH ATS22 SOFT START
FOR FAN CONTROL



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

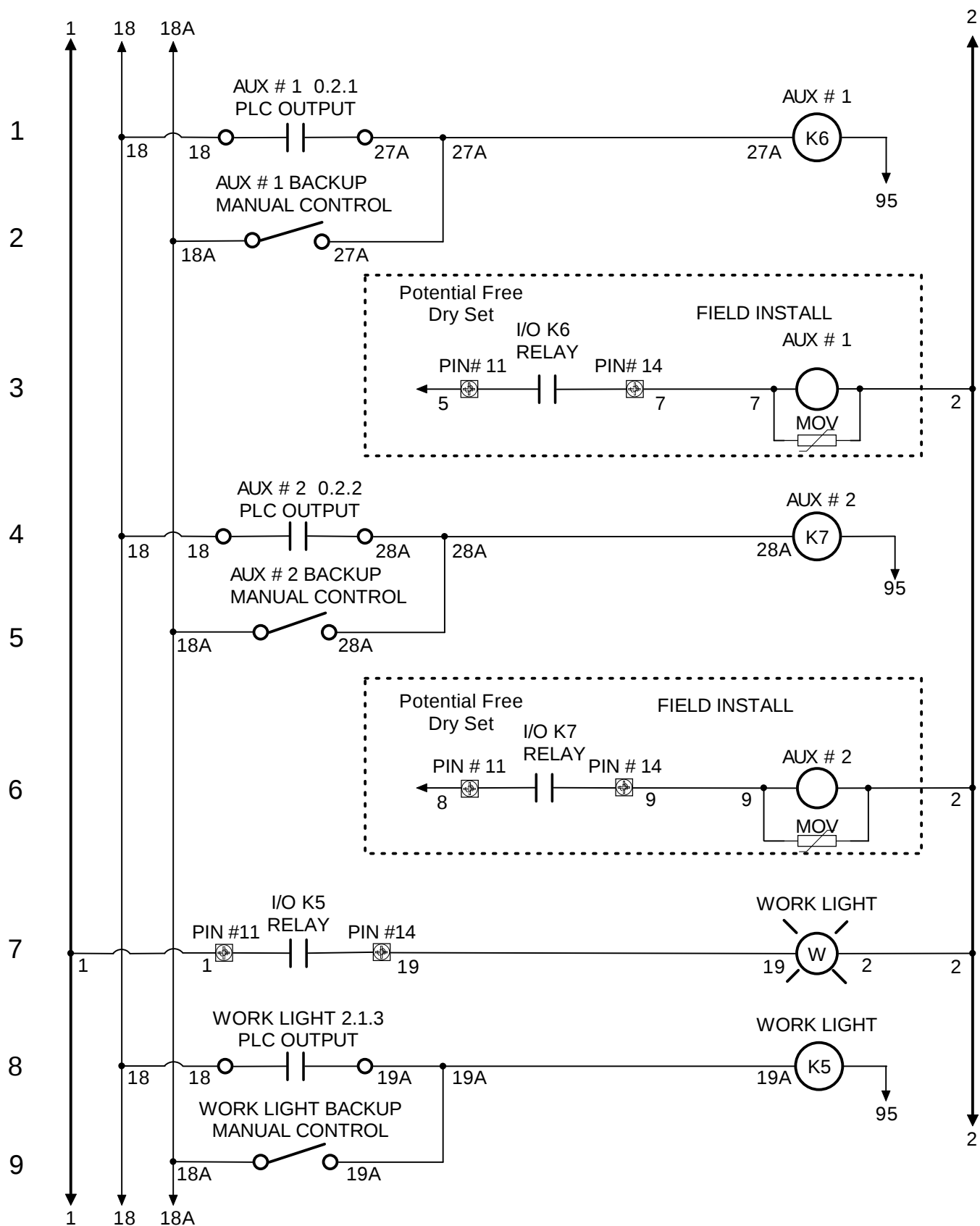
Author: SUKUP MFG CO

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.

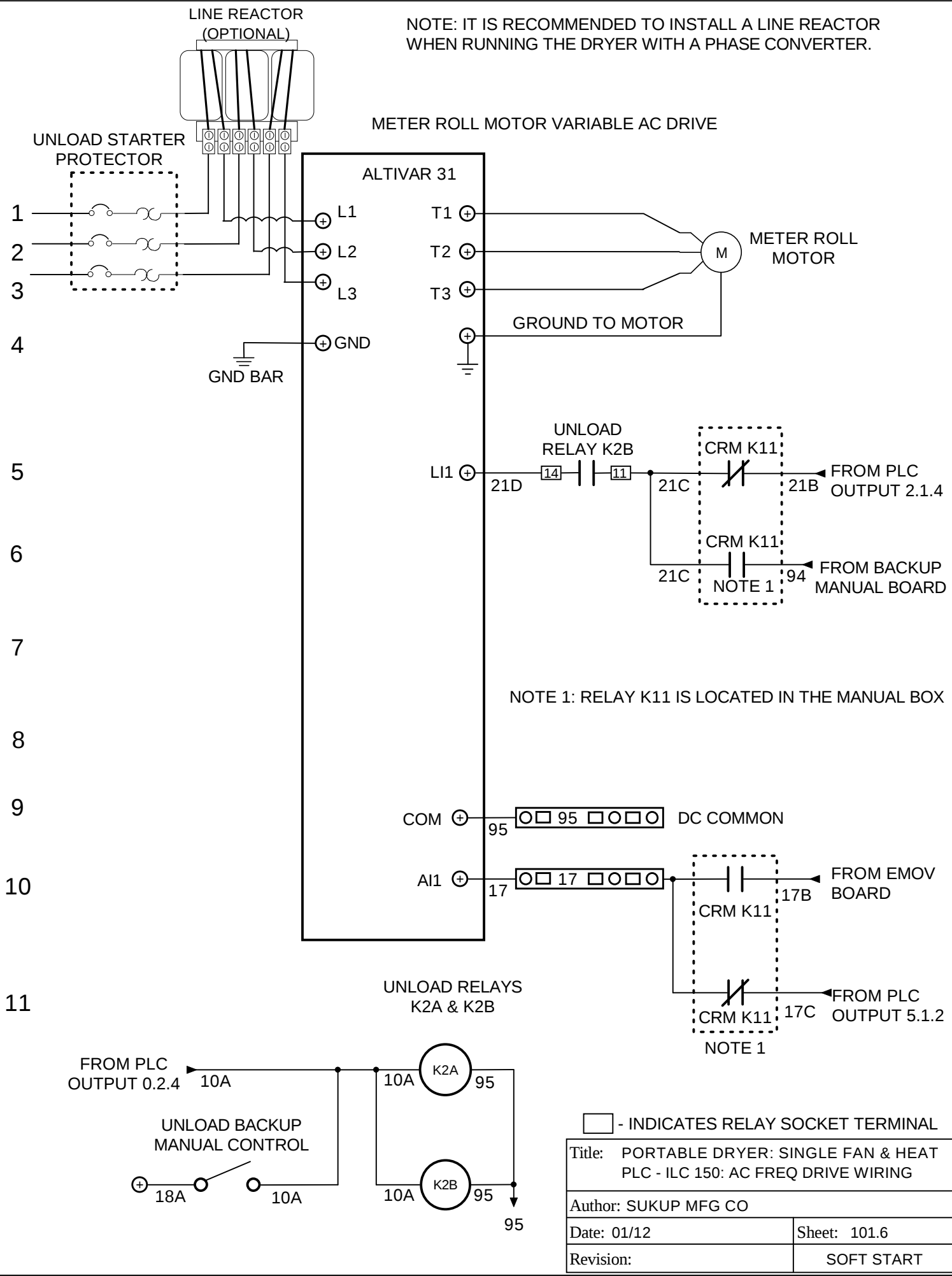
This contact is located on fault relay RL4. The relay is physically mounted on the manual control board. The contact is closed if no faults are present. Check LED # 57 (NO Fault) on the manual control board. This LED should be ON if no faults are present. (Load, Unload, and all Fan switches need to be 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.

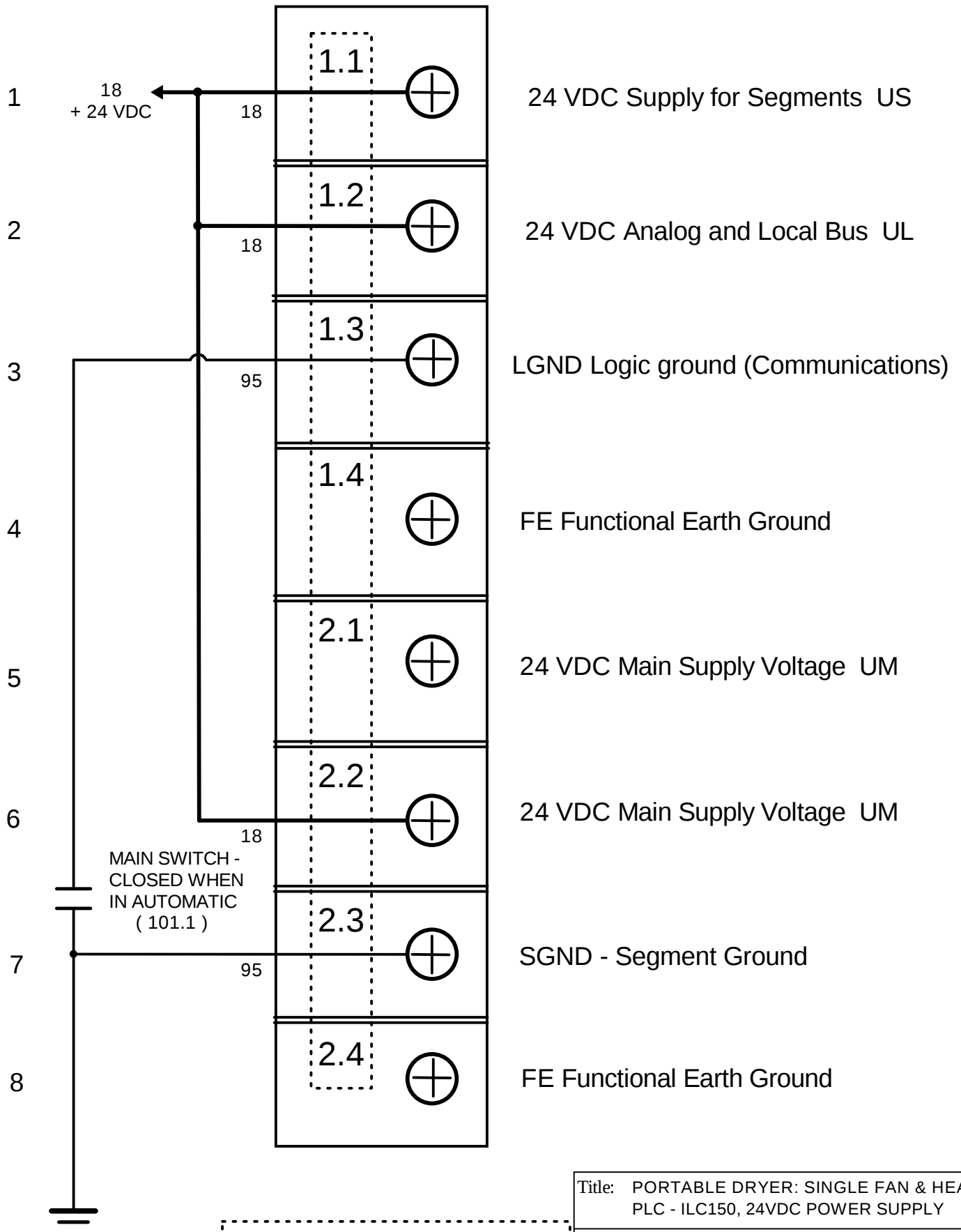
2. The X indicates the switch position. An X to the left, indicates the switch is in the Manual position, and an X to the right indicates the switch is in the Automatic position.

 - 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



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

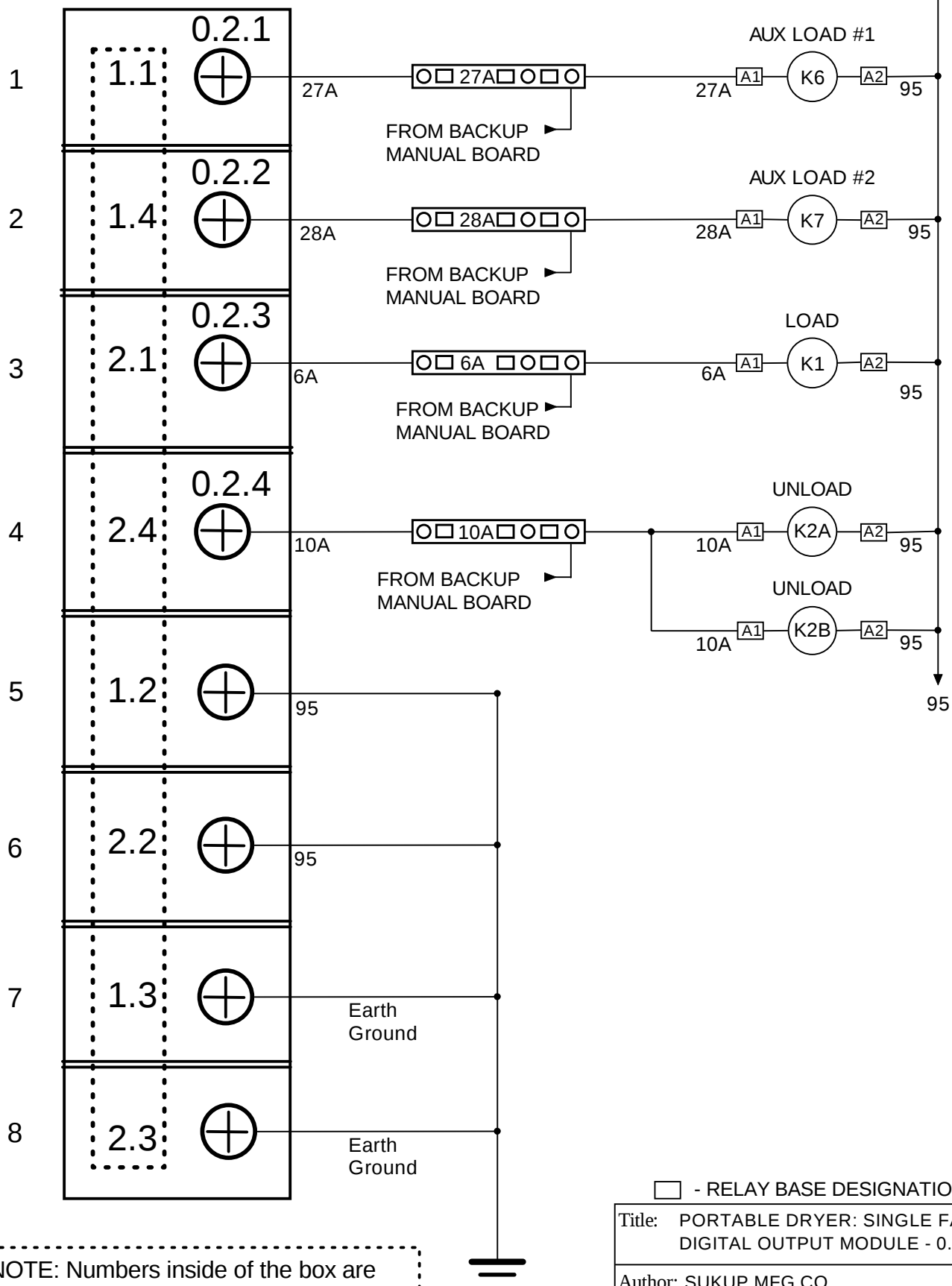
Date: 01/12

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

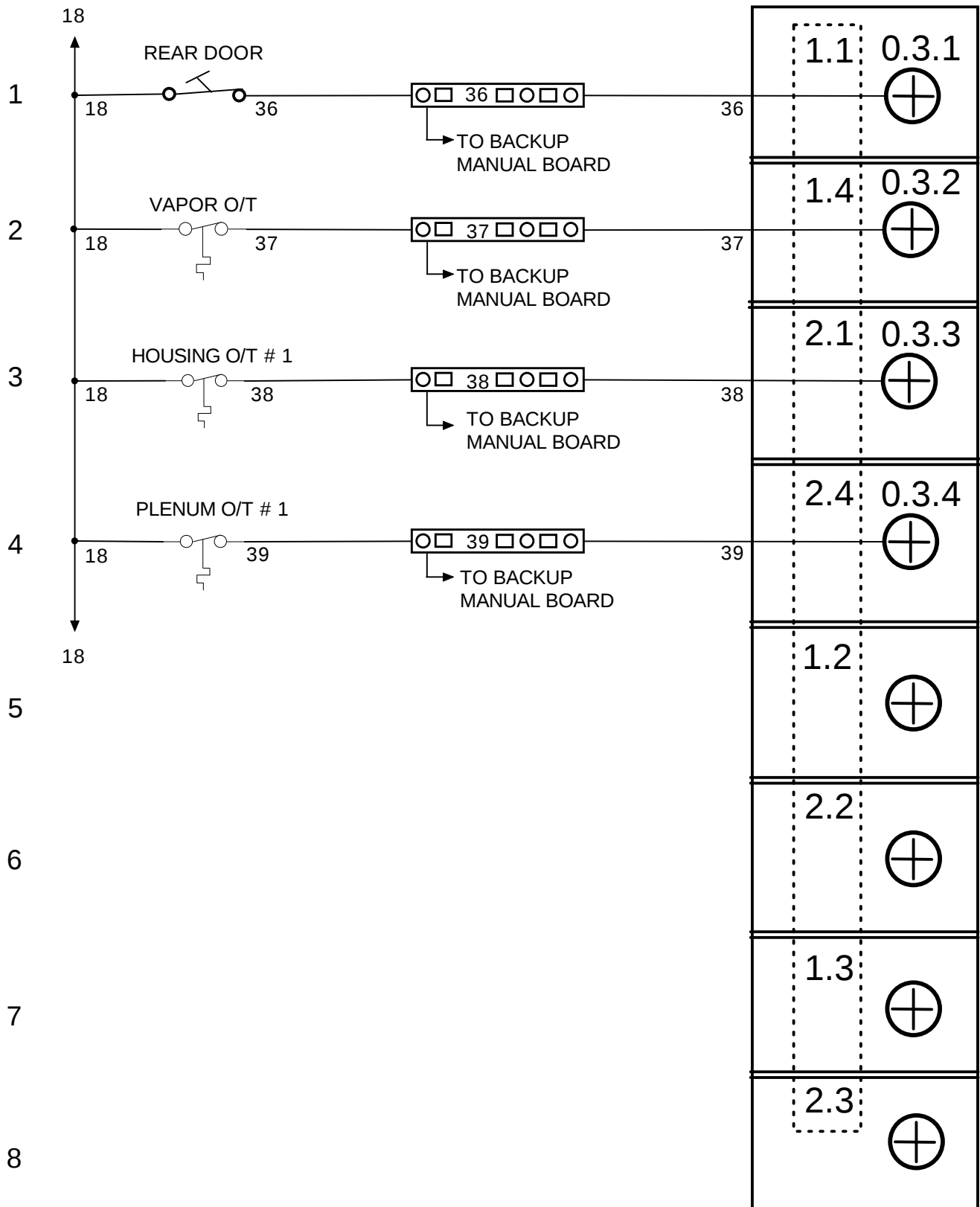
Date: 01/12

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

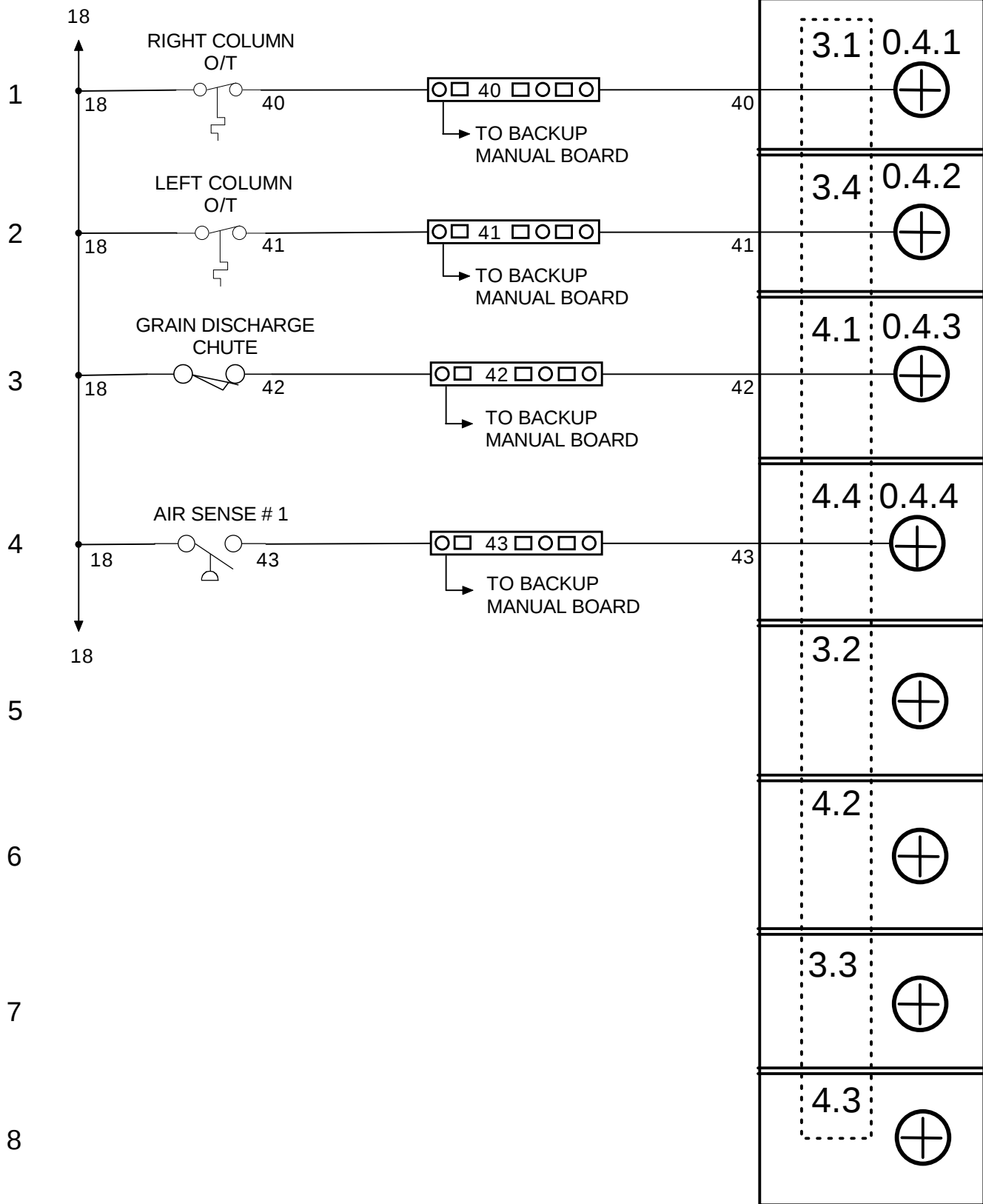
Date: 01/12

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

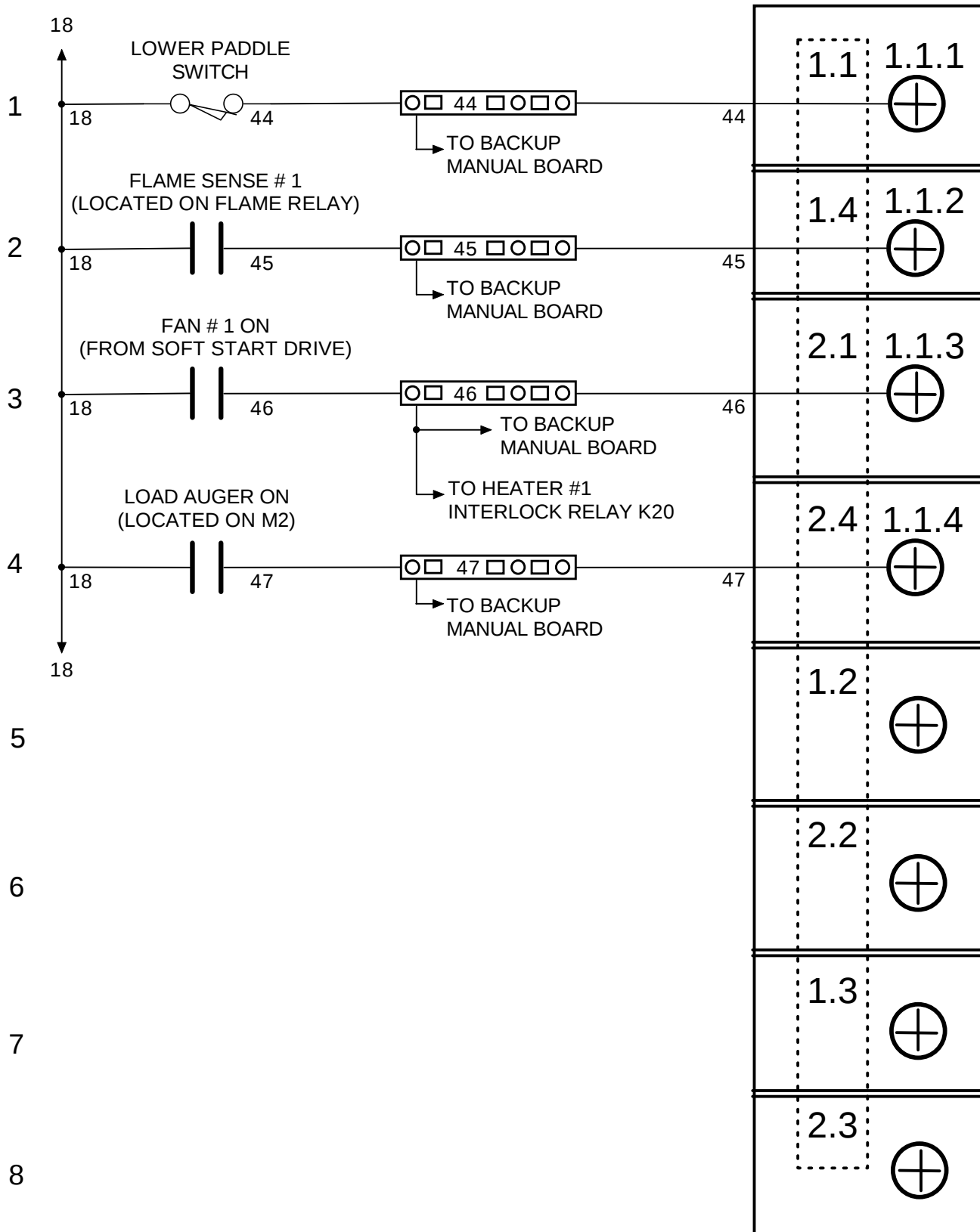
Date: 01/12

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

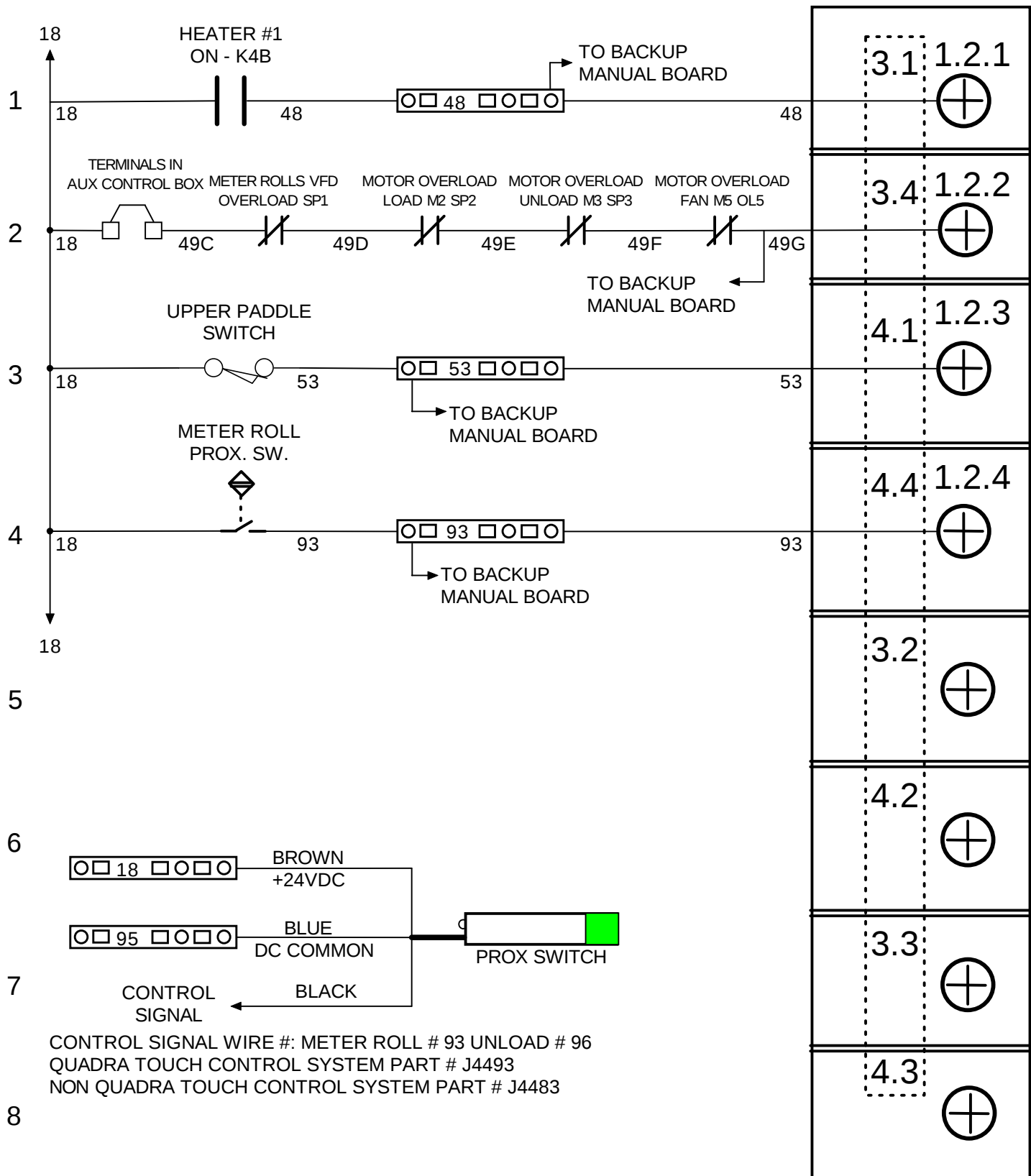
Date: 01/12

Sheet: 101.11

Revision:

SOFT START

DIGITAL INPUT MODULE - 1.2 OF 4 (BLUE)



Title: PORTABLE DRYER: SINGLE FAN & HEAT
DIGITAL INPUT MODULE - 1.2

Author: SUKUP MFG CO

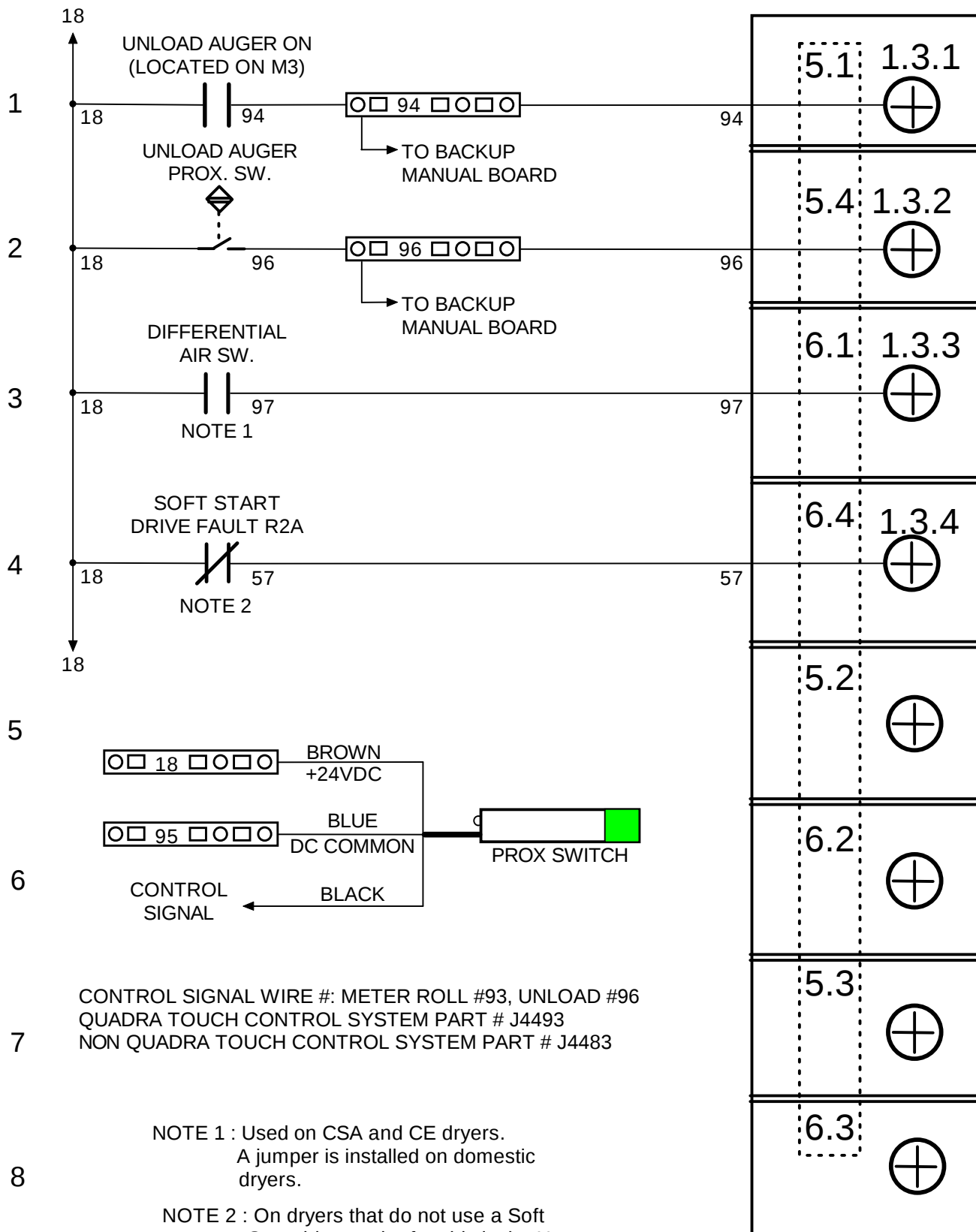
Date: 01/12

Sheet: 101.12

Revision:

SOFT START

DIGITAL INPUT MODULE - 1.3 OF 4 (BLUE)



Title: PROTABLE DRYER: SINGLE FAN & HEAT
DIGITAL INPUT MODULE - 1.3

Author: SUKUP MFG CO

Date: 01/12

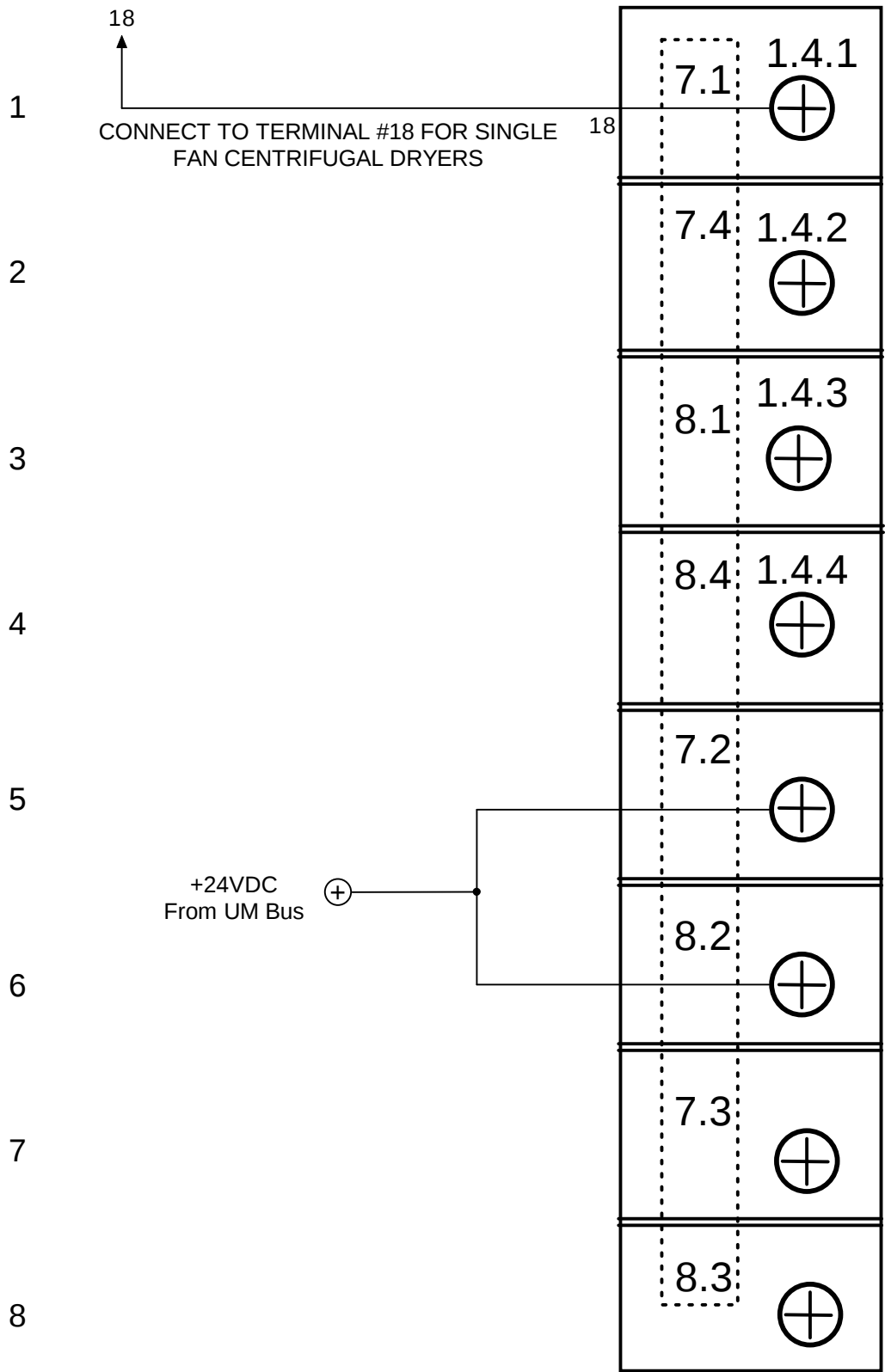
Sheet: 101.13

Revision:

SOFT START

NOTE: Numbers inside of the box are terminal designators printed on the module.

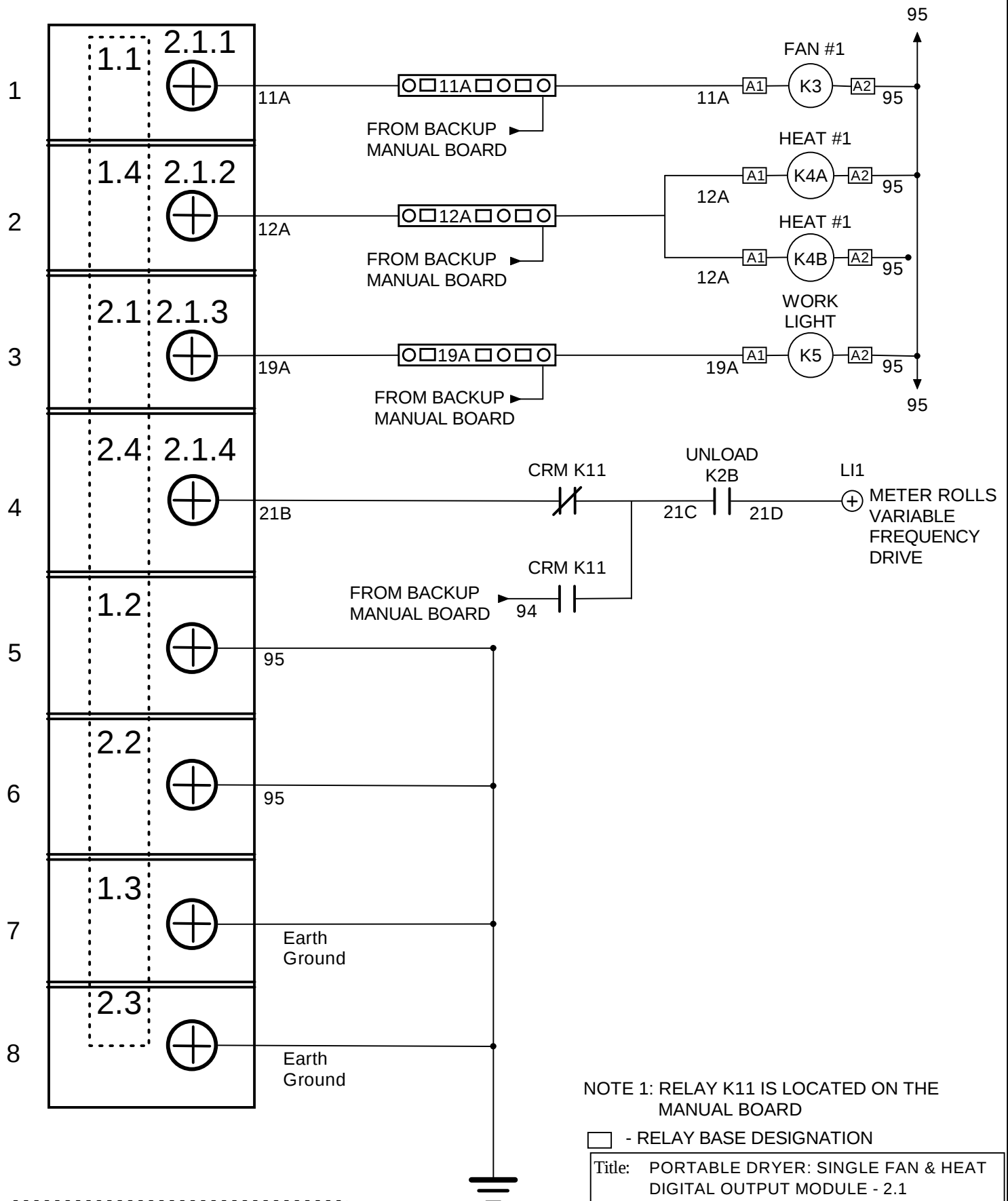
DIGITAL INPUT MODULE - 1.4 OF 4 (BLUE)



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

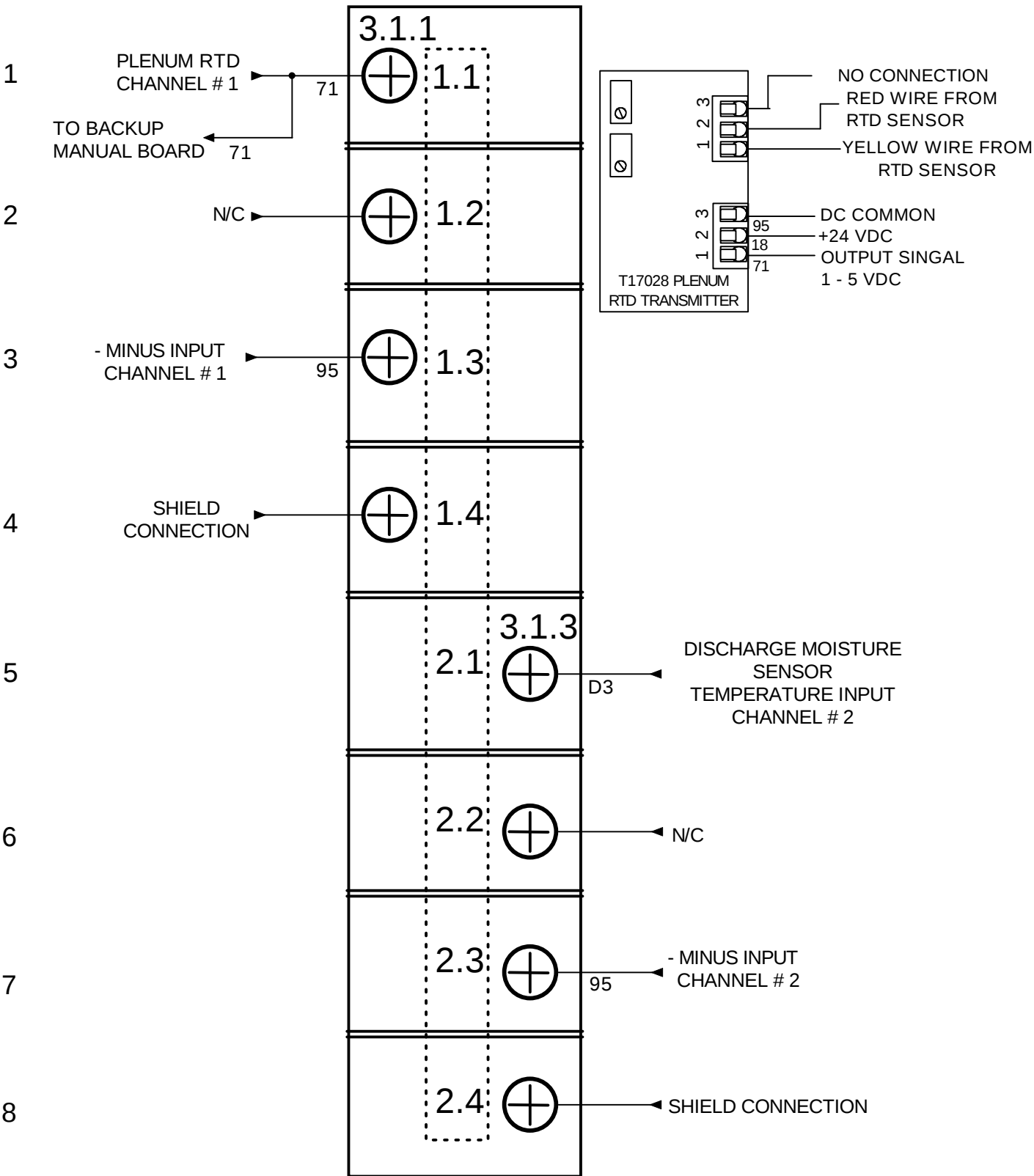
Date: 01/12

Sheet: 101.15

Revision:

SOFT START

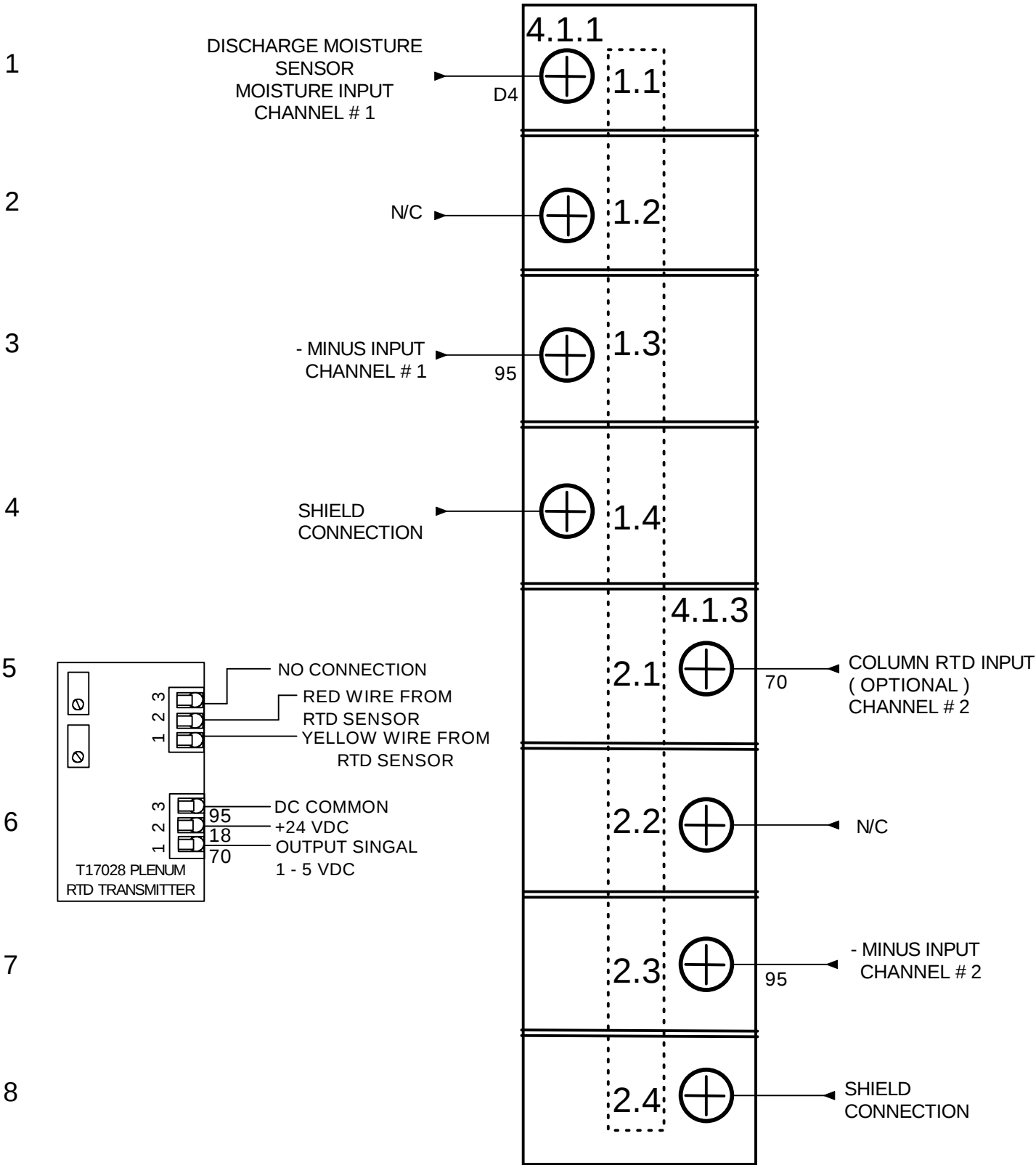
ANALOG INPUT MODULE - 3.1 (GREEN)



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

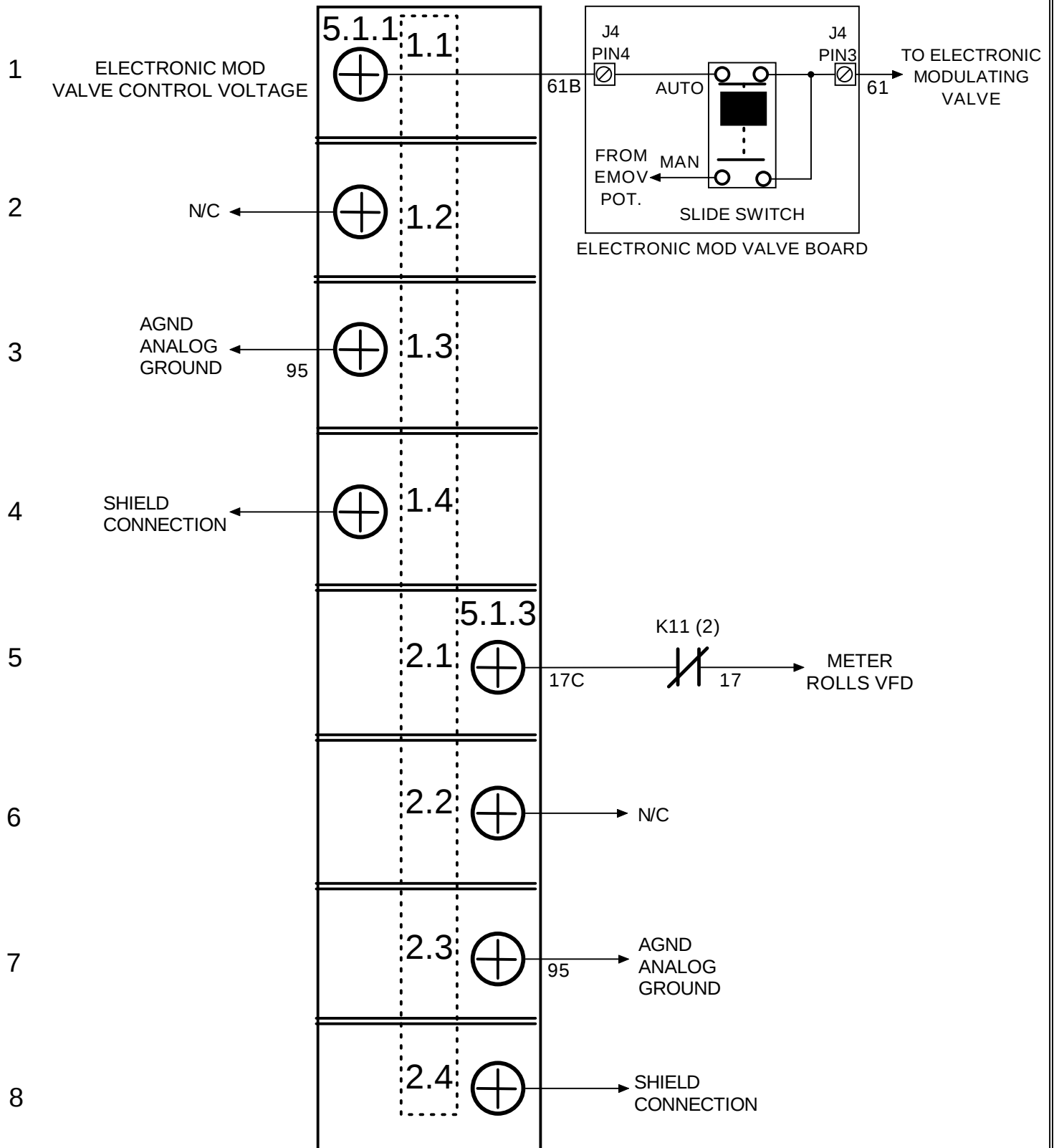
ANALOG INPUT MODULE - 4.1 (GREEN)



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

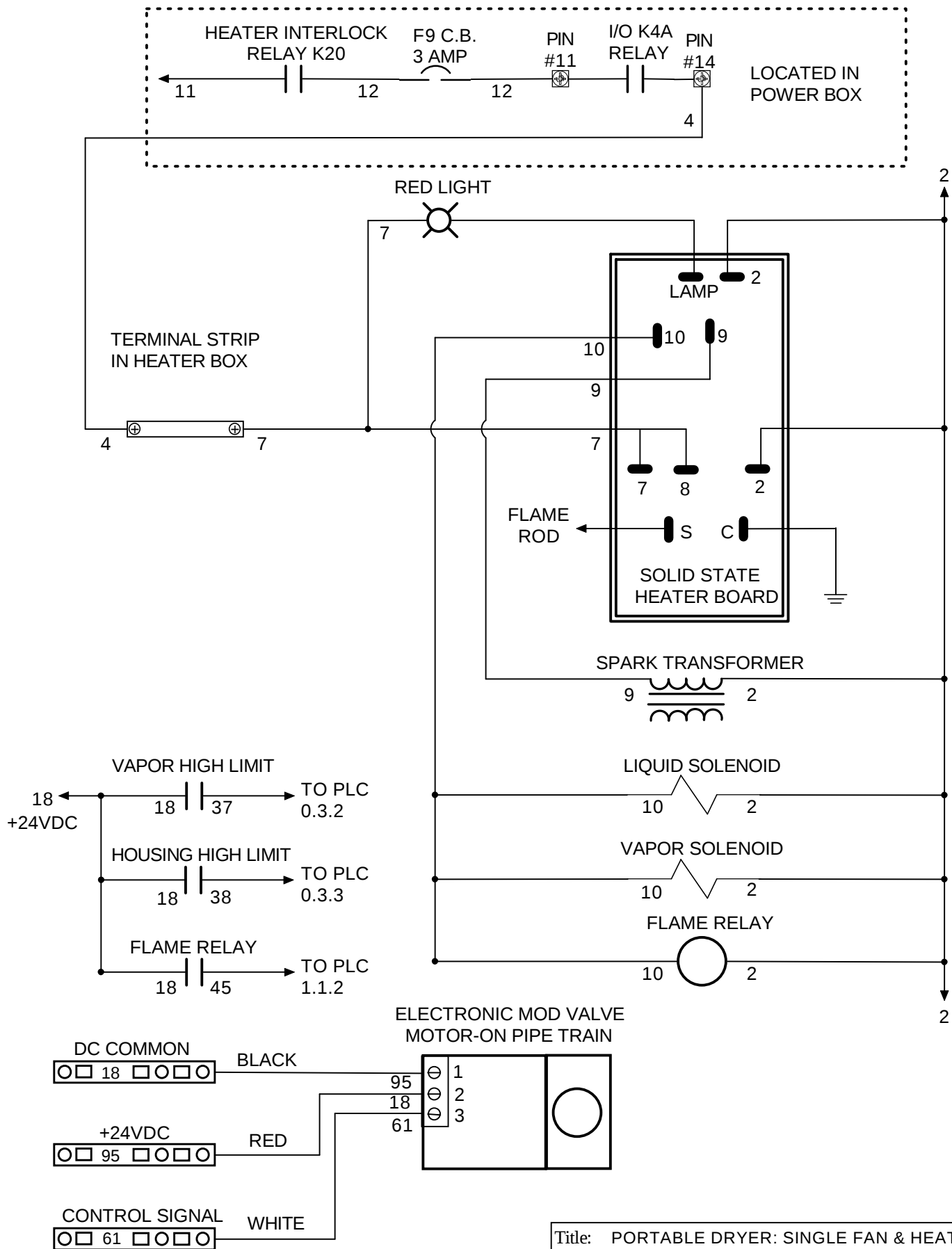
ANALOG OUTPUT MODULE 5.1 (YELLOW)



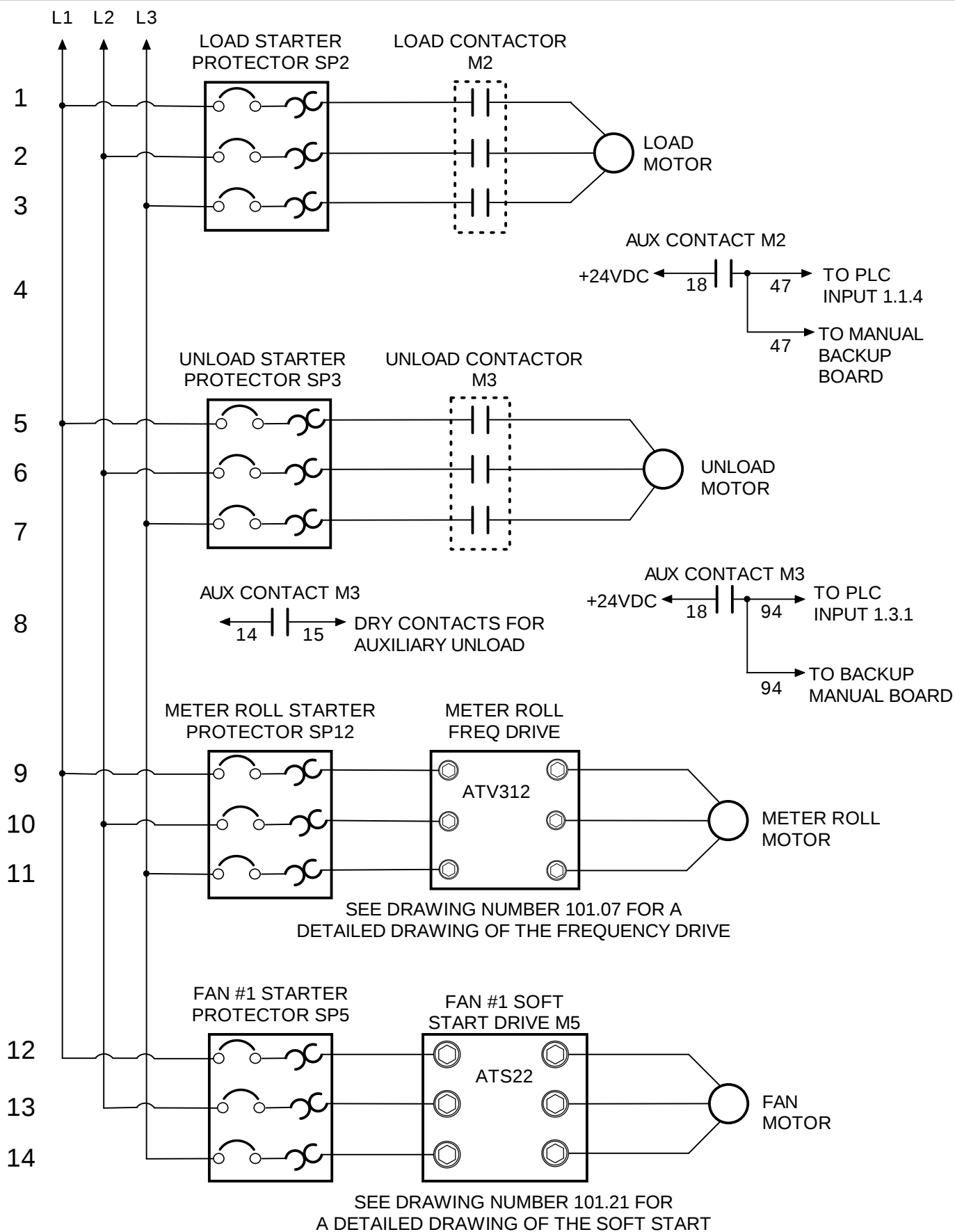
NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: SINGLE FAN & HEAT ANALOG OUTPUT MODULE - 5.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.18
Revision:	SOFT START

1
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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

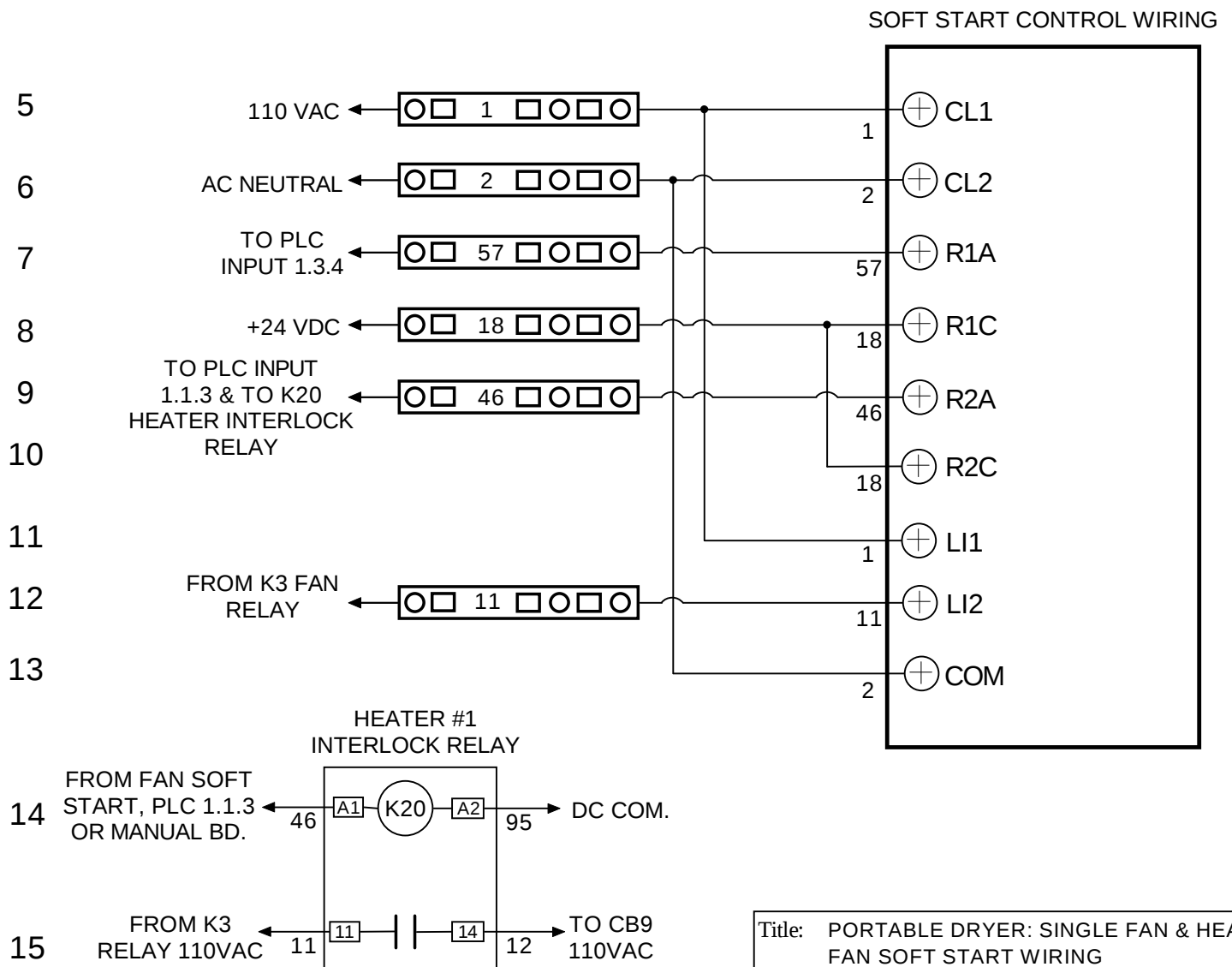
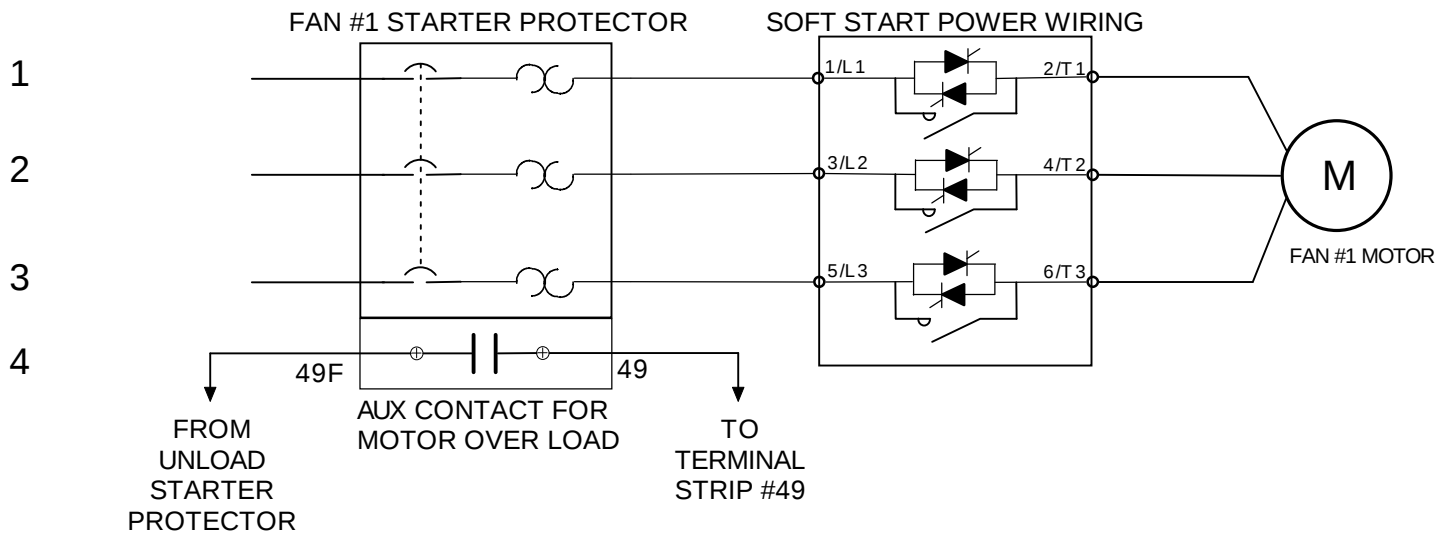
Author: SUKUP MFG CO

Date: 01/12

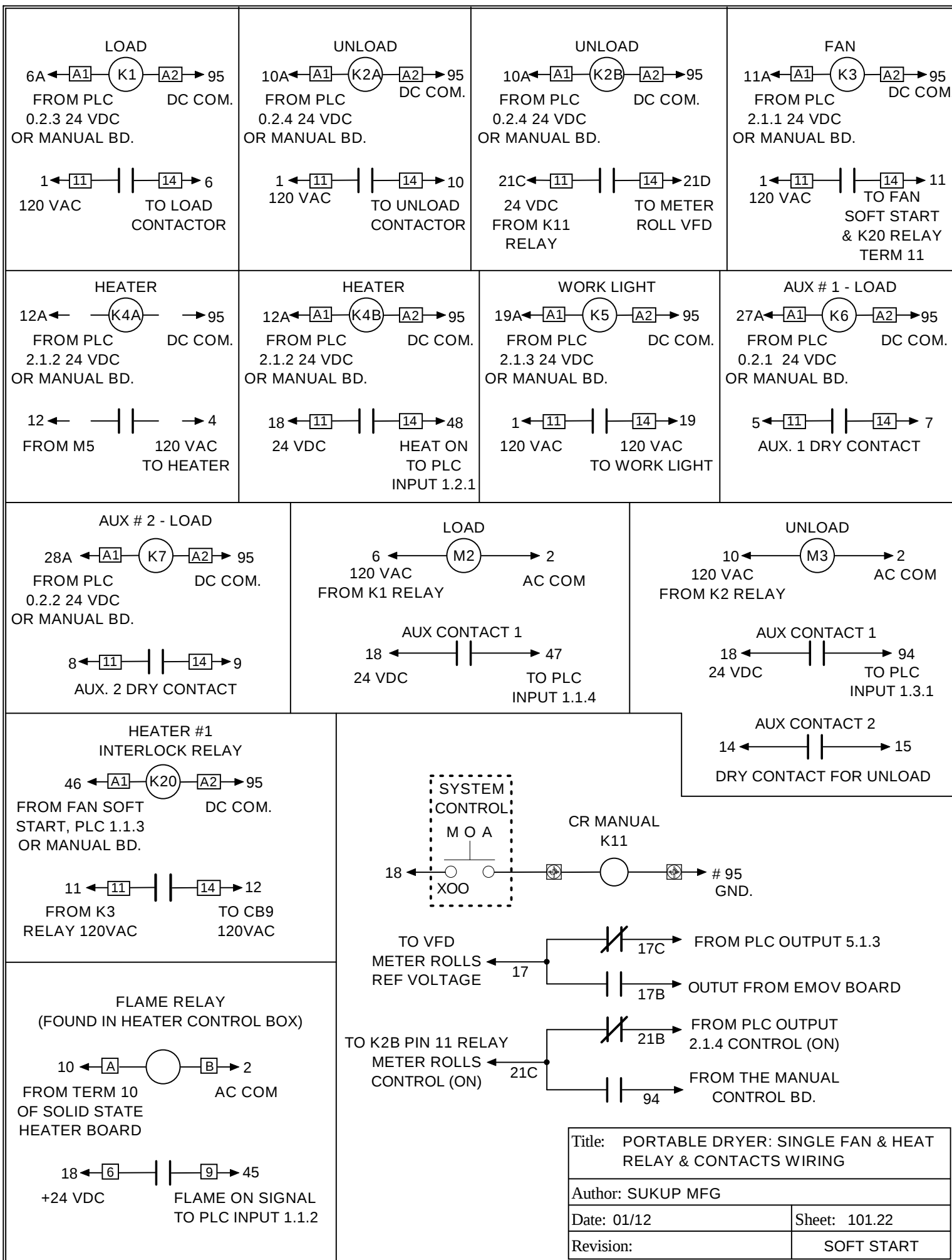
Sheet: 101.20

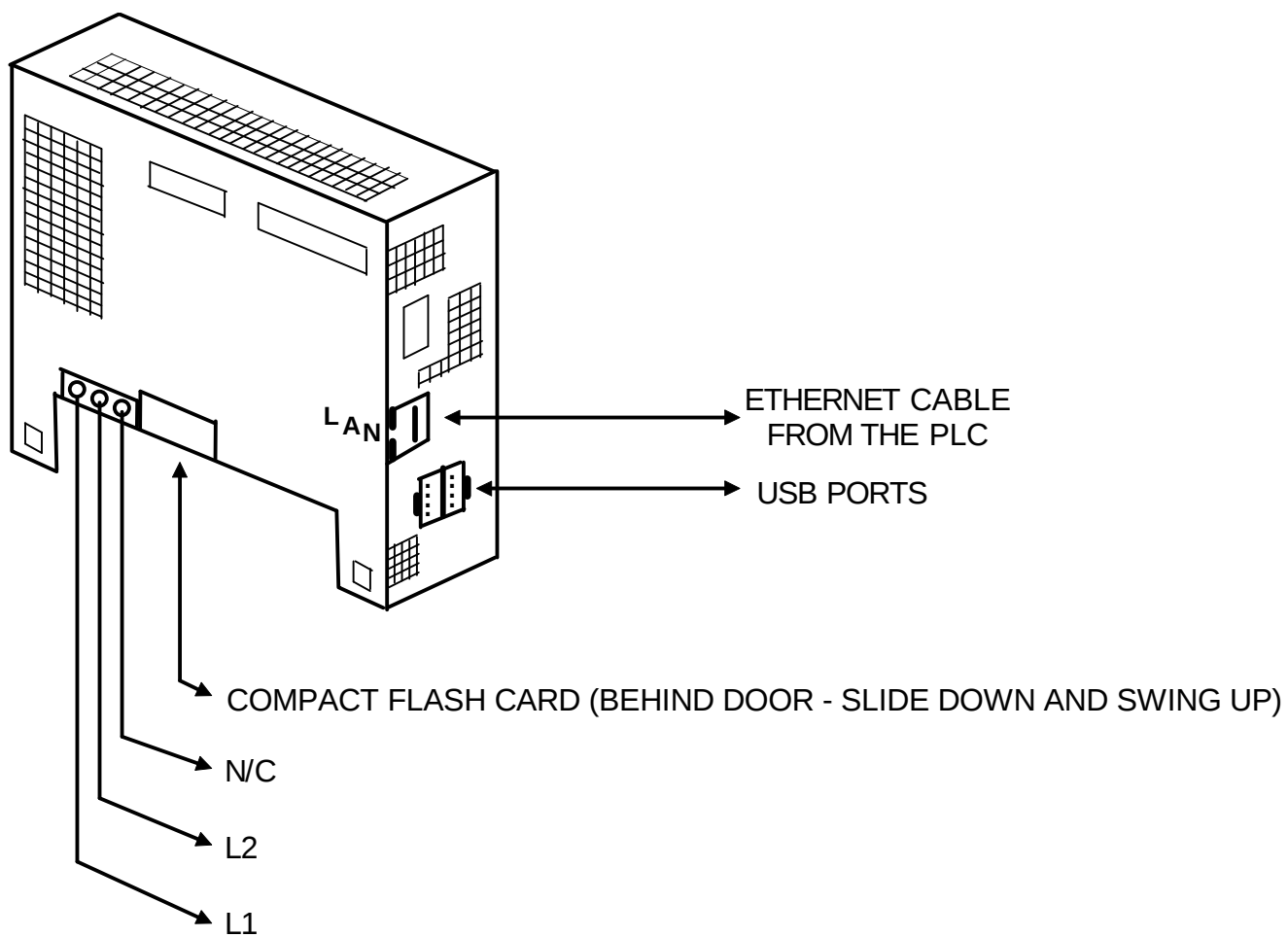
Revision:

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

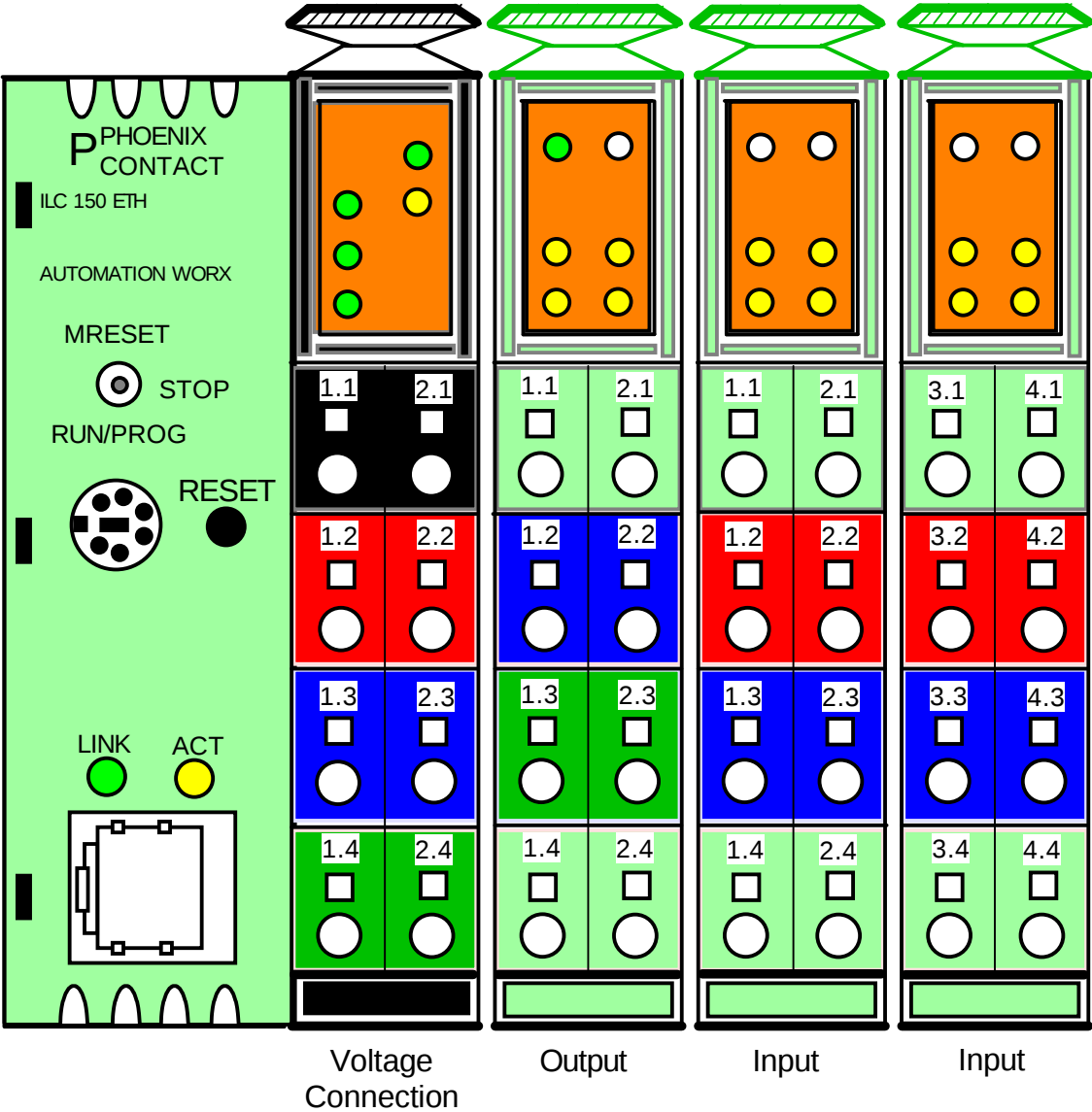
Date: 01/12

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

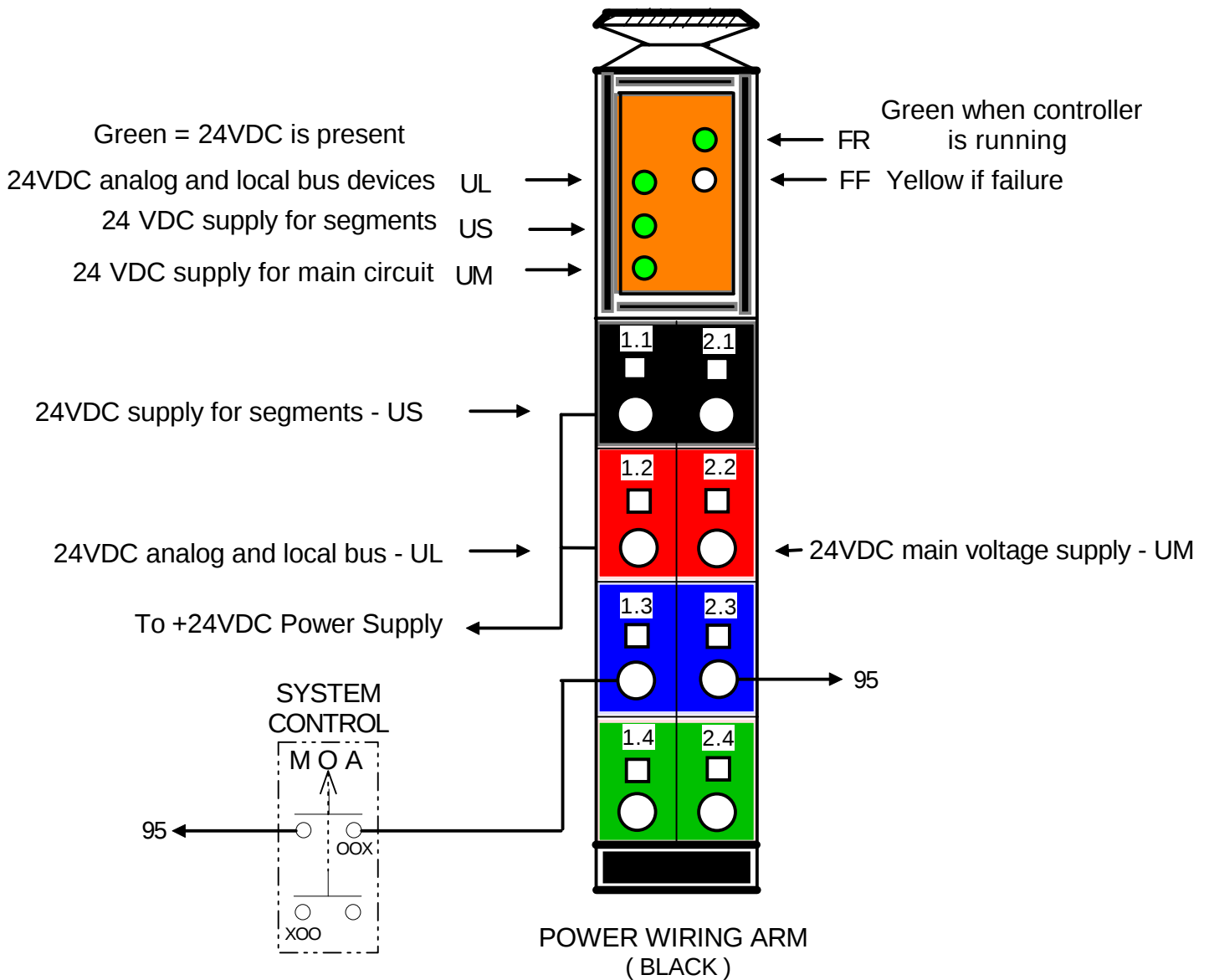
Date: 01/12

Sheet: 101.24

Revision:

SOFT START

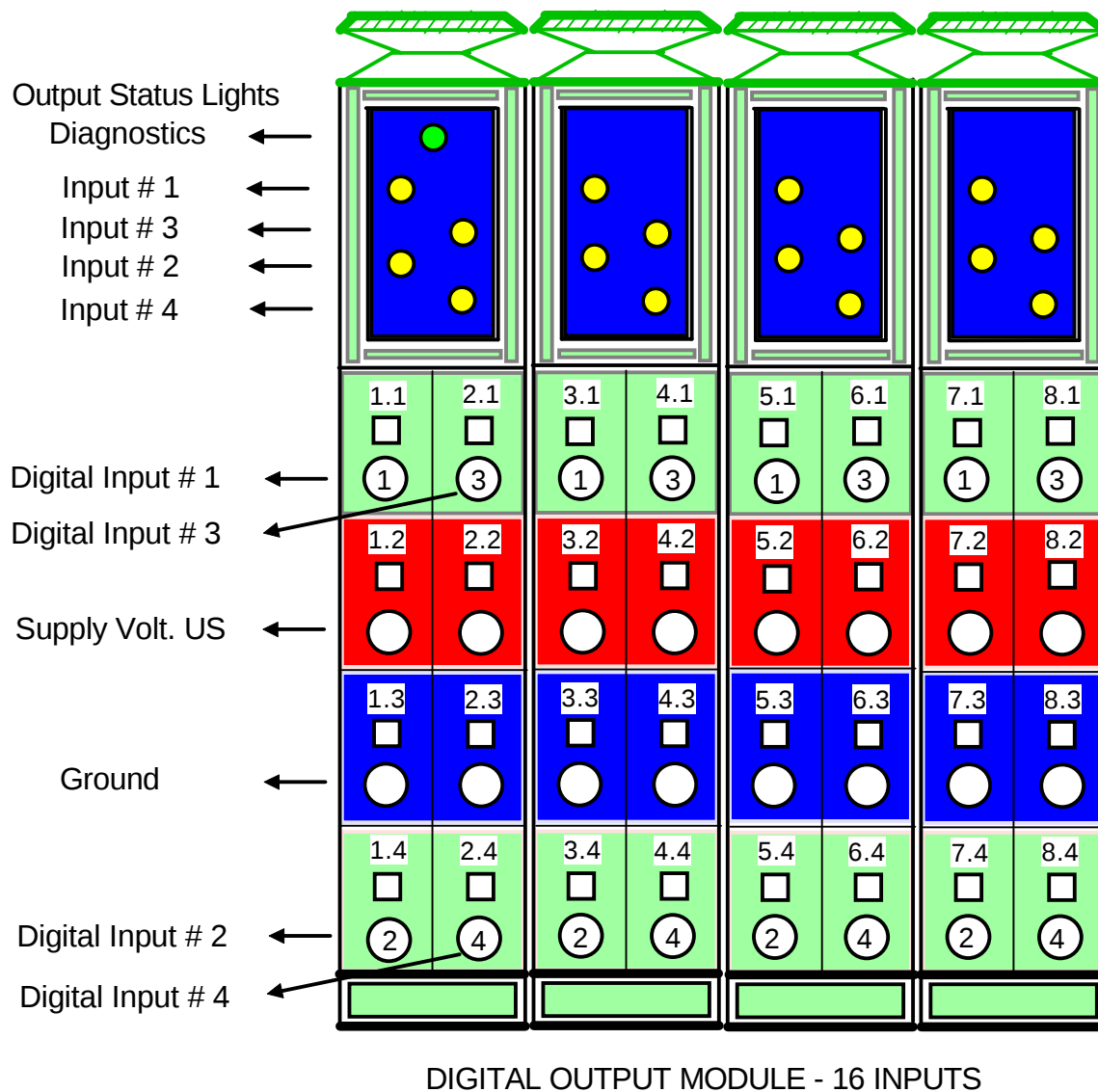
POWER SUPPLY CONNECTION FOR THE ILC 150 (ORANGE)



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

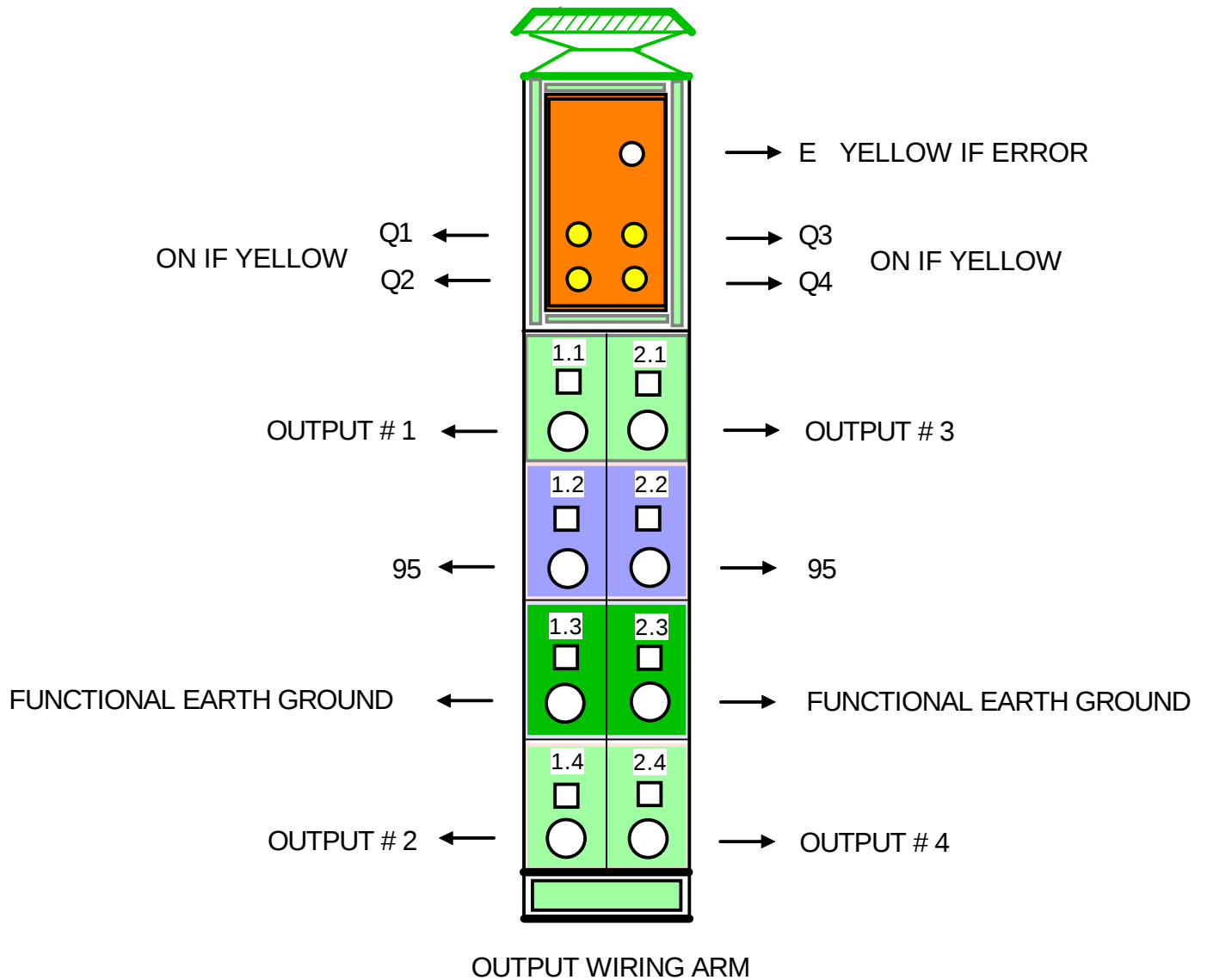
Date: 01/12

Sheet: 101.26

Revision:

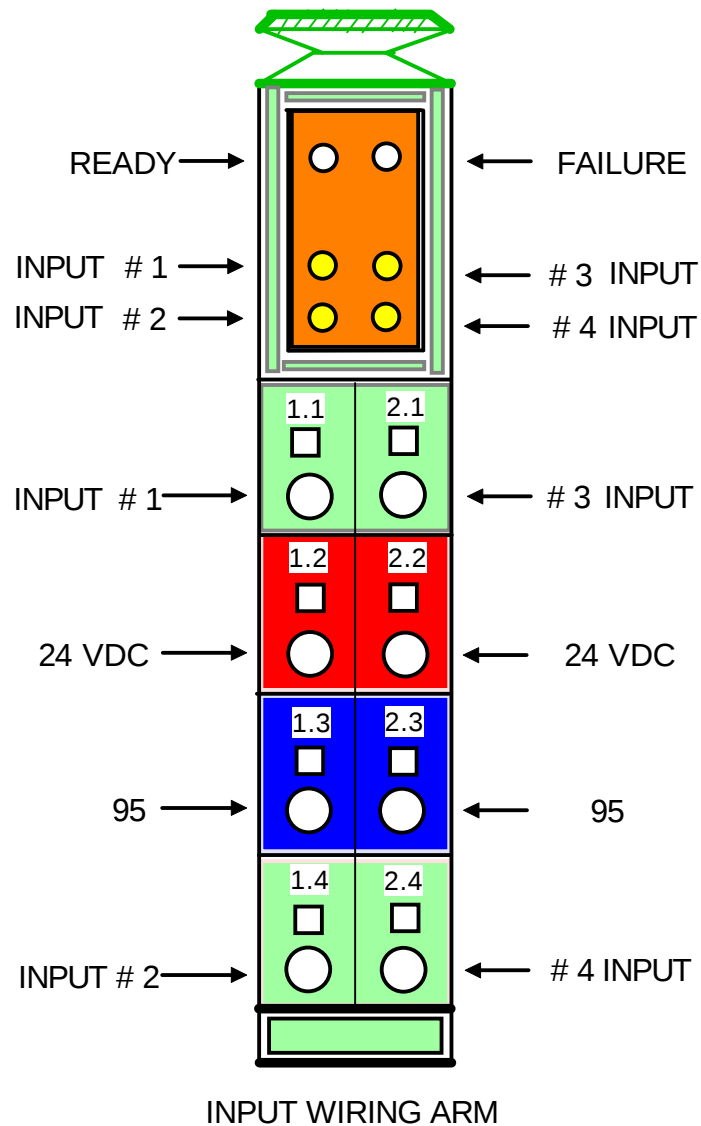
SOFT START

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

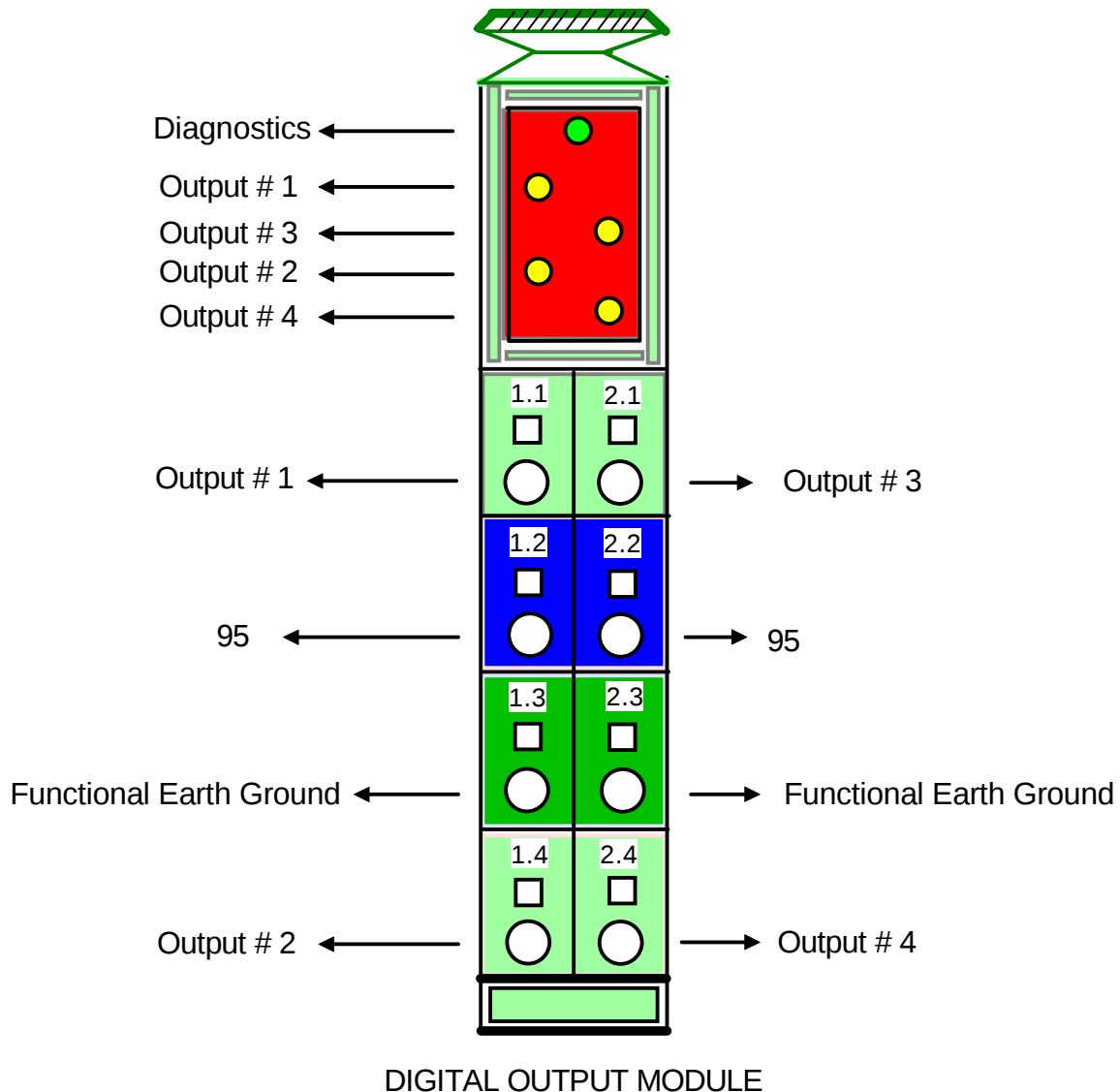
Date: 01/12

Sheet: 101.28

Revision:

SOFT START

DIGITAL OUTPUT MODULE PLC - ILC - 150 (RED)

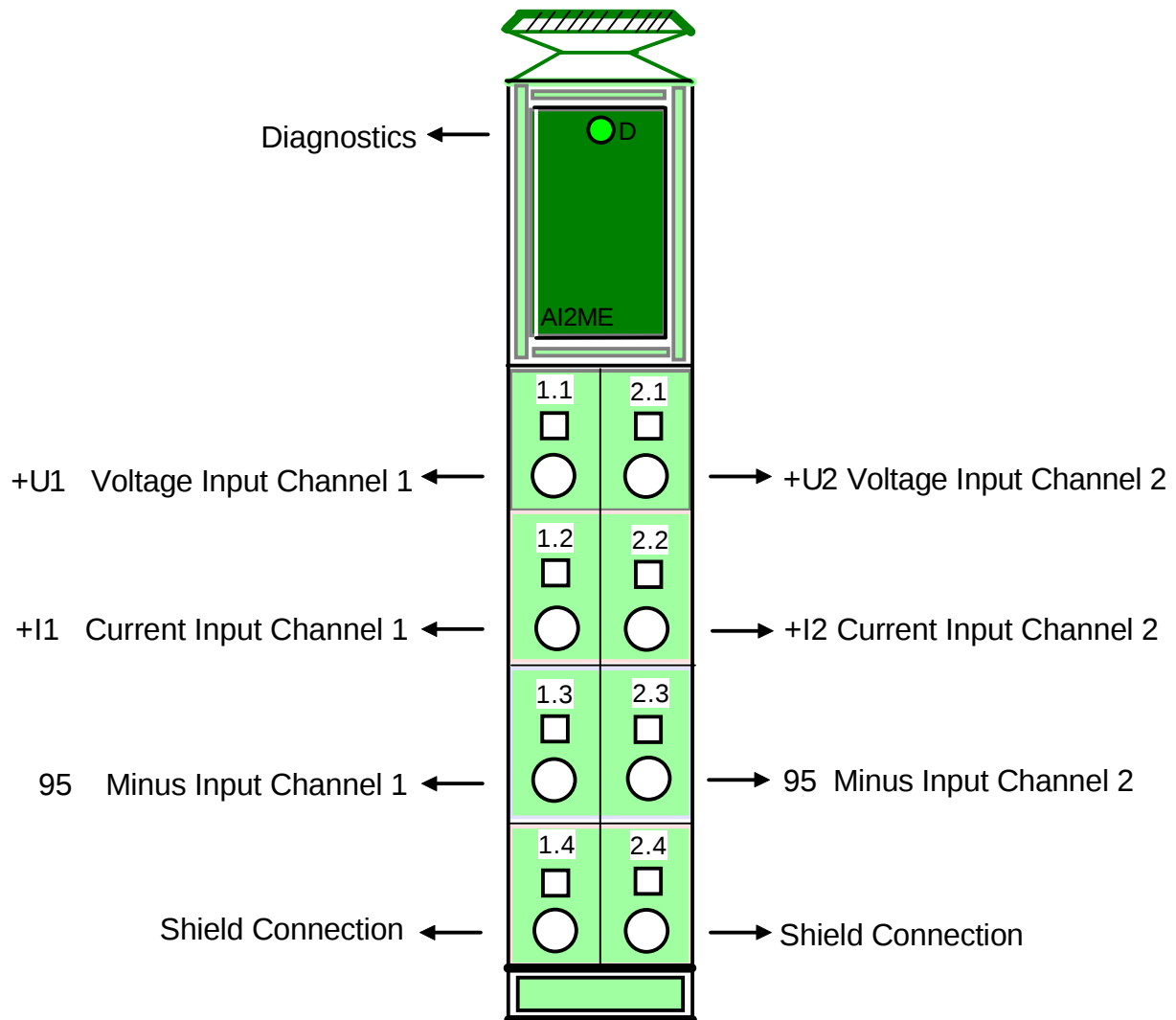


Diagnostics:

- 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

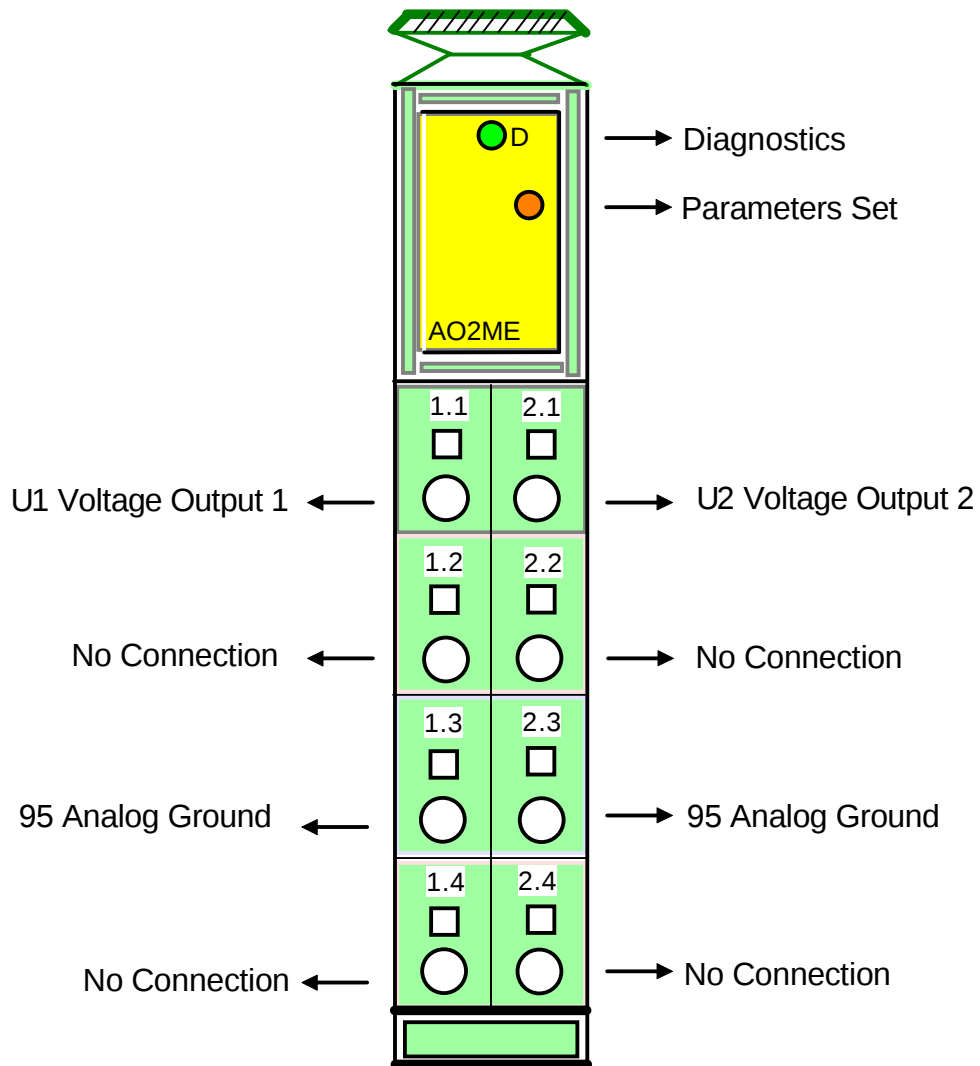
ANALOG INPUT MODULE PLC - ILC 150 (GREEN)



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

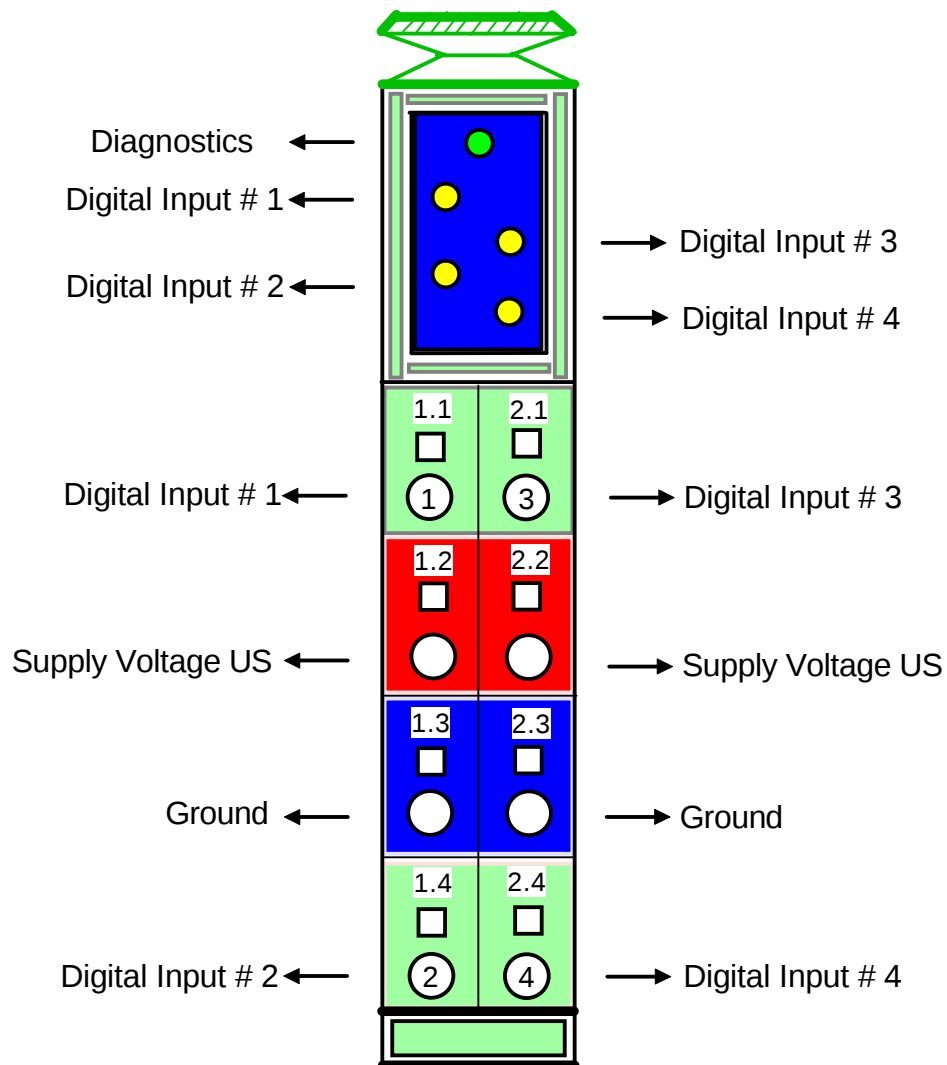
Date: 01/12

Sheet: 101.31

Revision:

SOFT START

DIGITAL INPUT MODULE - 4 INPUTS PLC - ILC - 150, 24 VDC (BLUE)



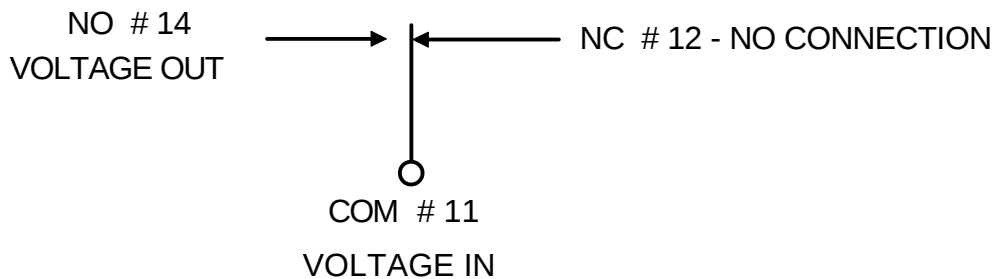
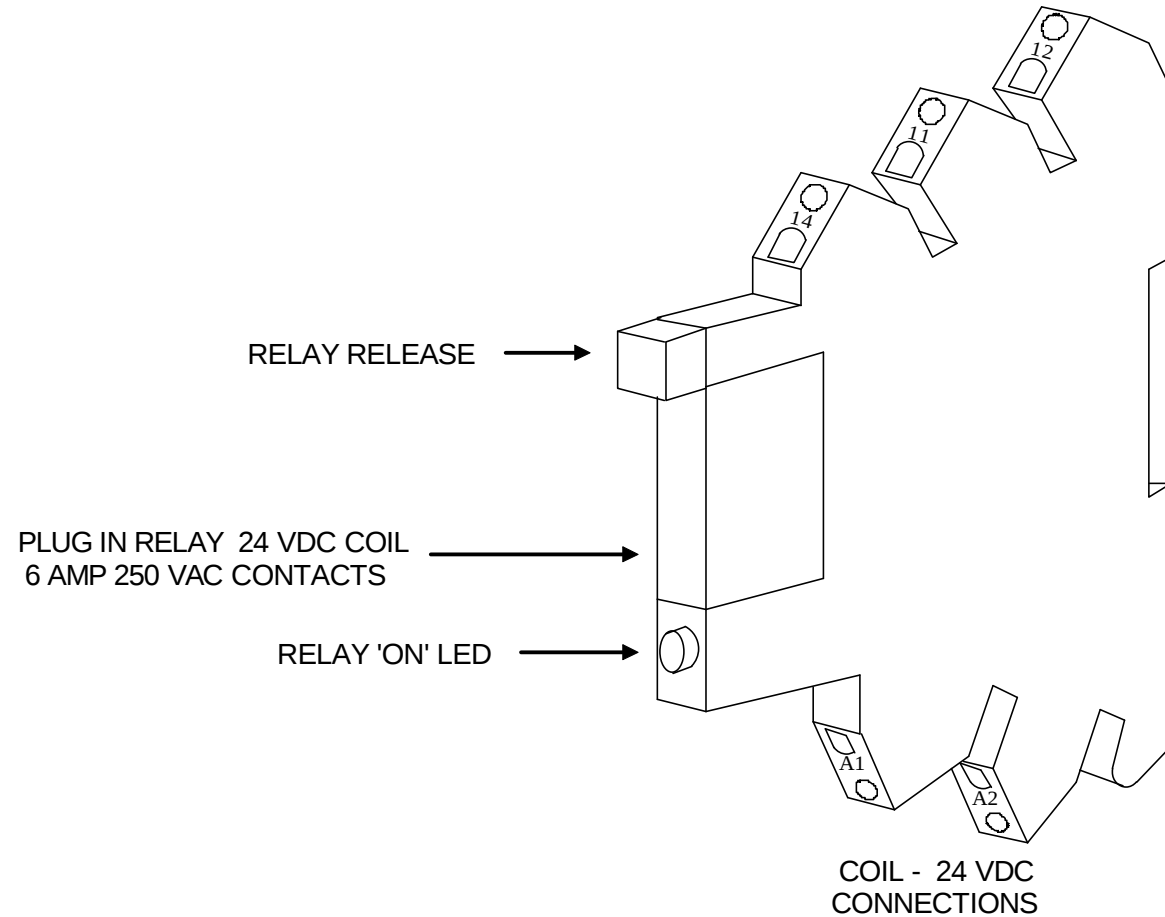
DIGITAL INPUT MODULE

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

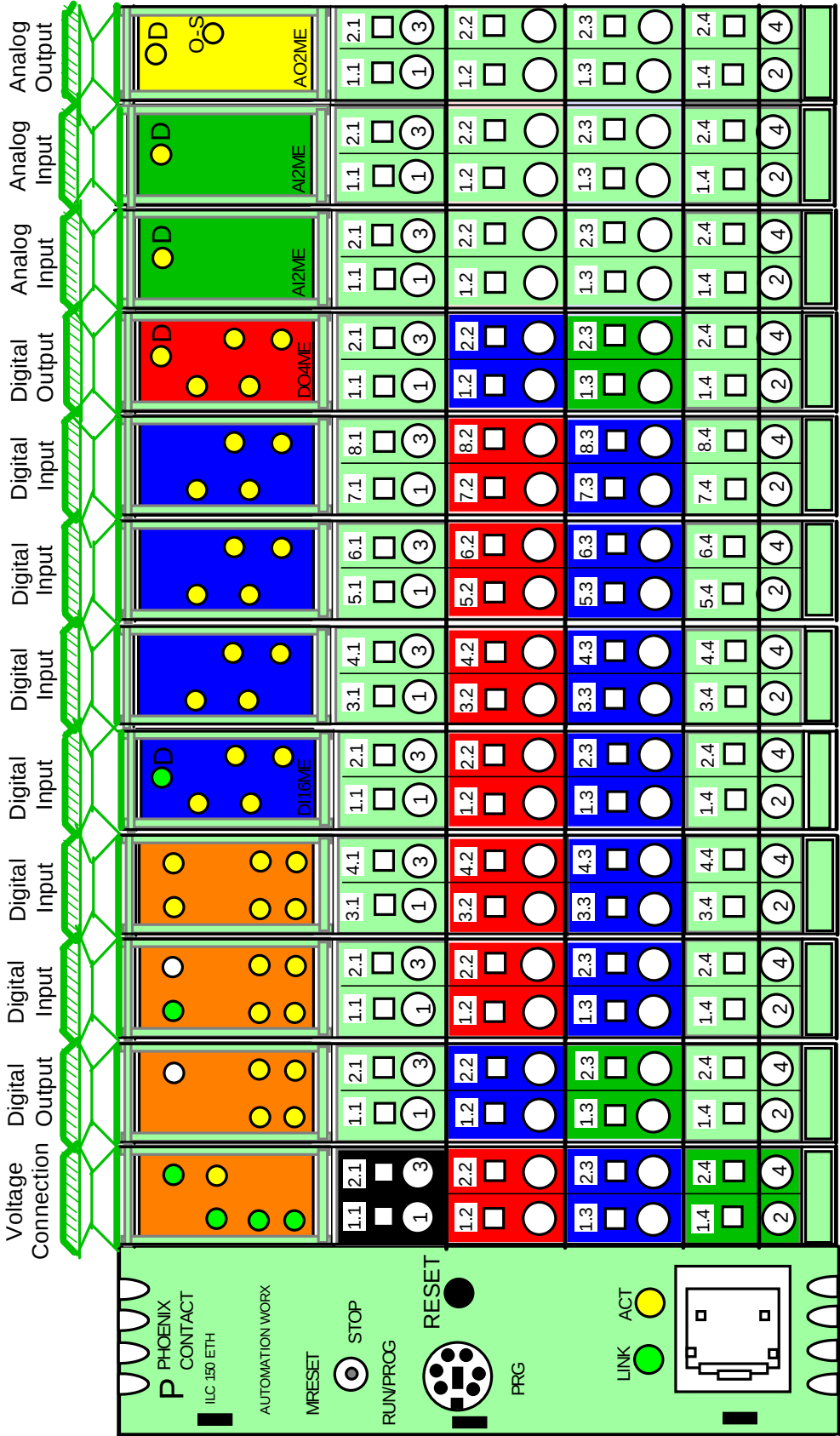
Date: 01/12

Sheet: 101.33

Revision:

SOFT START

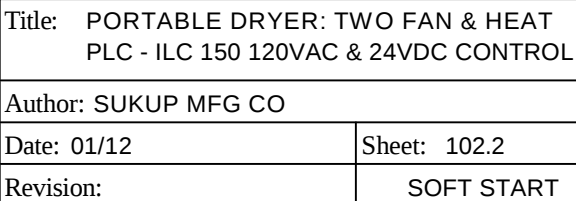
BASE NUMBERING - SINGLE FAN PLC

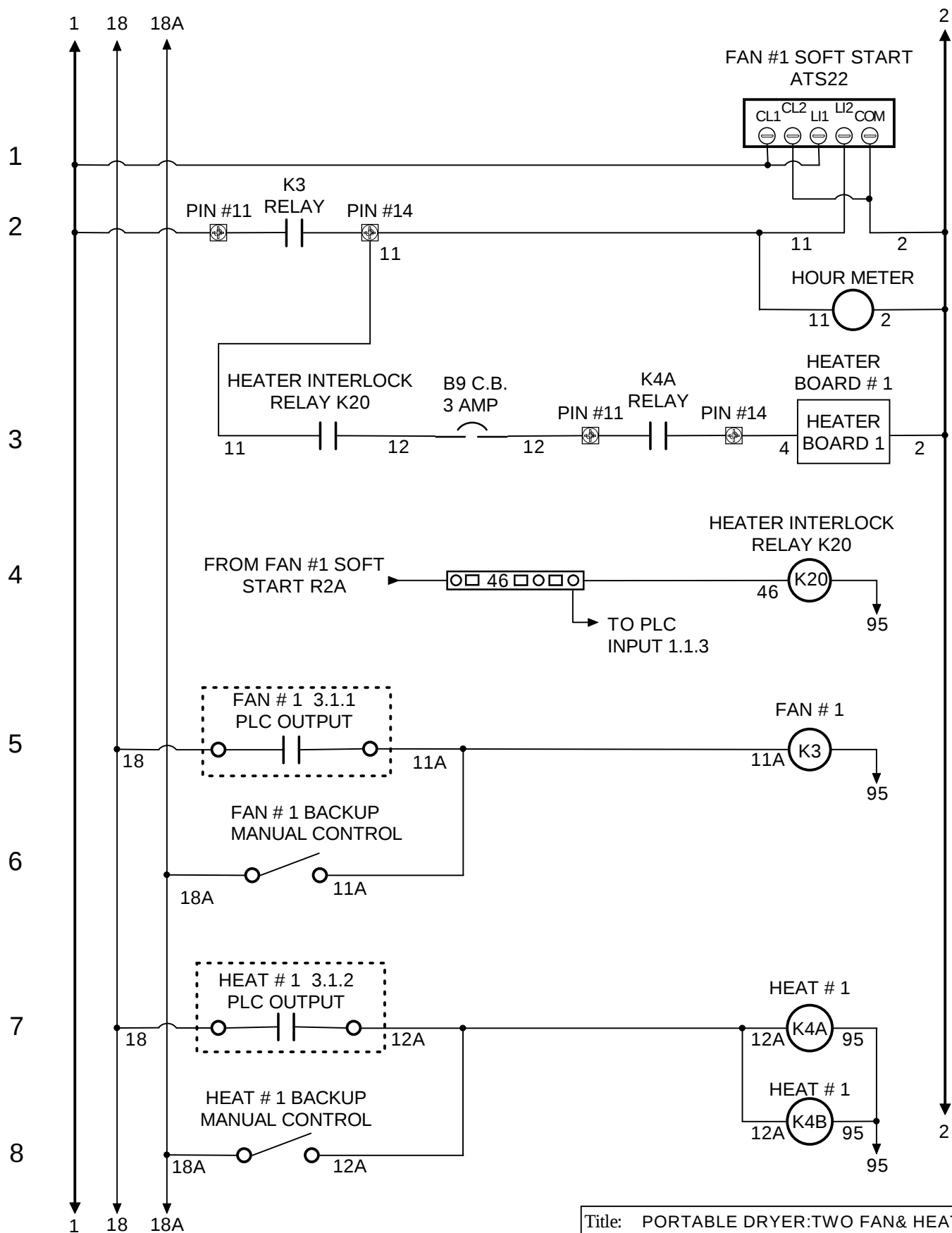


NOTE: 1st number = module # 2nd number = segment # in that module 3rd number = I/O # on that segment

Title: PORTABLE DRYER: SINGLE FAN & HEAT PLC MODULE BASE NUMBERING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 101.34
Revision: SOFT START	

2012
ELECTRICAL DRAWINGS
TWO FAN & HEAT
WITH ATS22
SOFT START





Title: PORTABLE DRYER:TWO FAN& HEAT PLC
ILC 150 120VAC & 24 VDC CONTROL

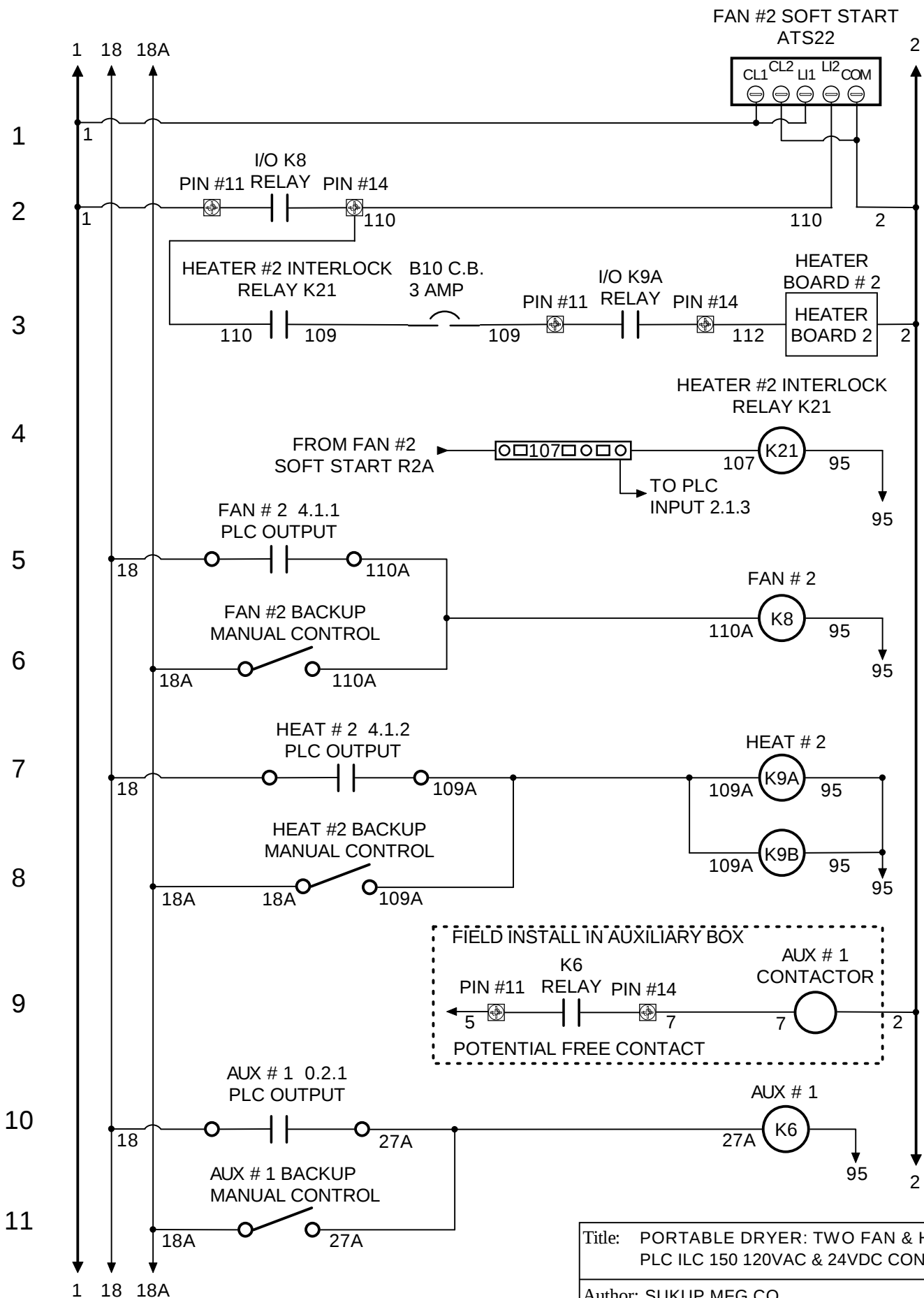
Author: SUKUP MFG CO

Date: 01/12

Sheet: 102.3

Revision:

SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT
PLC ILC 150 120VAC & 24VDC CONTROL

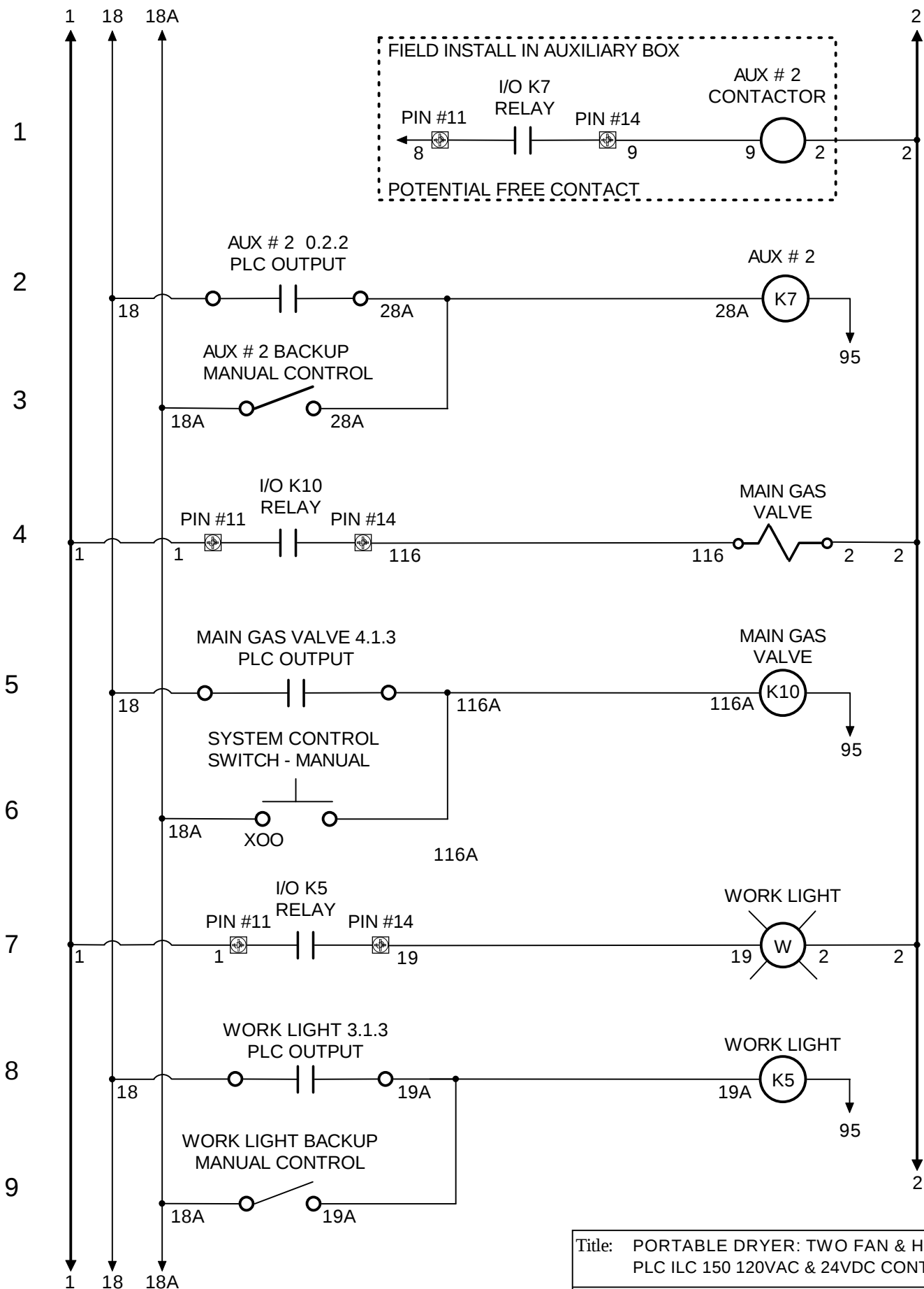
Author: SUKUP MFG CO

Date: 01/12

Sheet: 102.4

Revision:

SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT
PLC ILC 150 120VAC & 24VDC CONTROL

Author: SUKUP MFG CO

Date: 01/12

Sheet: 102.5

Revision:

SOFT START

NOTE PAGE

1. The following note applies to MANUAL operation only.

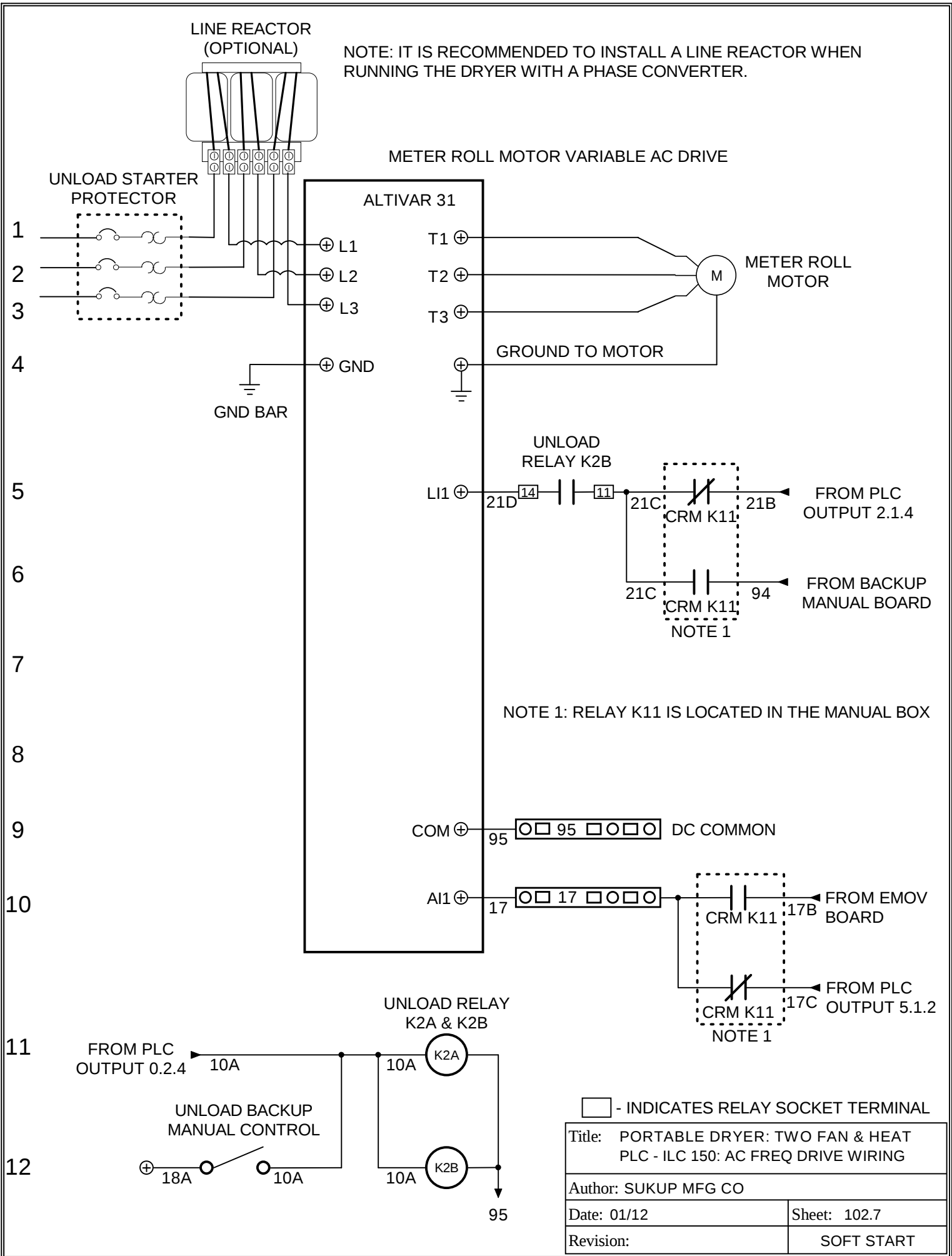
This contact is located on fault relay RL4. The relay is physically mounted on the manual control board. The contact is closed if no faults are present. Check LED # 57 (NO Fault) on the manual control board. This LED should be ON if no faults are present. (Load, Unload, and all Fan switches need to be 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.

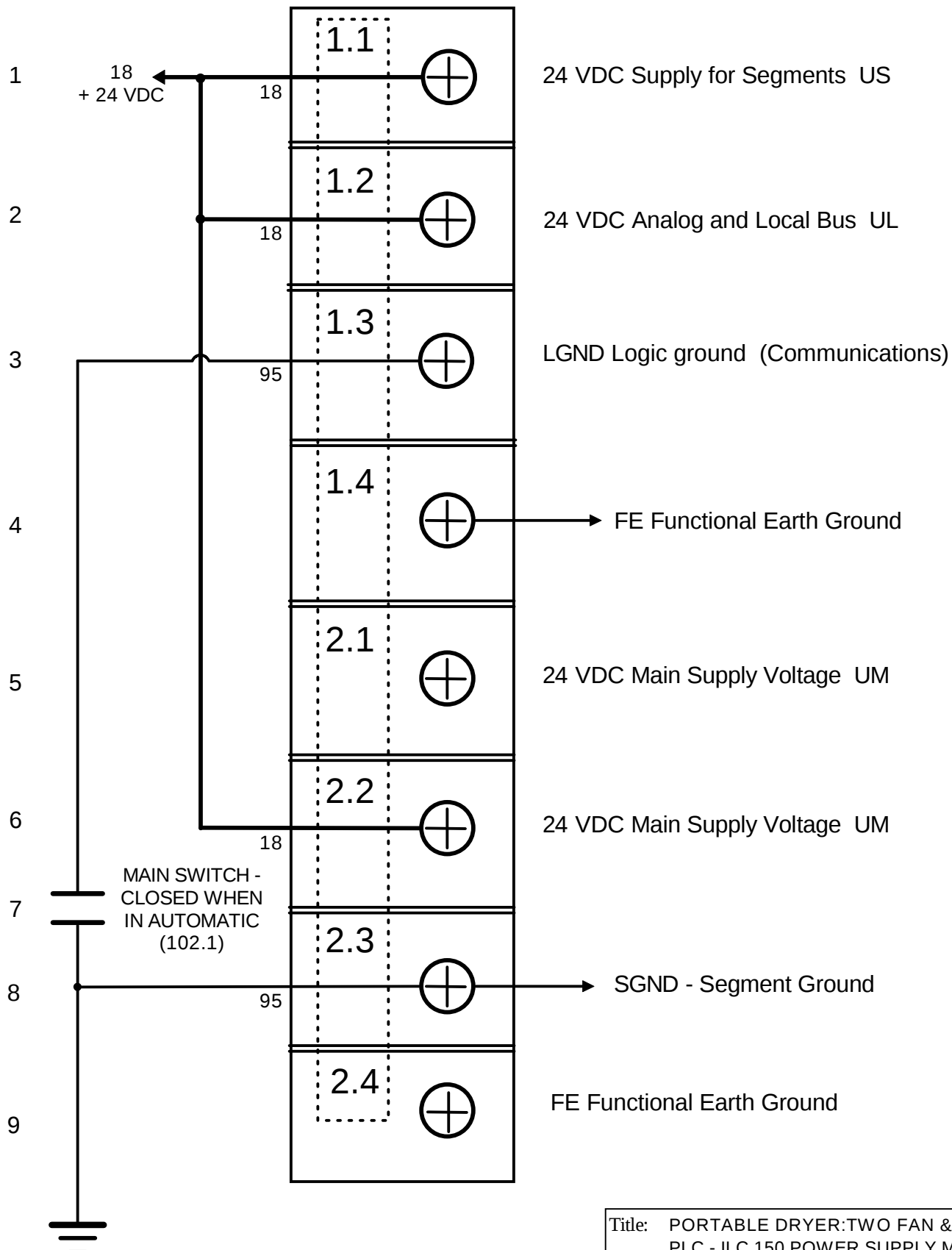
2. The X indicates the switch position. An X to the left, indicates the switch is in the Manual position, and an X to the right indicates the switch is in the Automatic position.
3. If auxiliary contactors are used, the overloads are wired in series and connected to these terminals. If auxiliary contactors are not used, a jumper is required between these two terminals, or an overload fault will occur.

  - Indicates a power box connection terminal.

Title: PORTABLE DRYER: TWO FAN & HEAT NOTES PAGE	
Author: SUKUP MFG CO	
Date: 01/10	Sheet: 102.6
Revision:	SOFT START



24 VDC WIRING ARM - 0.1 (ORANGE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER:TWO FAN & HEAT
PLC - ILC 150 POWER SUPPLY MODULE

Author: SUKUP MFG CO

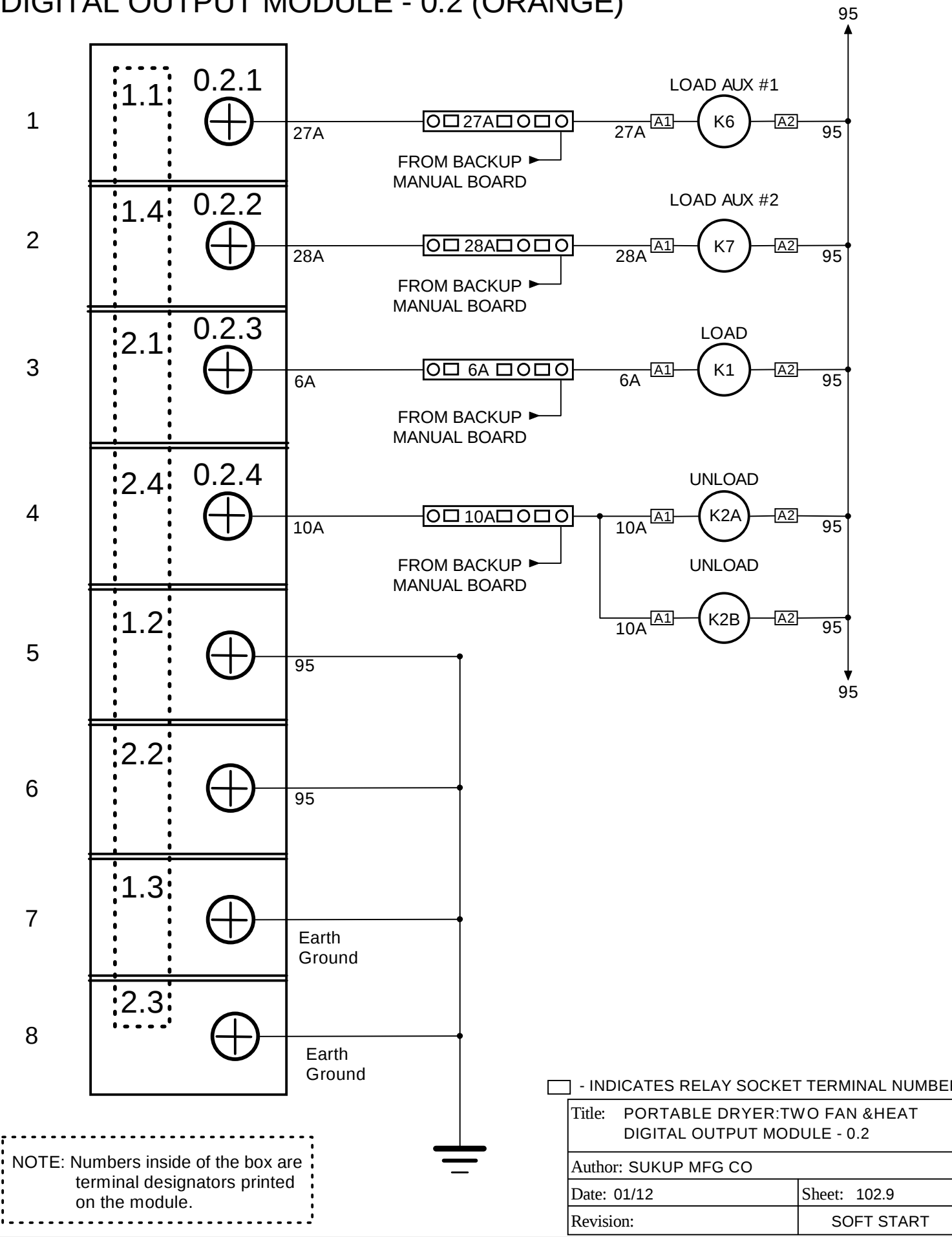
Date: 01/12

Sheet: 102.8

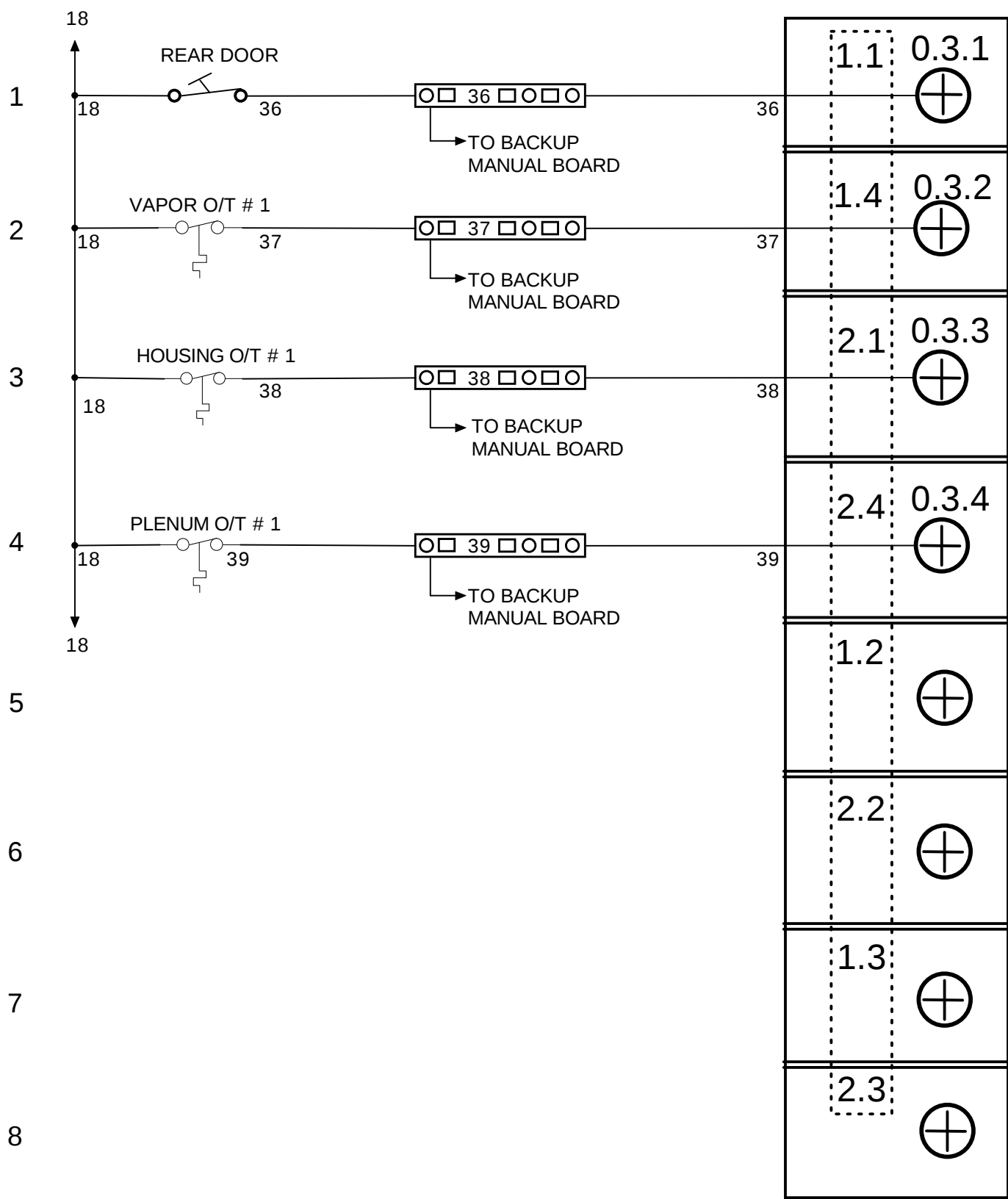
Revision:

SOFT START

DIGITAL OUTPUT MODULE - 0.2 (ORANGE)



DIGITAL INPUT MODULE - 0.3 (ORANGE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT
DIGITAL INPUT MODULE - 0.3

Author: SUKUP MFG CO

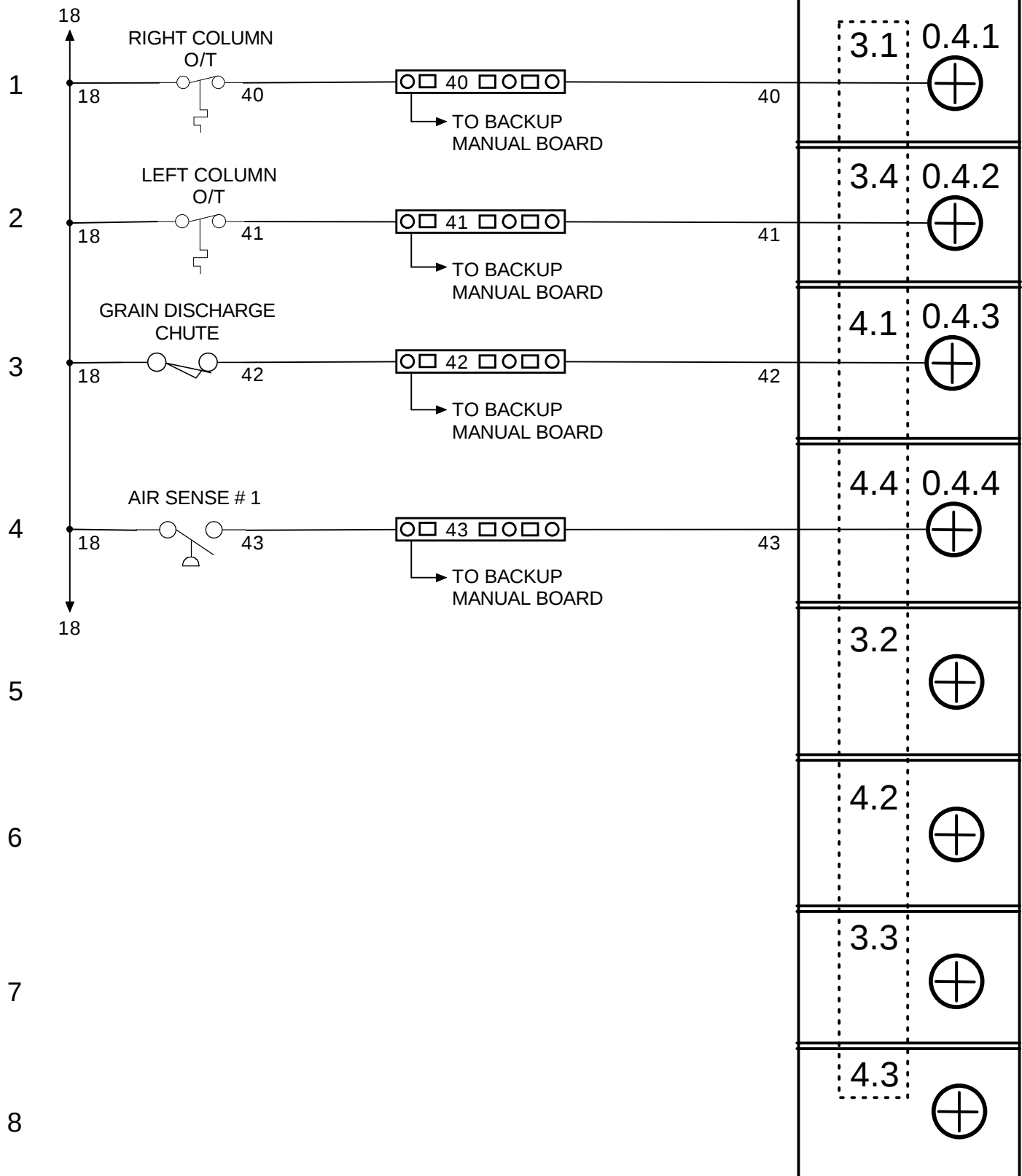
Date: 01/12

Sheet: 102.10

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: TWO FAN & HEAT
DIGITAL INPUT MODULE - 0.4

Author: SUKUP MFG CO

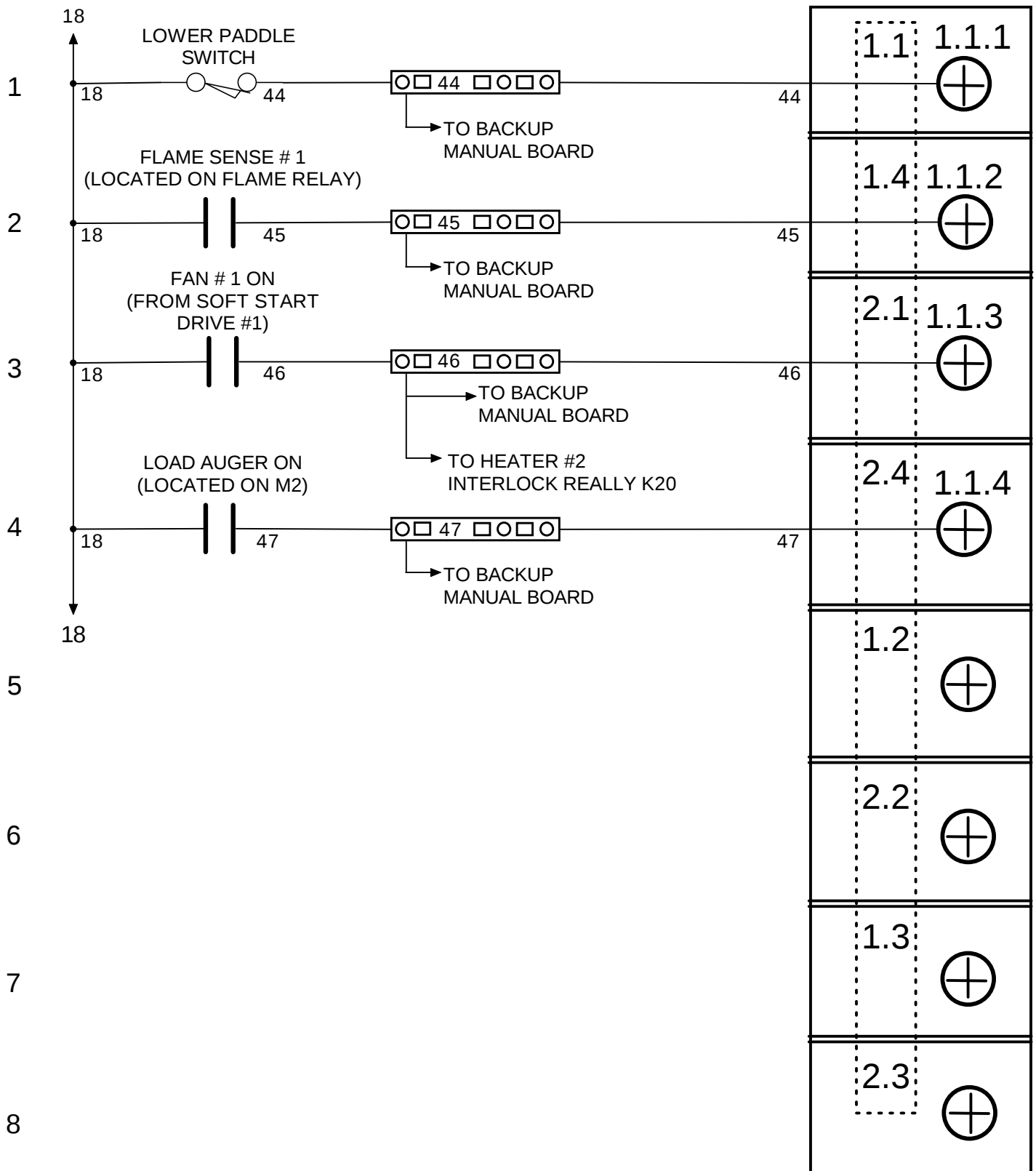
Date: 01/12

Sheet: 102.11

Revision:

SOFT START

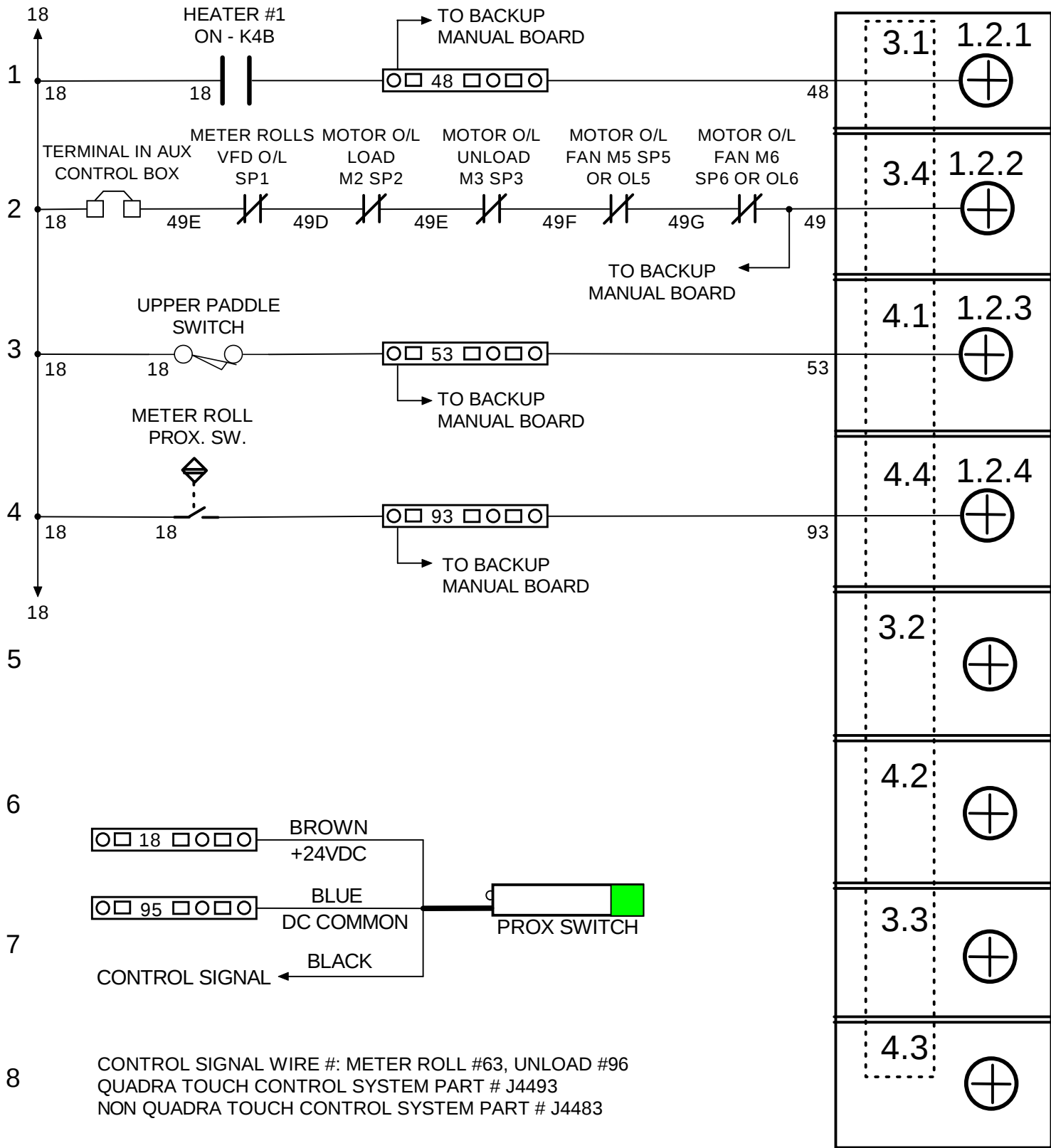
DIGITAL INPUT MODULE - 1.1 OF 4 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT DIGITAL INPUT MODULE - 1.1	
Author: SUKUP MFG SO	
Date: 01/12	Sheet: 102.12
Revision:	SOFT START

DIGITAL INPUT MODULE - 1.2 OF 4 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABEL DRYER: TWO FAN & HEAT
DIGITAL INPUT MODULE - 1.2

Author: SUKUP MFG CO

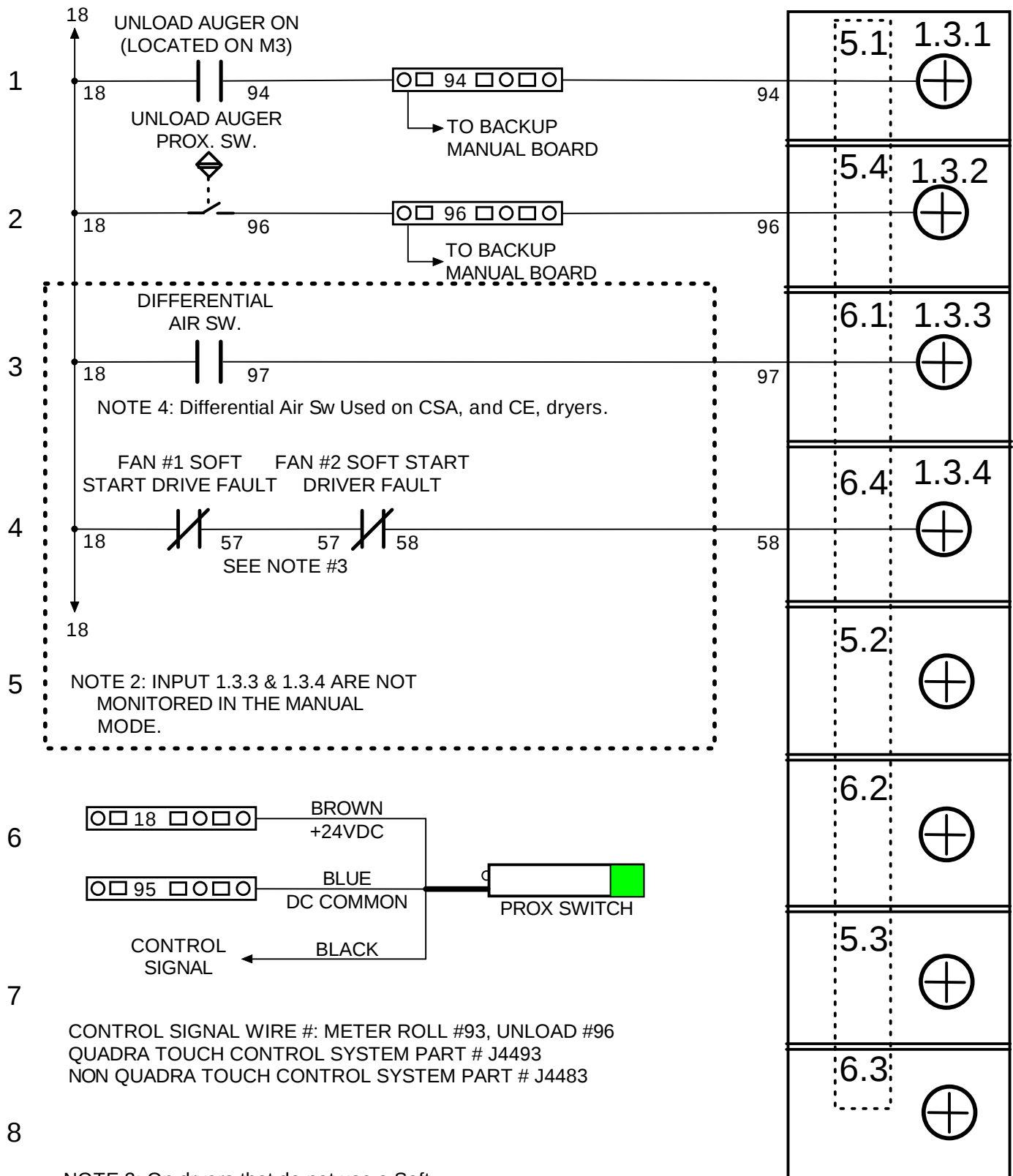
Date: 01/12

Sheet: 102.13

Revision:

SOFT START

DIGITAL INPUT MODULE -1.3 OF 4 (BLUE)



Title: PORTABLE DRYER: TWO FAN & HEAT
DIGITAL INPUT MODULE - 1.3

Author: SUKUP MFG CO

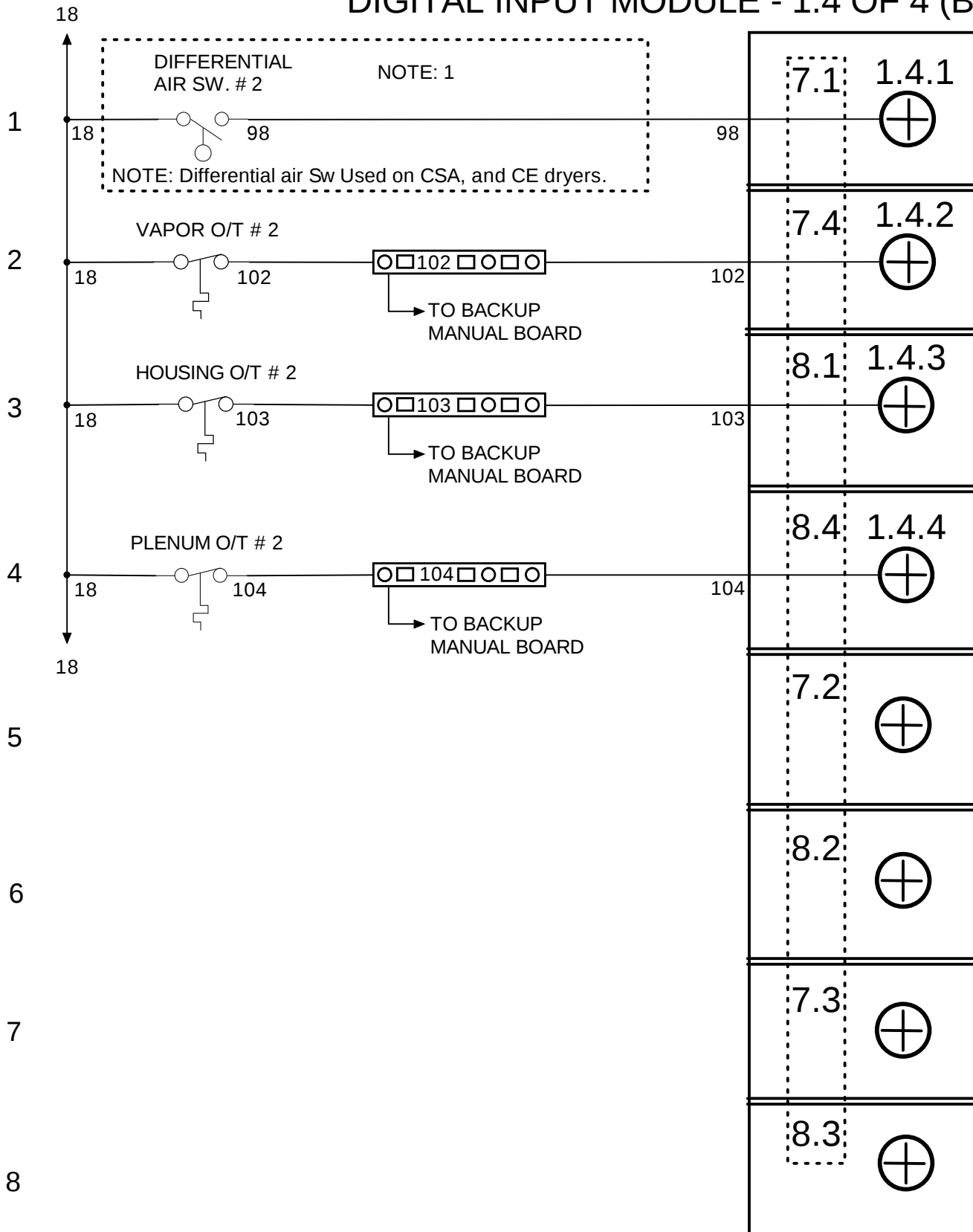
Date: 01/12

Sheet: 102.14

Revision:

SOFT START

DIGITAL INPUT MODULE - 1.4 OF 4 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

NOTE : 1 INPUT 1.4.1 IS NOT MONITORED IN THE MANUAL MODE

Title: PORTABLE DRYER: TWO FAN & HEAT
DIGITAL INPUT MODULE - 1.4

Author: SUKUP MFG CO

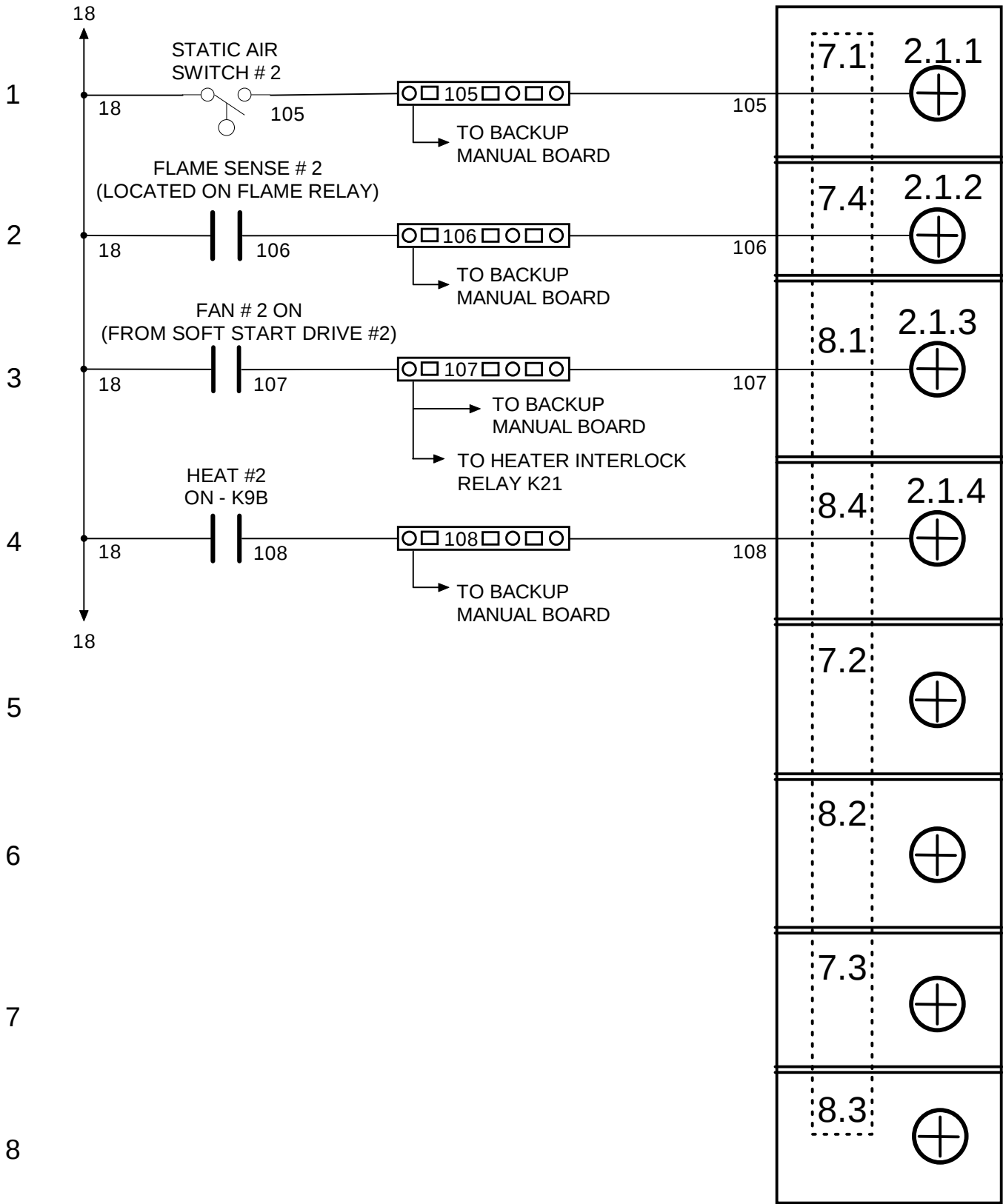
Date: 01/12

Sheet: 102.15

Revision:

SOFT START

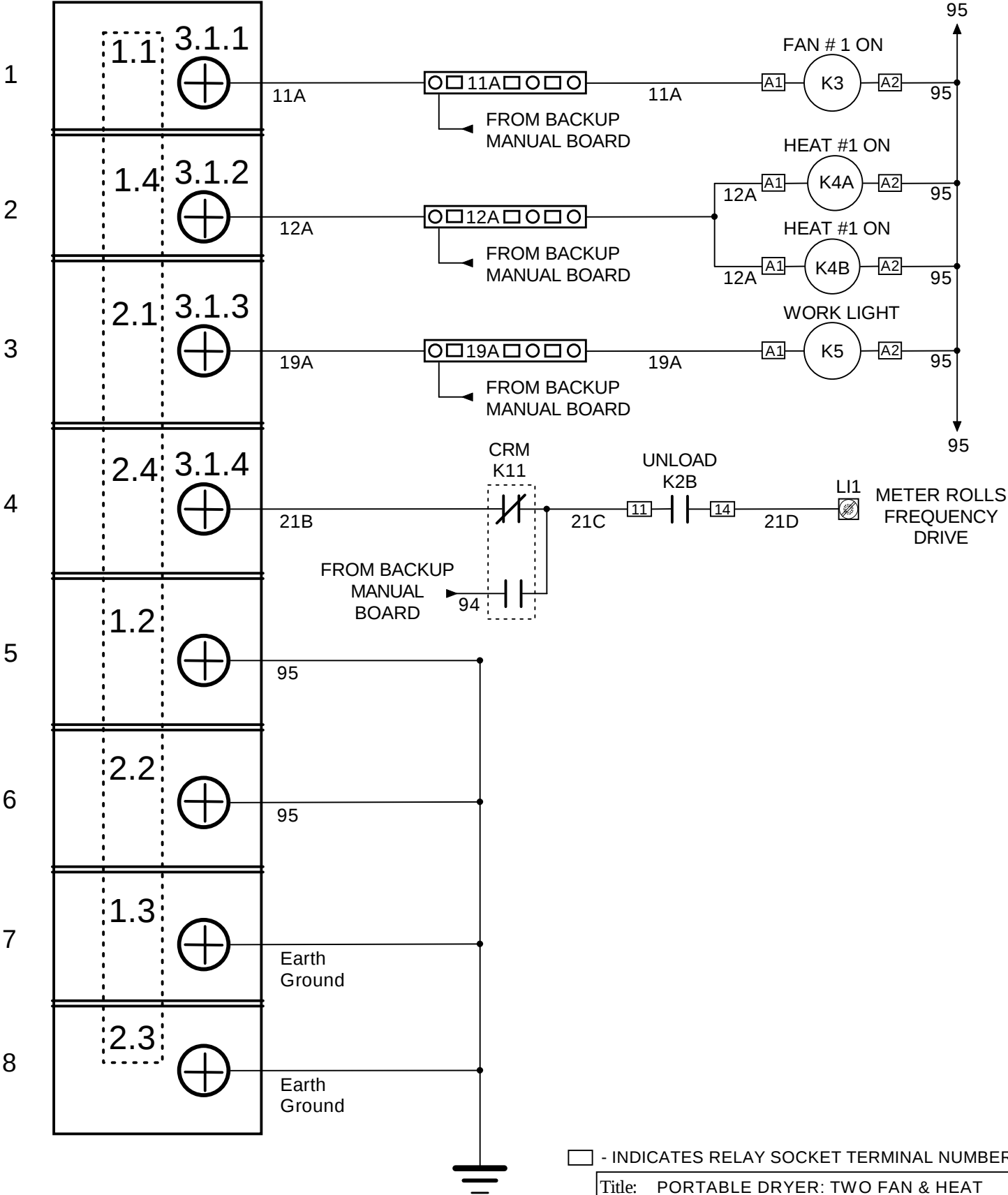
DIGITAL INPUT MODULE - 2.1 (BLUE)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT DIGITAL INPUT MODULE - 2.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.16
Revision:	SOFT START

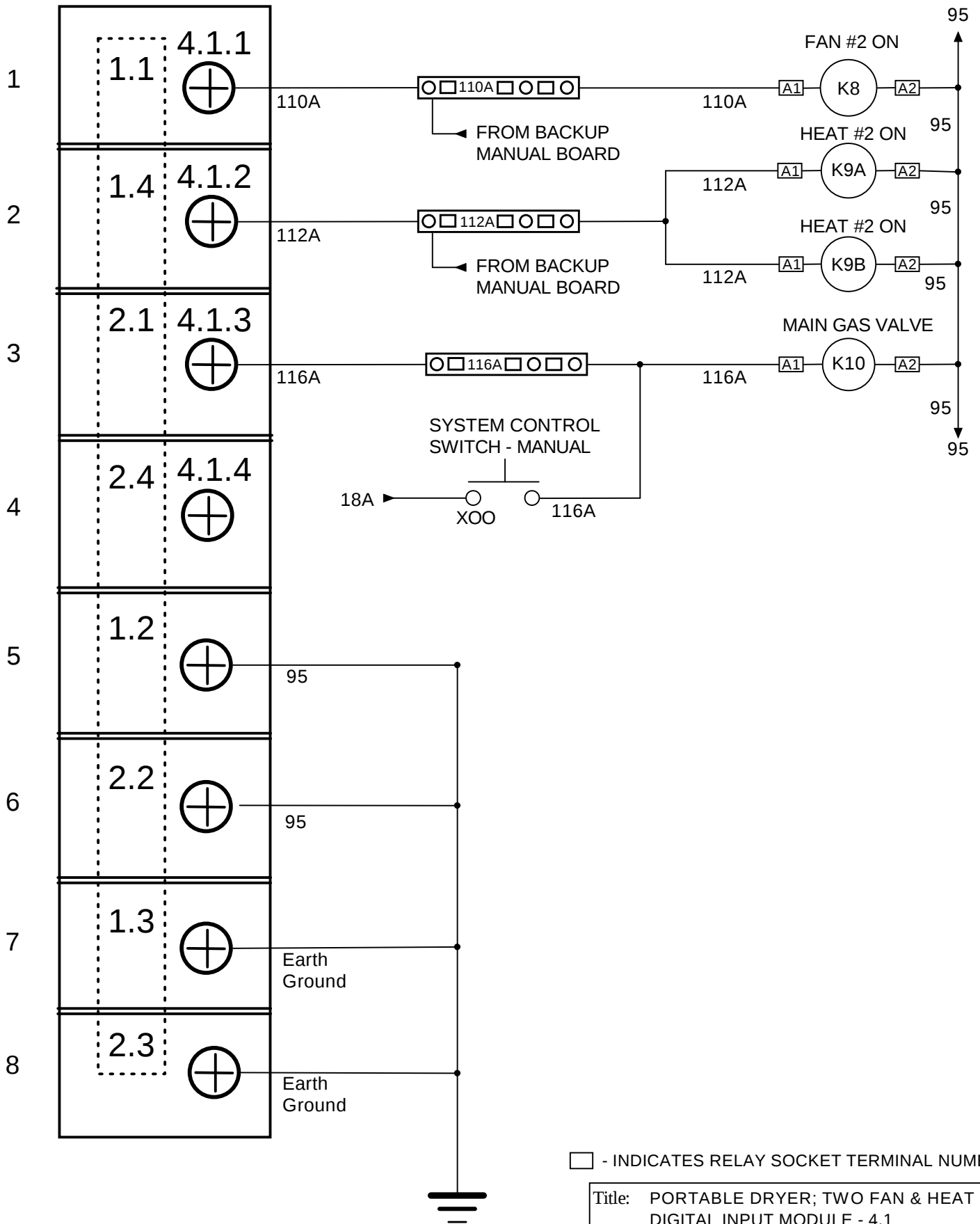
DIGITAL OUTPUT MODULE 3.1 (RED)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT DIGITAL OUTPUT MODULE - 3.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.17
Revision:	SOFT START

DIGITAL OUTPUT MODULE 4.1 (RED)



NOTE: Numbers inside of the box are terminal designators printed on the module.

□ - INDICATES RELAY SOCKET TERMINAL NUMBER

Title: PORTABLE DRYER; TWO FAN & HEAT
DIGITAL INPUT MODULE - 4.1

Author: SUKUP MFG CO

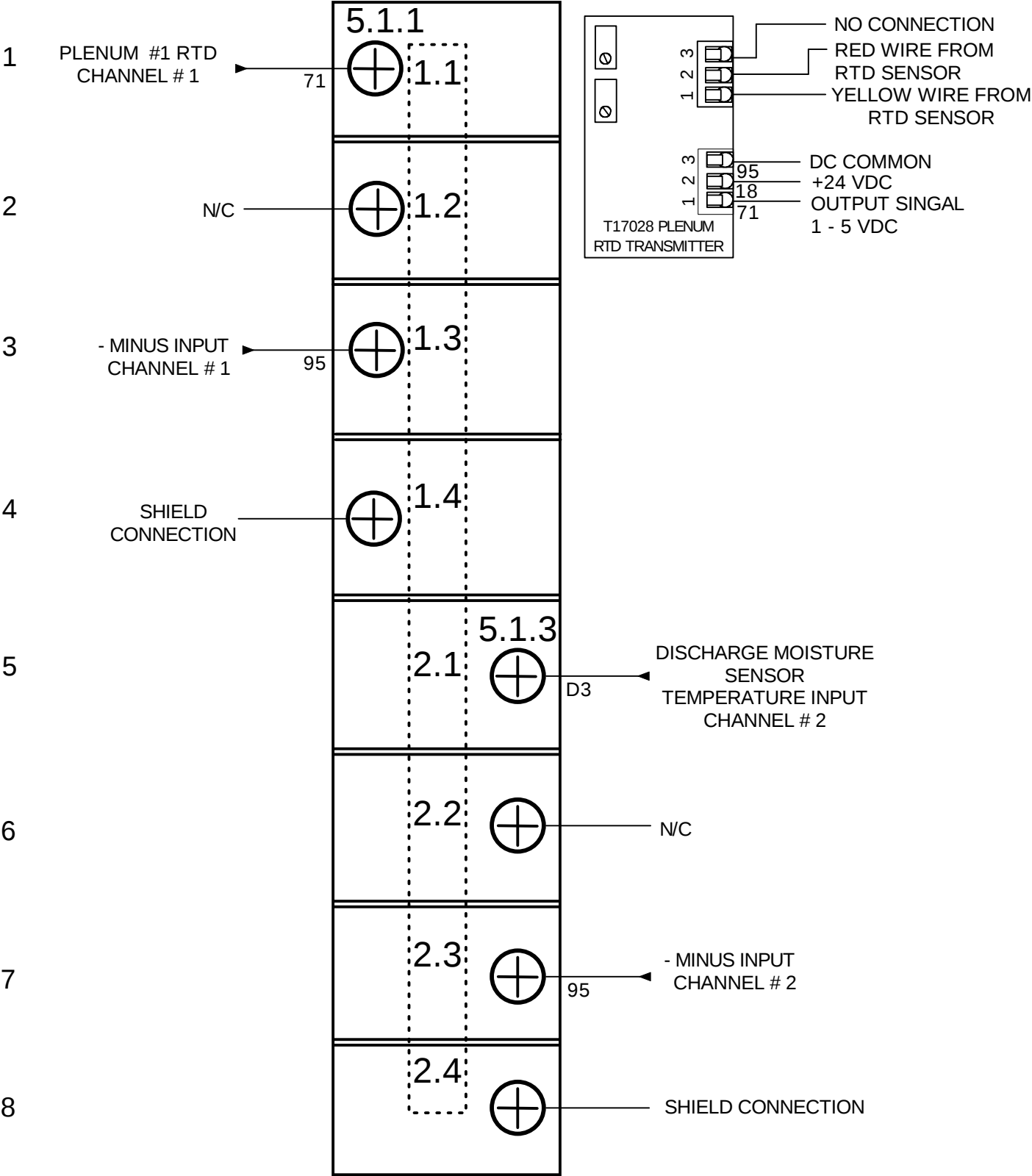
Date: 01/12

Sheet: 102.18

Revision:

SOFT START

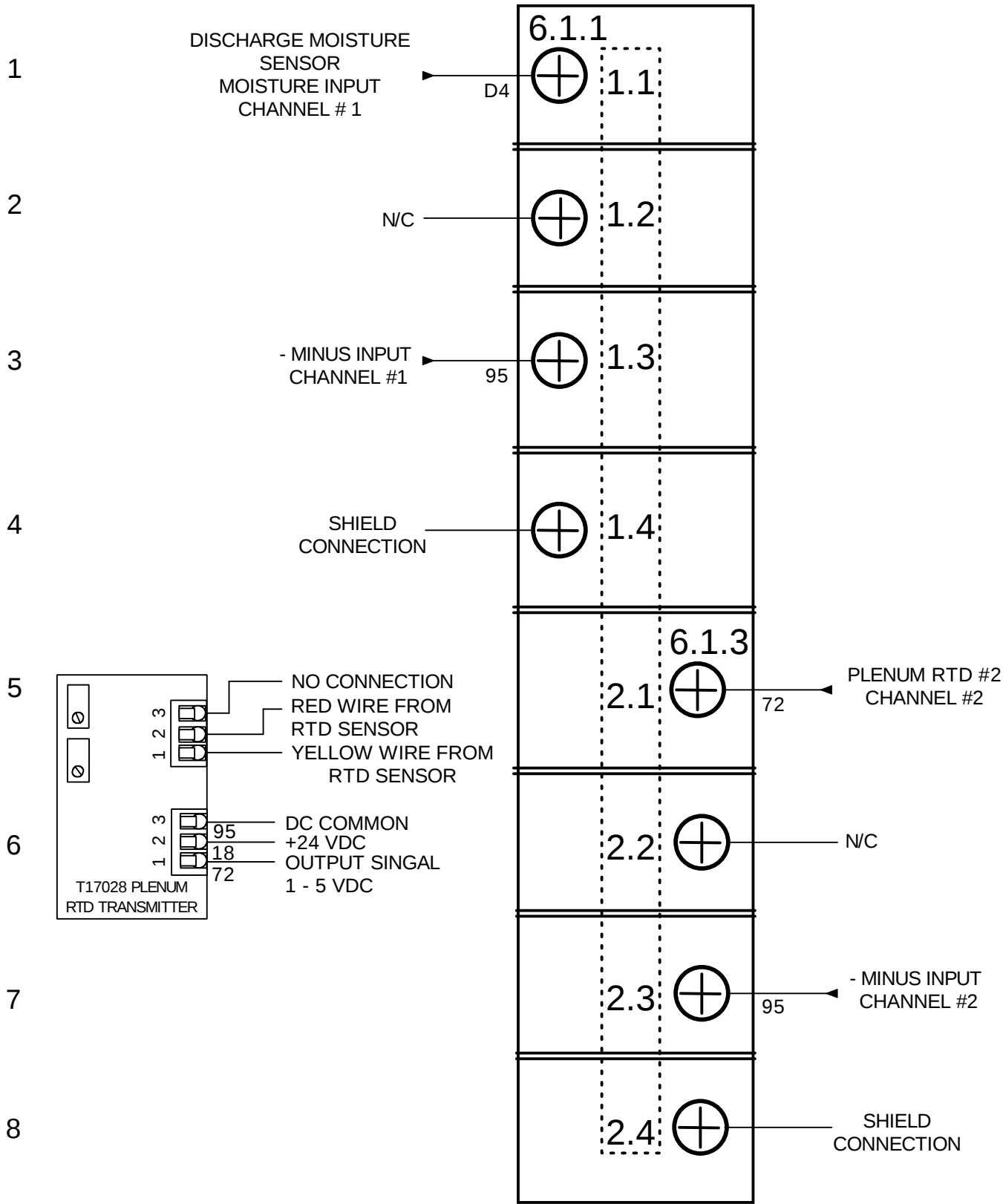
ANALOG INPUT MODULE - 5.1 (GREEN)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT ANALOG INPUT MODULE - 5.1	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.19
Revision:	SOFT START

ANALOG INPUT MODULE - 6.1 (GREEN)



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT ANALOG INPUT MODULE - 6.1

Author: SUKUP MFG CO

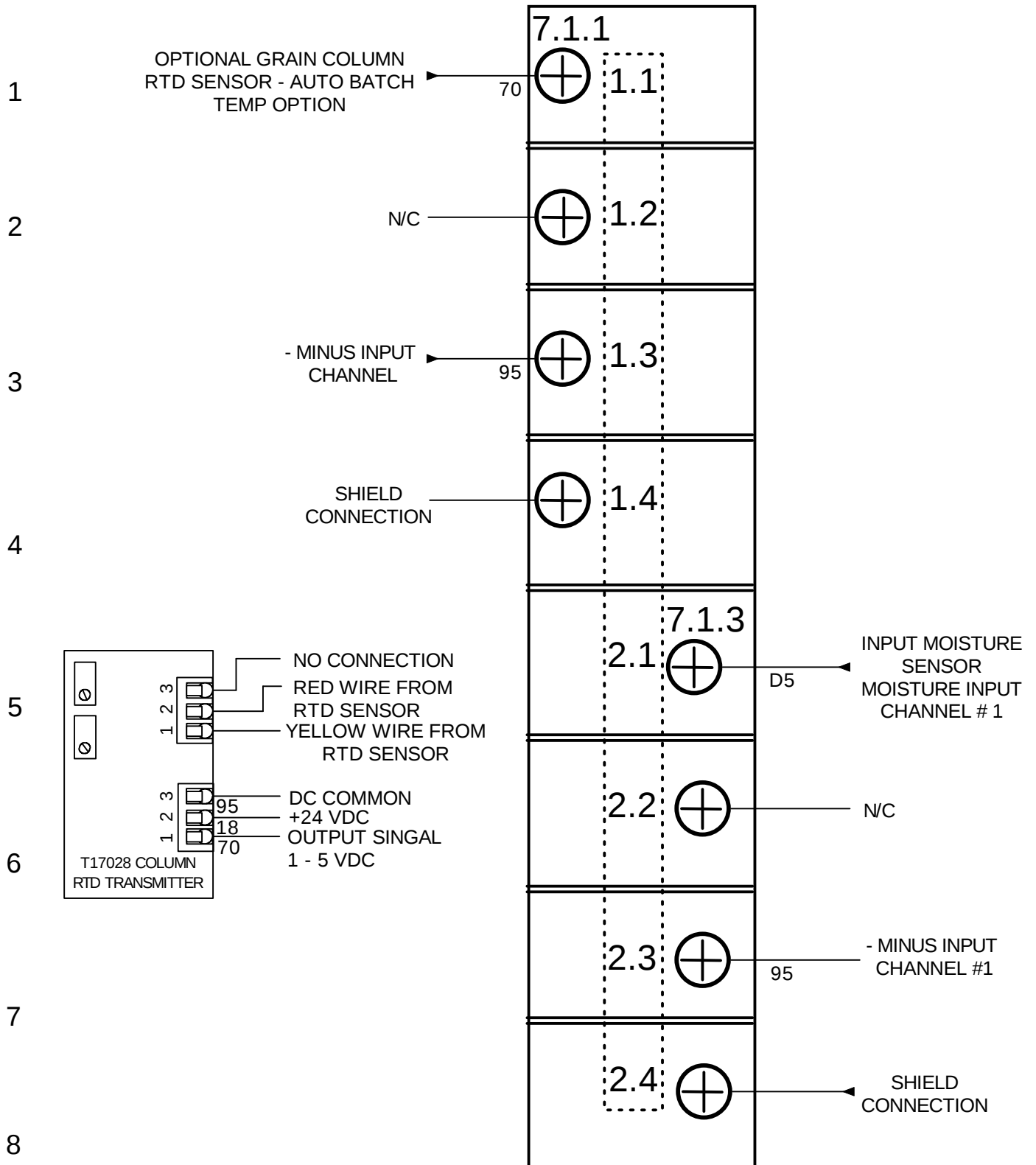
Date: 01/12

Sheet: 102.20

Revision:

SOFT START

ANALOG INPUT MODULE - 7.1 (GREEN) TWO FAN WITH INPUT MOISTURE SENSOR & GRAIN COLUMN RTD OPTIONS



Title: PORTABLE DRYER: TWO FAN & HEAT
STACK ANALOG INPUT MODULE - 7.1

Author: SUKUP MFG CO

Date: 01/12

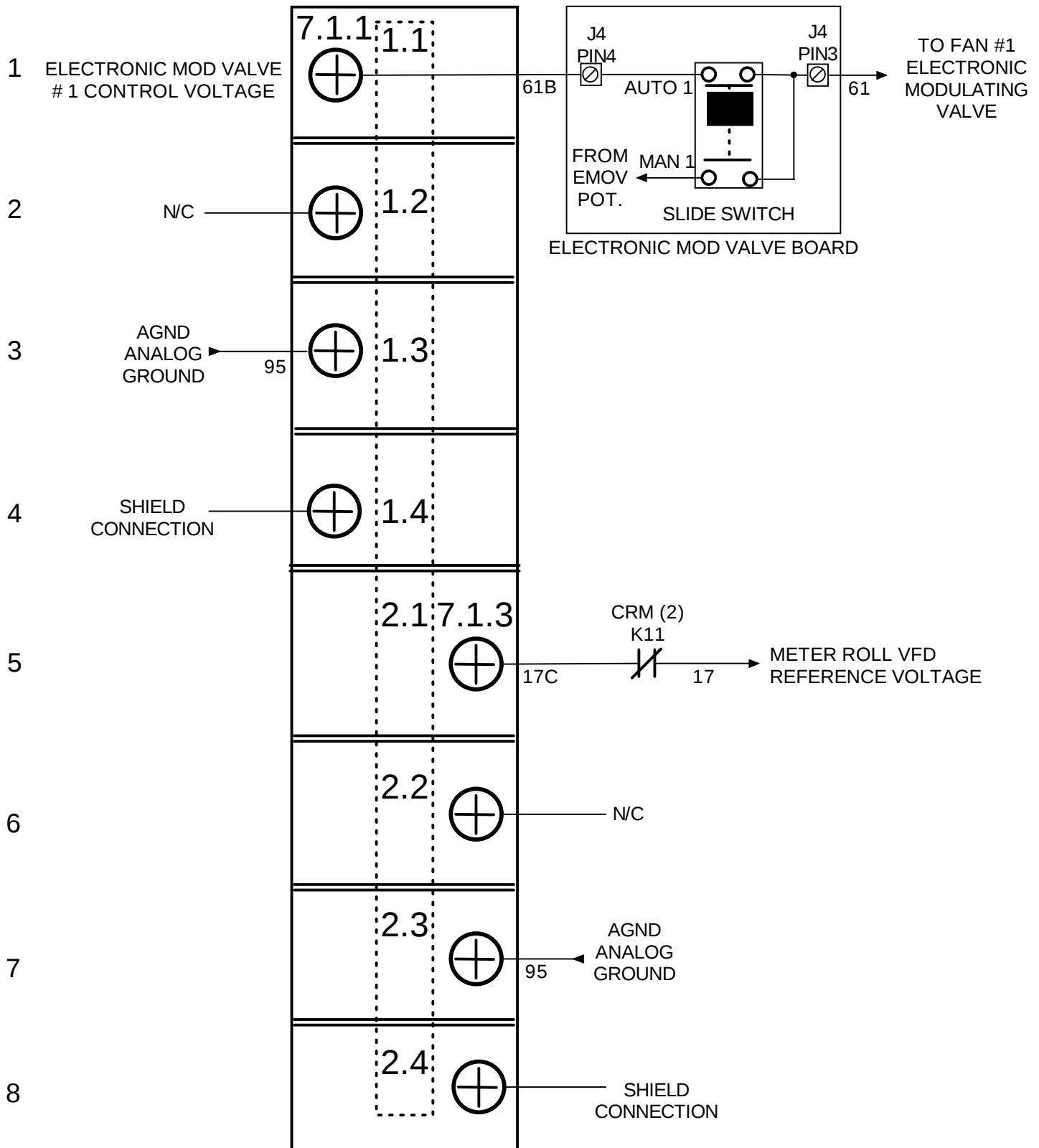
Sheet: 102.21

Revision:

SOFT START

ANALOG OUTPUT MODULE (0-10 VDC) 7.1 (YELLOW)

THIS CARD IS 8.1 ON A TWO FAN STACK DRYER OR WHEN EQUIPPED WITH A INPUT MOISTURE SENSOR



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT ANALOG OUTPUT MODULE - 8.1

Author: SUKUP MFG CO

Date: 01/12

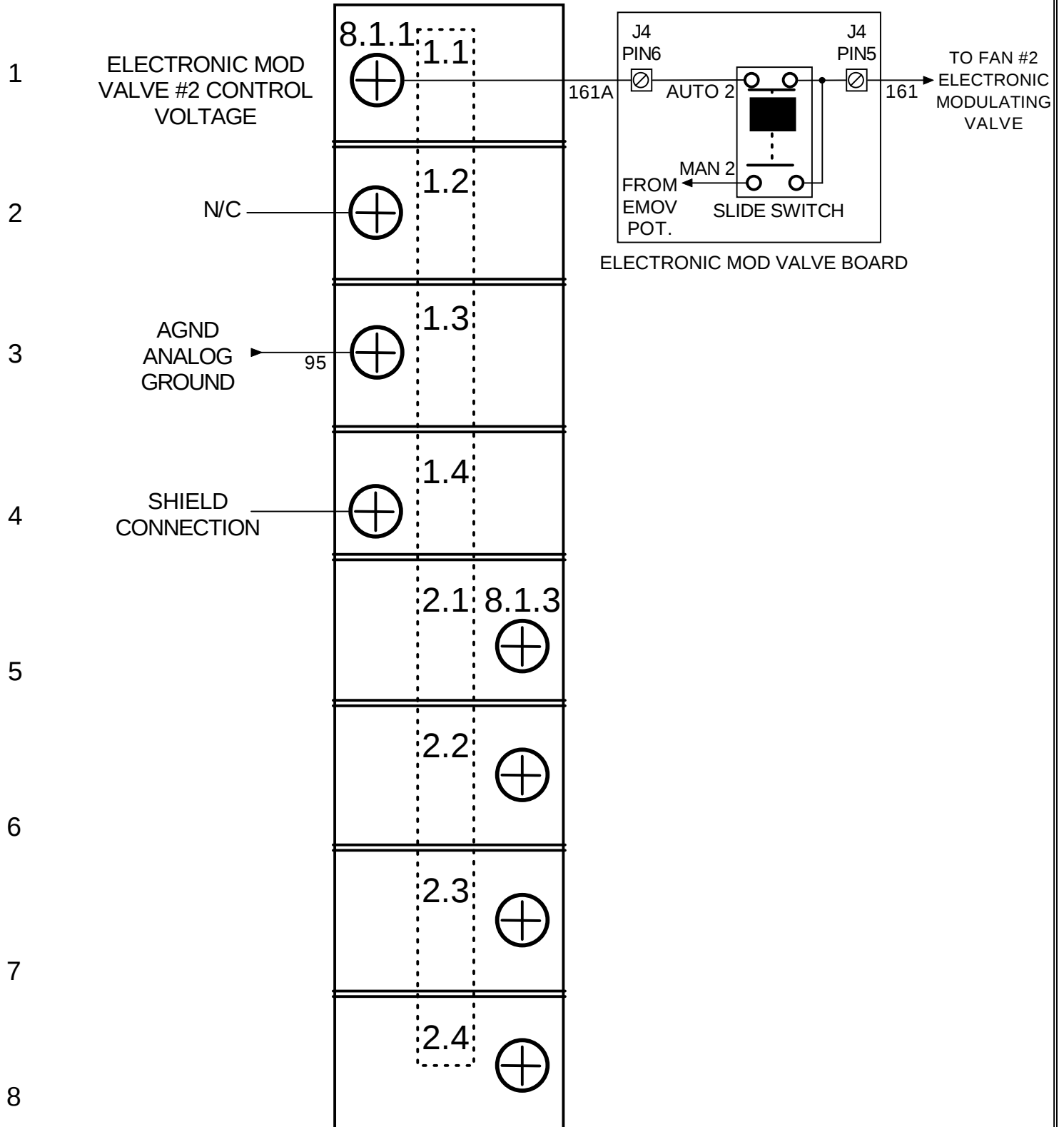
Sheet: 102.22

Revision:

SOFT START

ANALOG OUTPUT MODULE 8.1 (YELLOW)

THIS CARD IS 9.1 ON A TWO FAN STACK DRYER OR WHEN EQUIPPED WITH
A INPUT MOISTURE SENSOR



NOTE: Numbers inside of the box are terminal designators printed on the module.

Title: PORTABLE DRYER: TWO FAN & HEAT
ANALOG OUTPUT MODULE - 8.1

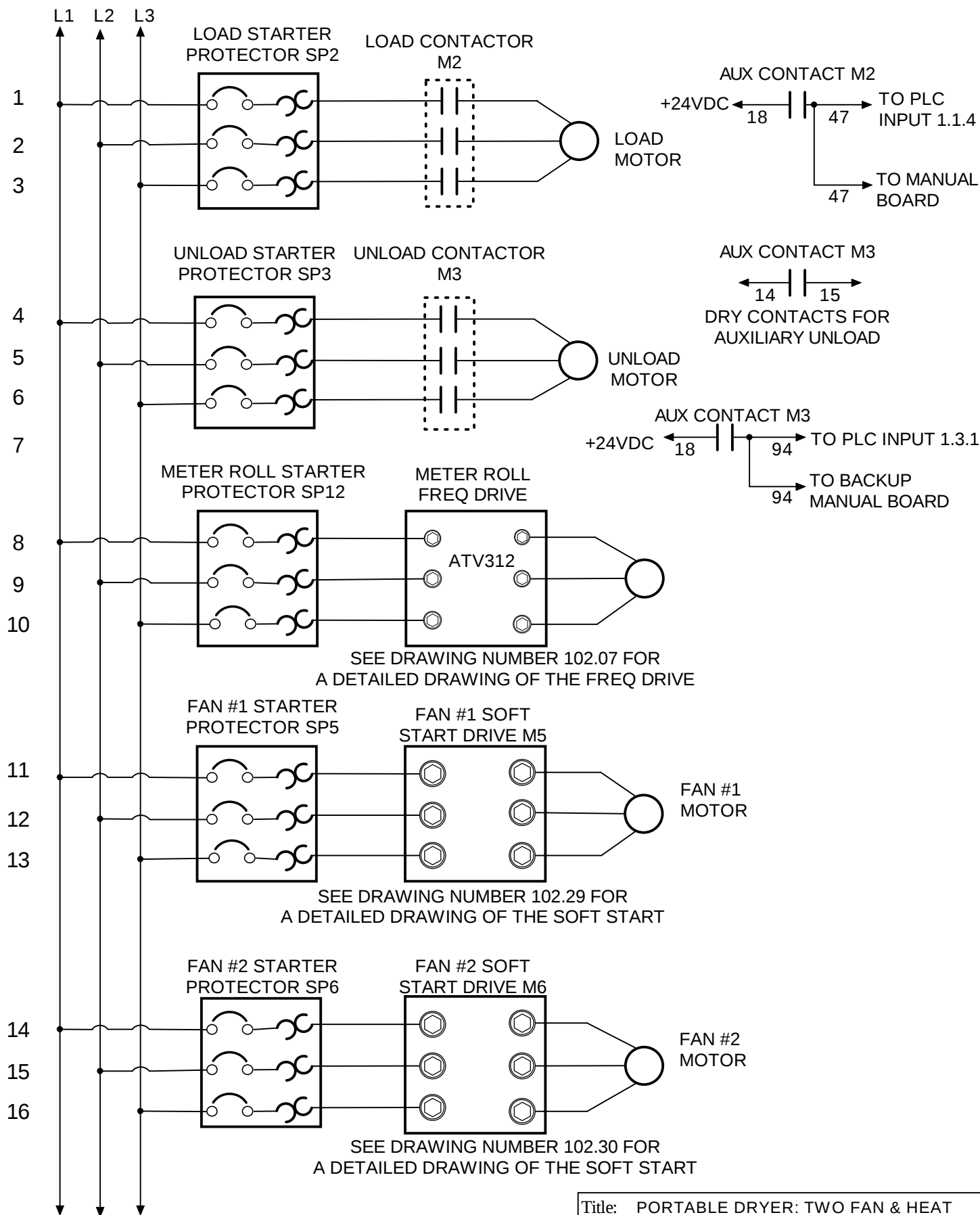
Author: SUKUP MFG CO

Date: 01/12

Sheet: 102.23

Revision:

SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT MOTOR CONTACTOR & RELAY WIRING

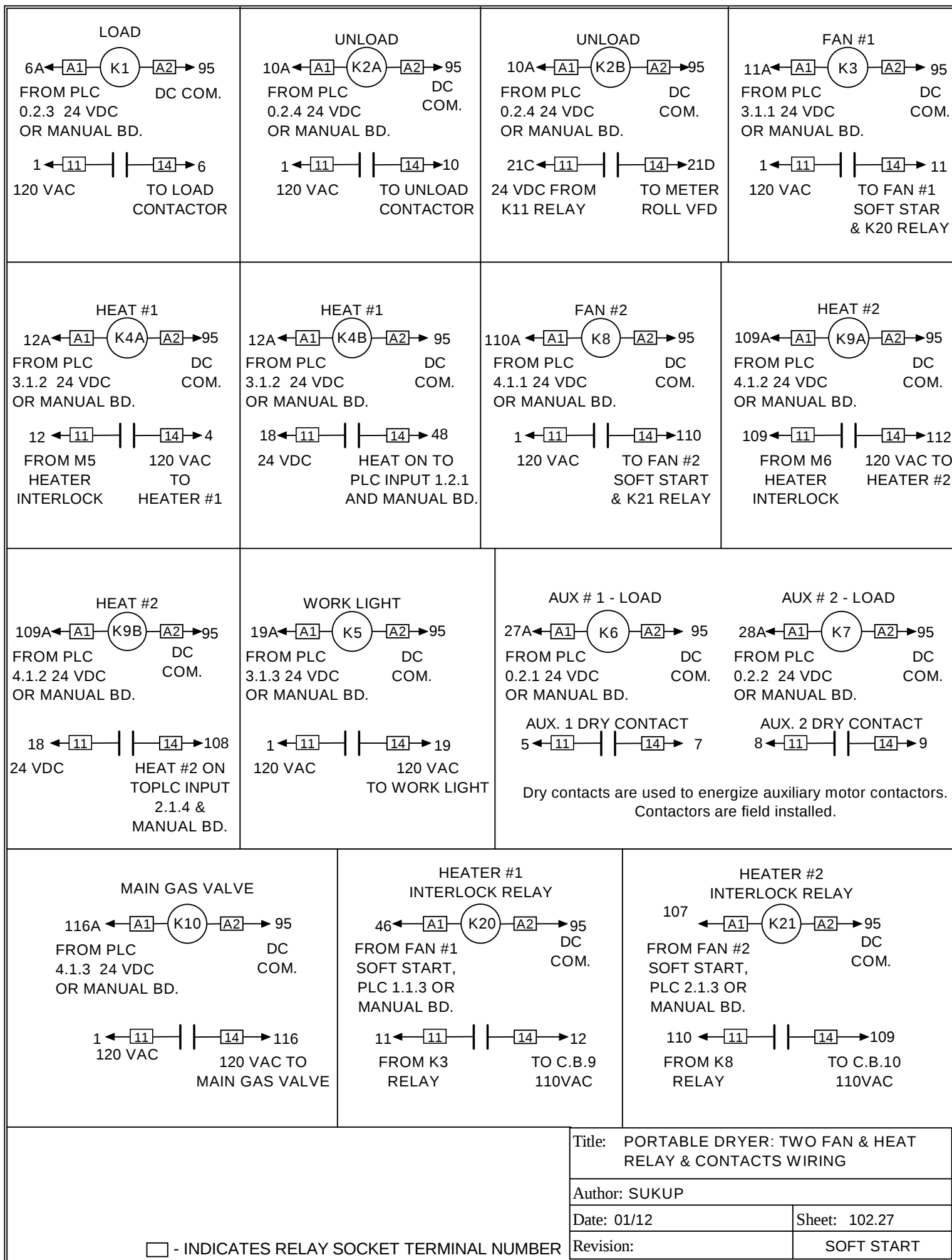
Author: SUKUP MFG

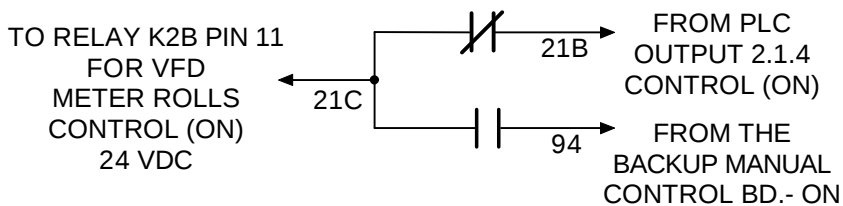
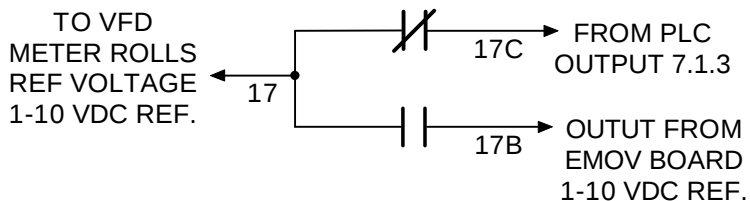
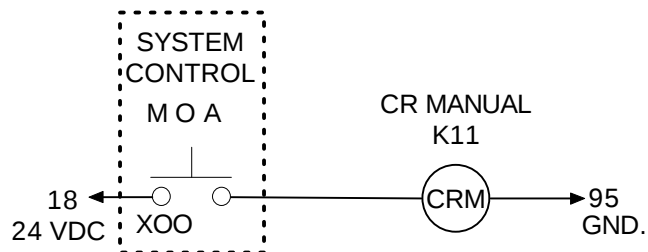
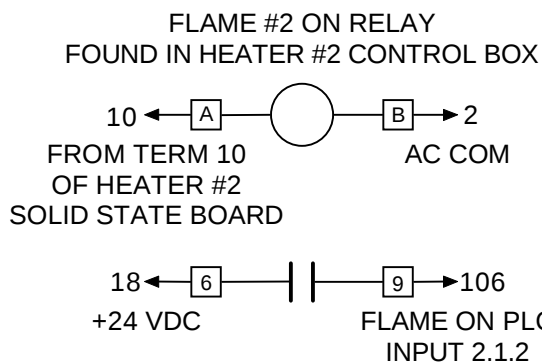
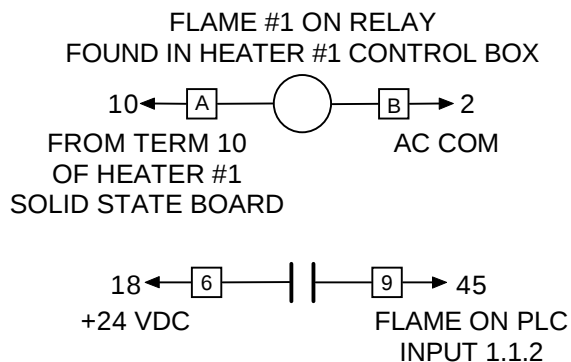
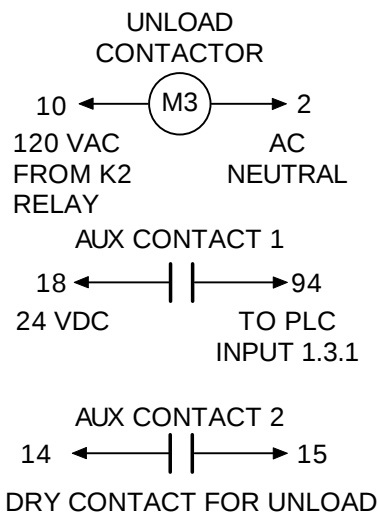
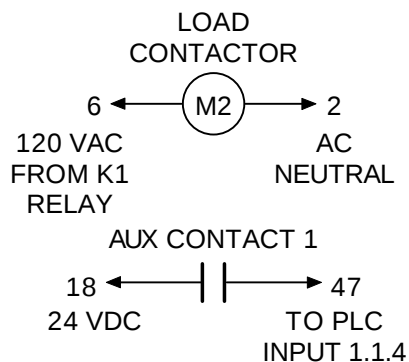
Date: 01/12

Sheet: 102.26

Revision:

SOFT START





□ - INDICATES RELAY SOCKET TERMINAL NUMBER

Title: PORTABLE DRYER: TWO FAN & HEAT RELAY & CONTACTS WIRING

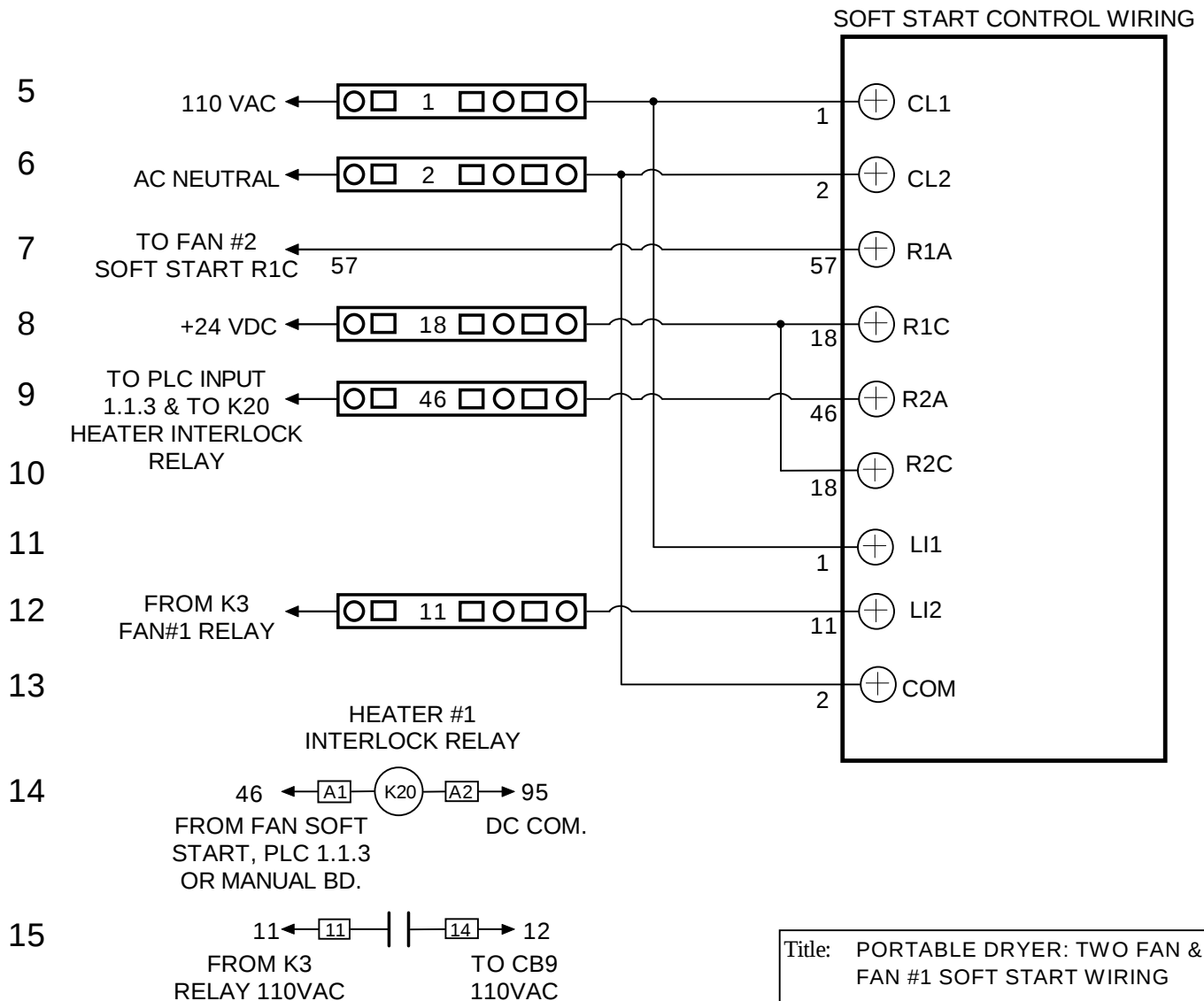
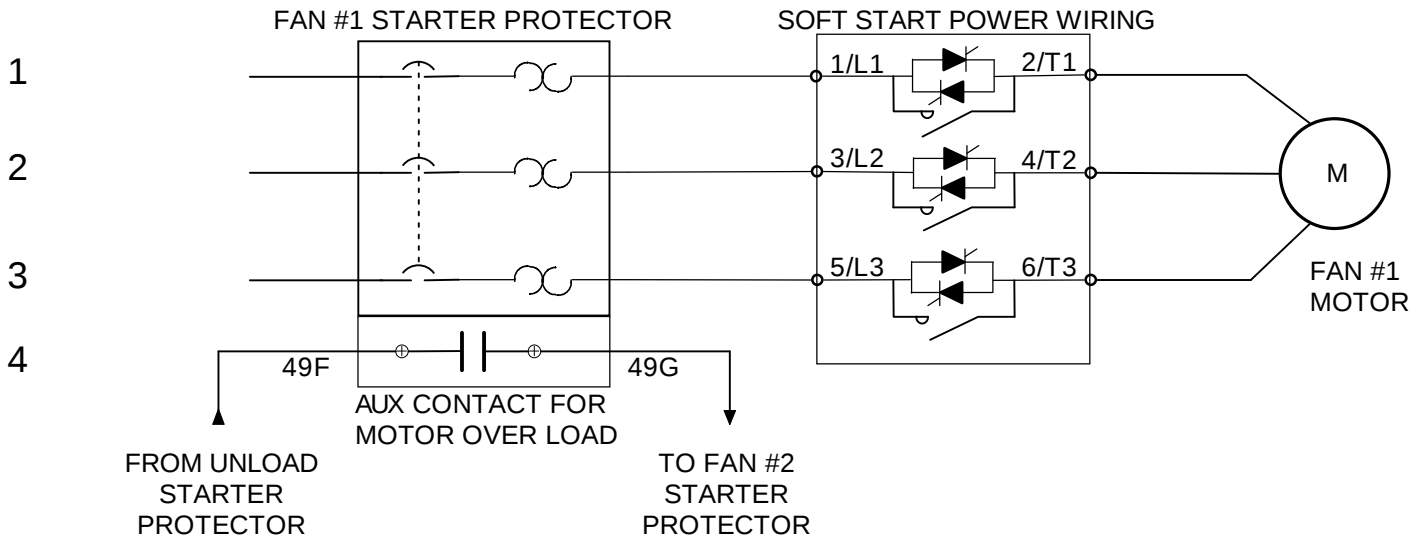
Author: SUKUP MFG

Date: 01/12

Sheet: 102.28

Revision:

SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT FAN #1 SOFT START WIRING

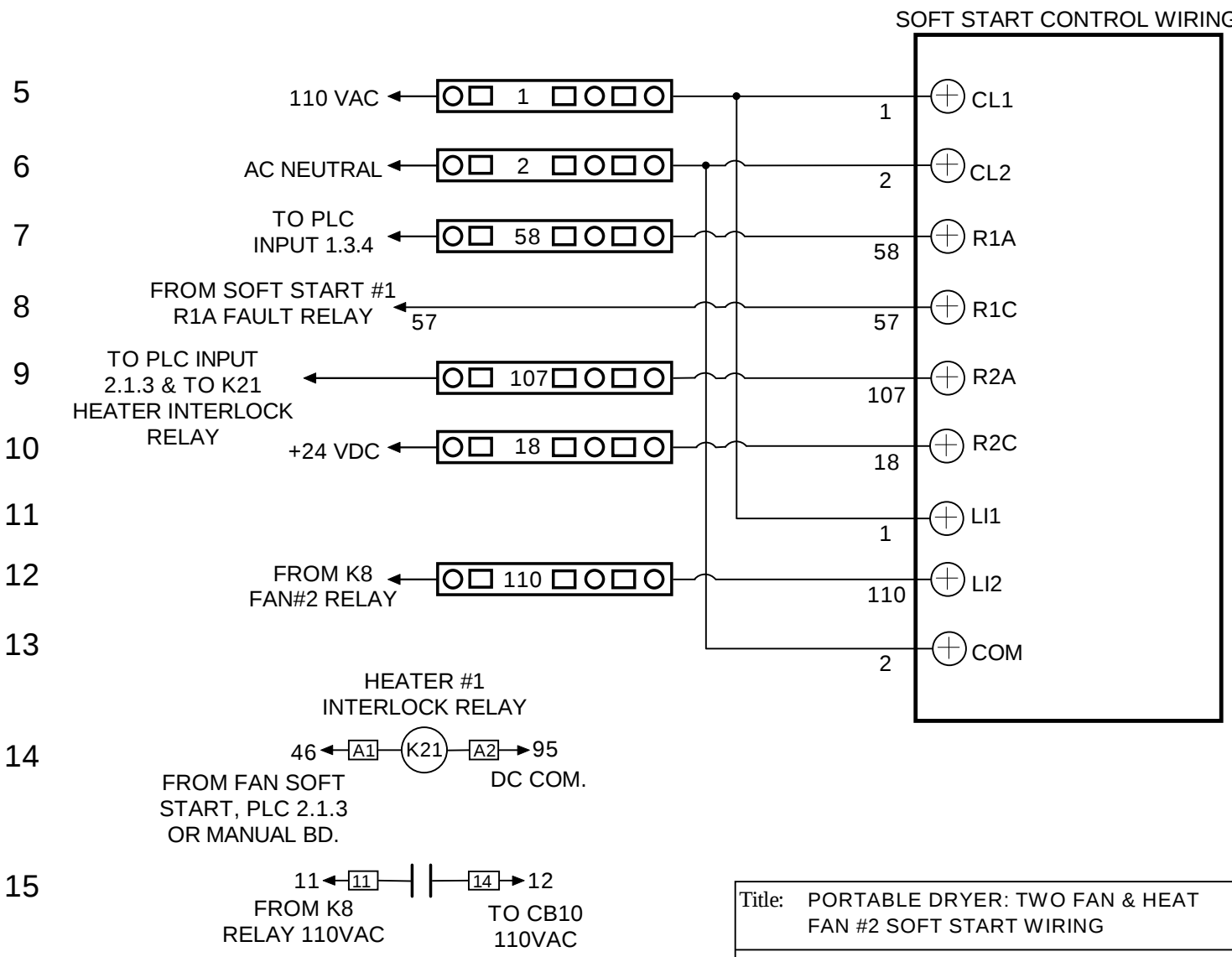
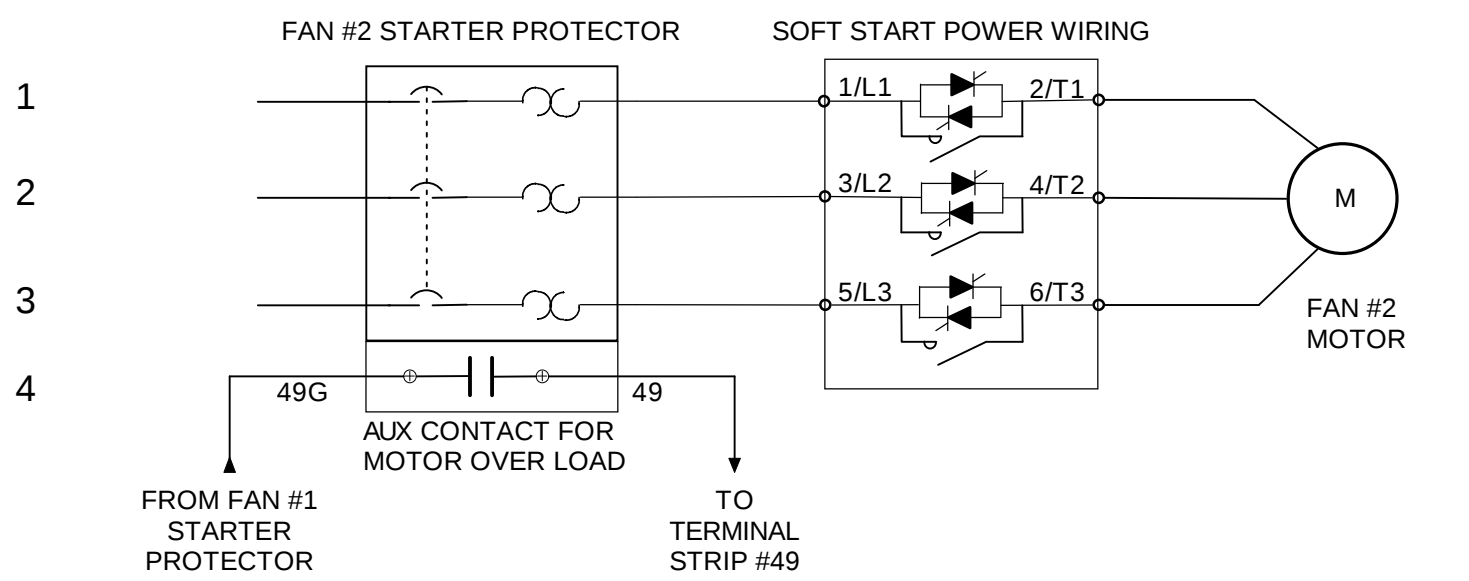
Author: SUKUP MFG CO

Date: 01/12

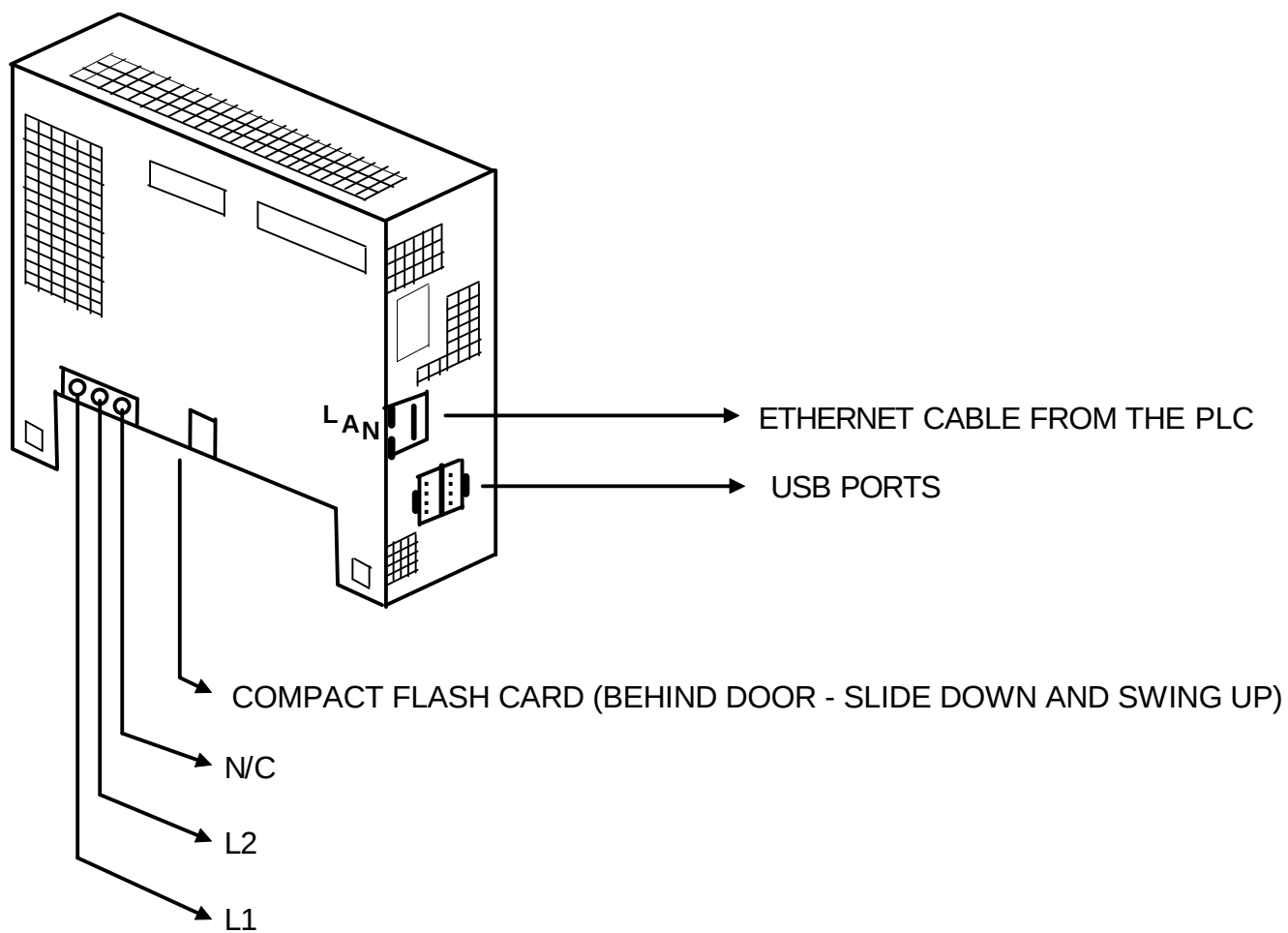
Sheet: 102.29

Revision:

SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT FAN #2 SOFT START WIRING	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.30
Revision:	SOFT START



Title: PORTABLE DRYER: TWO FAN & HEAT
HMI - TOUCHSCREEN

Author: SUKUP MFG CO

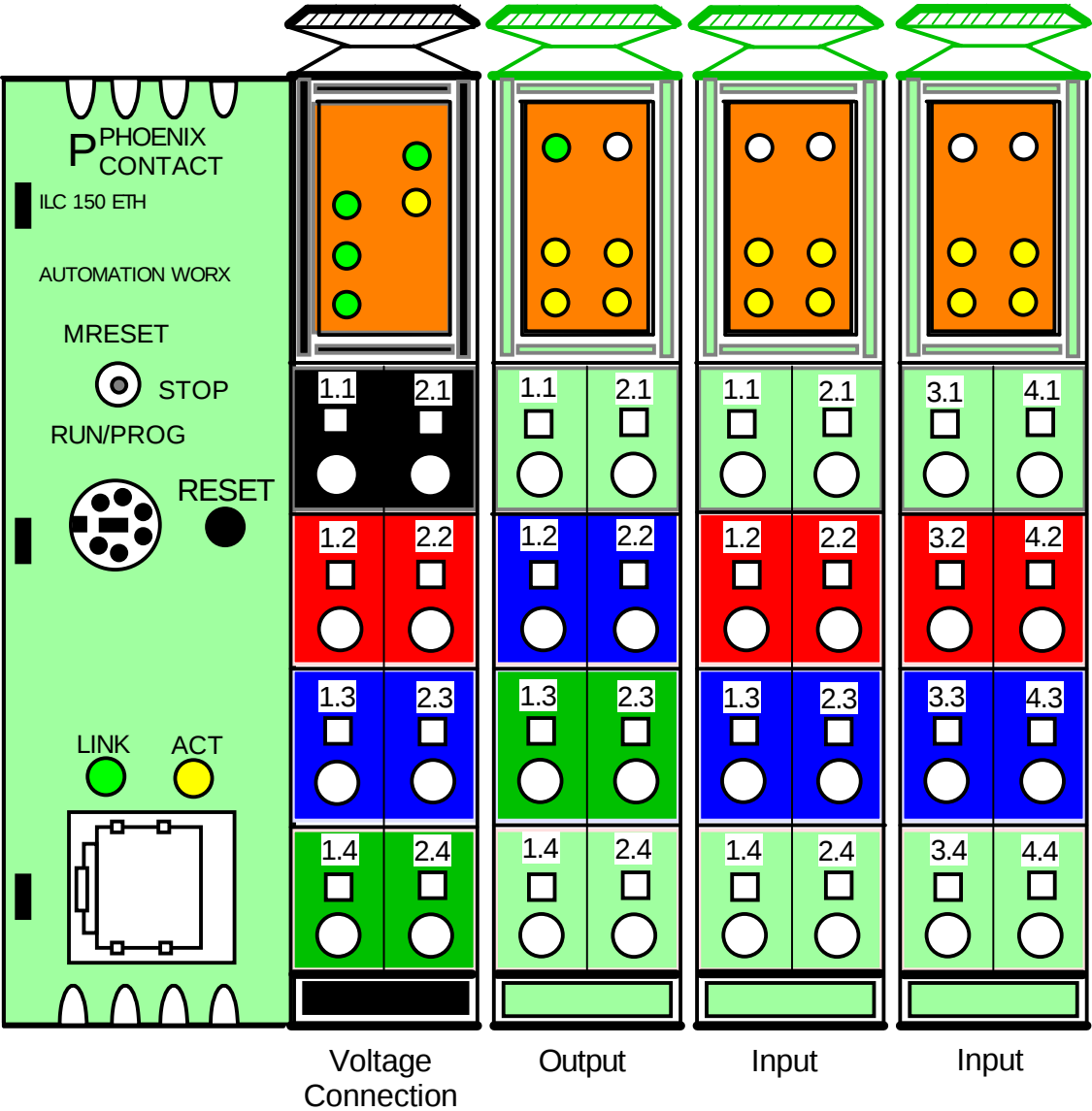
Date: 01/12

Sheet: 102.31

Revision:

SOFT START

PHOENIX CONTACT PLC MODULE ILC 150 (ORANGE)



Title: PORTABLE DRYER: TWO FAN & HEAT
PHOENIX CONTACT PLC - ILC150

Author: SUKUP MFG CO

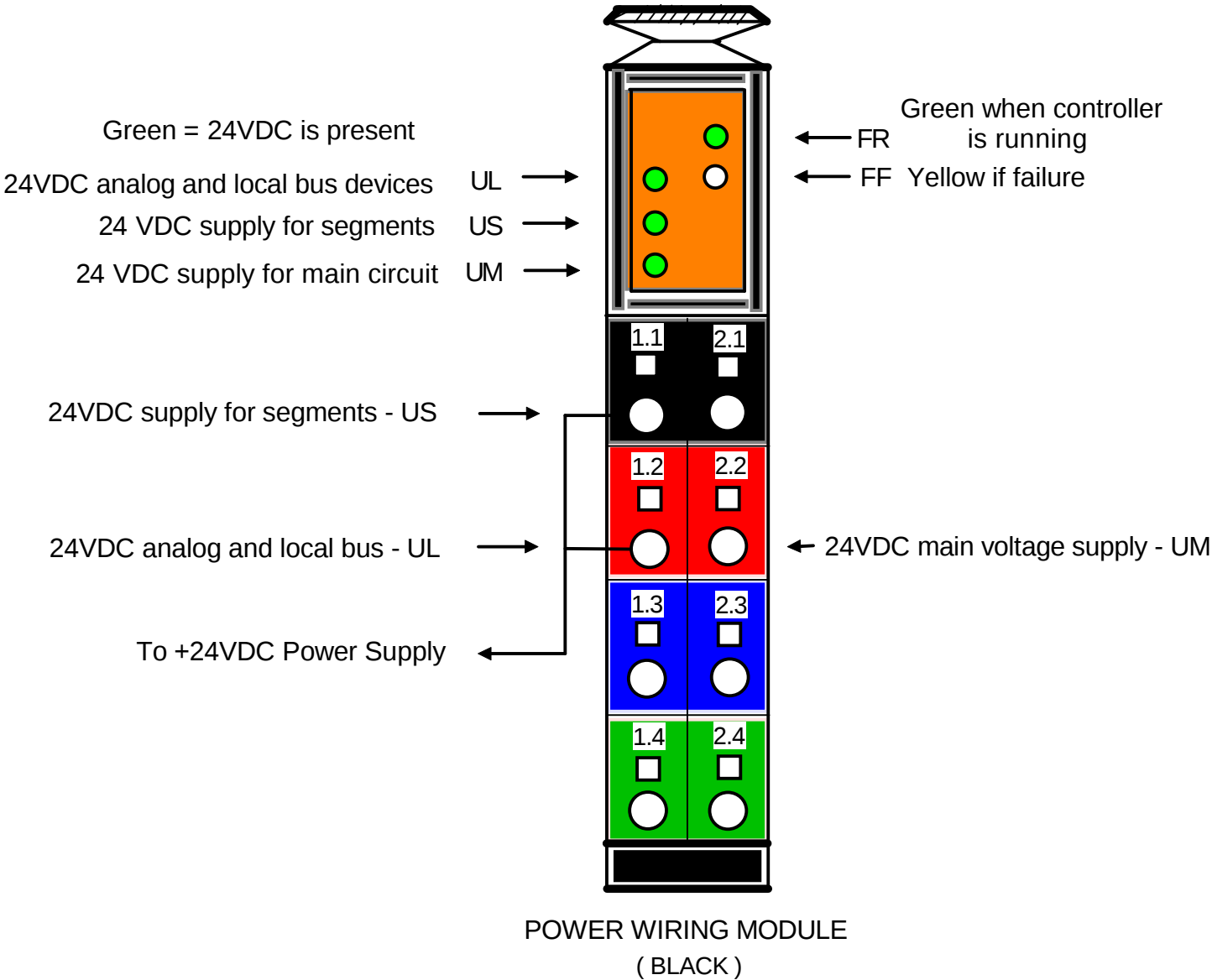
Date: 01/12

Sheet: 102.32

Revision:

SOFT START

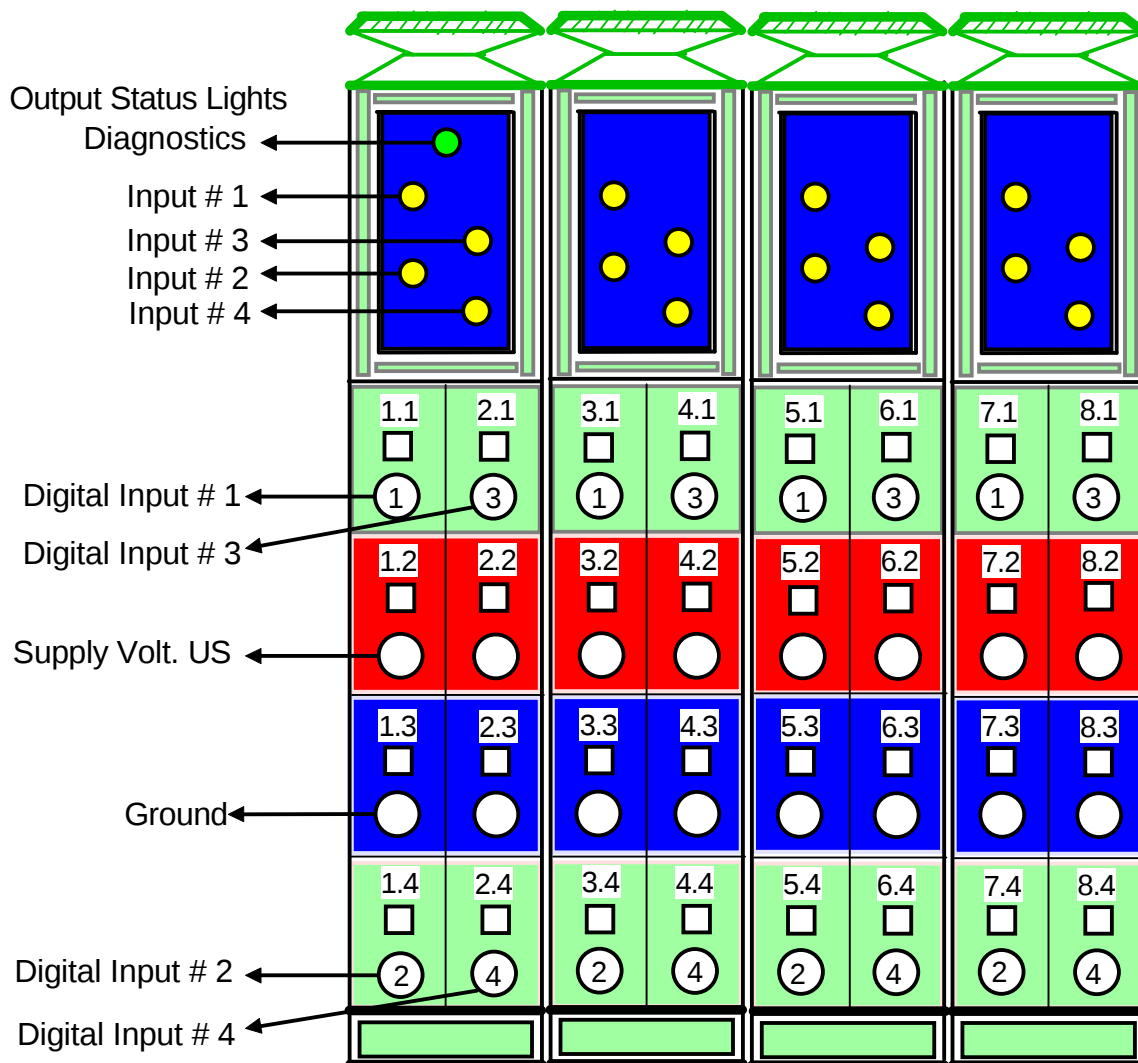
POWER SUPPLY CONNECTION FOR THE ILC 150 (ORANGE)



NOTE: This wiring module 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: TWO FAN & HEAT PLC POWER WIRING MODULE 24VDC	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.33
Revision:	SOFT START

DIGITAL INPUT MODULE - ILC 150 (BLUE)



DIGITAL OUTPUT MODULE - 16 INPUTS

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: TWO FAN & HEAT
DIGITAL INPUT MODULE - 16 INPUTS

Author: SUKUP MFG CO

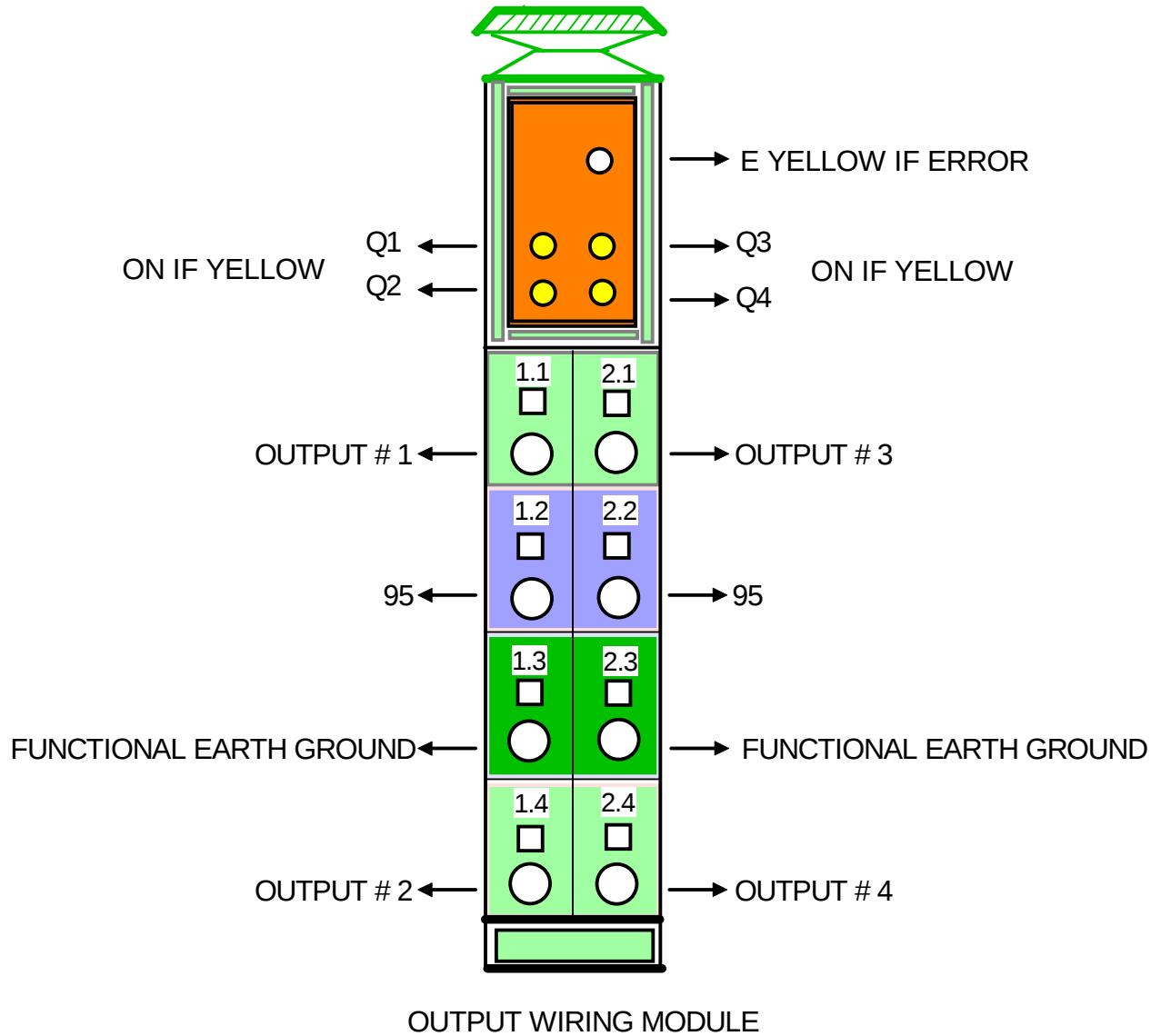
Date: 01/12

Sheet: 102.34

Revision:

SOFT START

OUTPUT WIRING ARM - ILC 150 (ORANGE)



Title: PORTABLE DRYER: TWO FAN & HEAT
OUTPUT WIRING MODULE

Author: SUKUP MFG CO

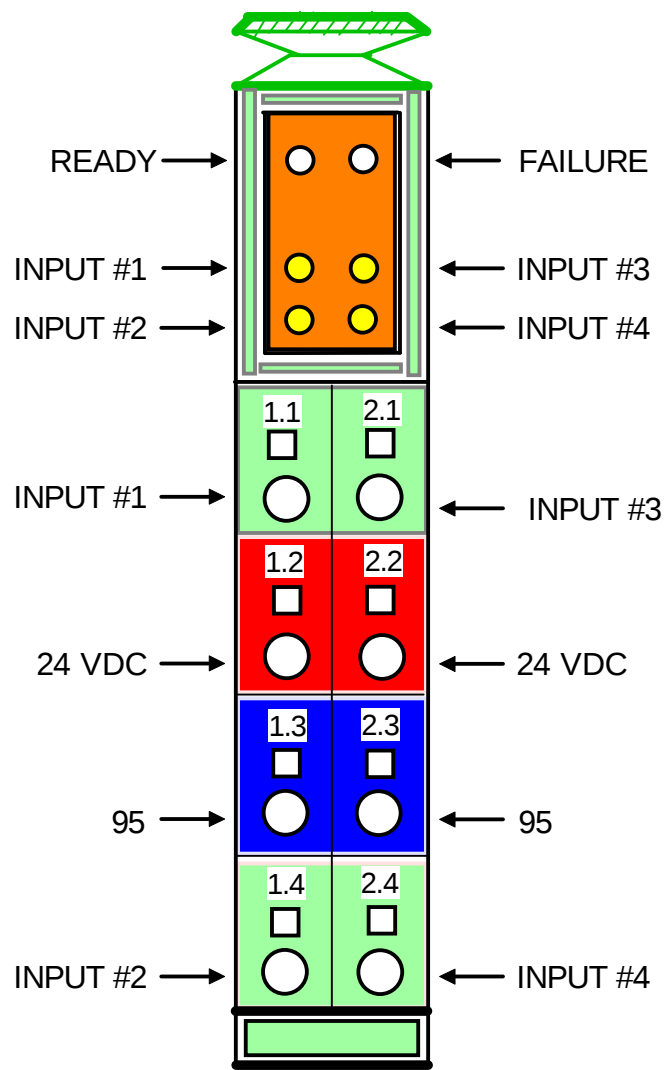
Date: 01/12

Sheet: 102.35

Revision:

SOFT START

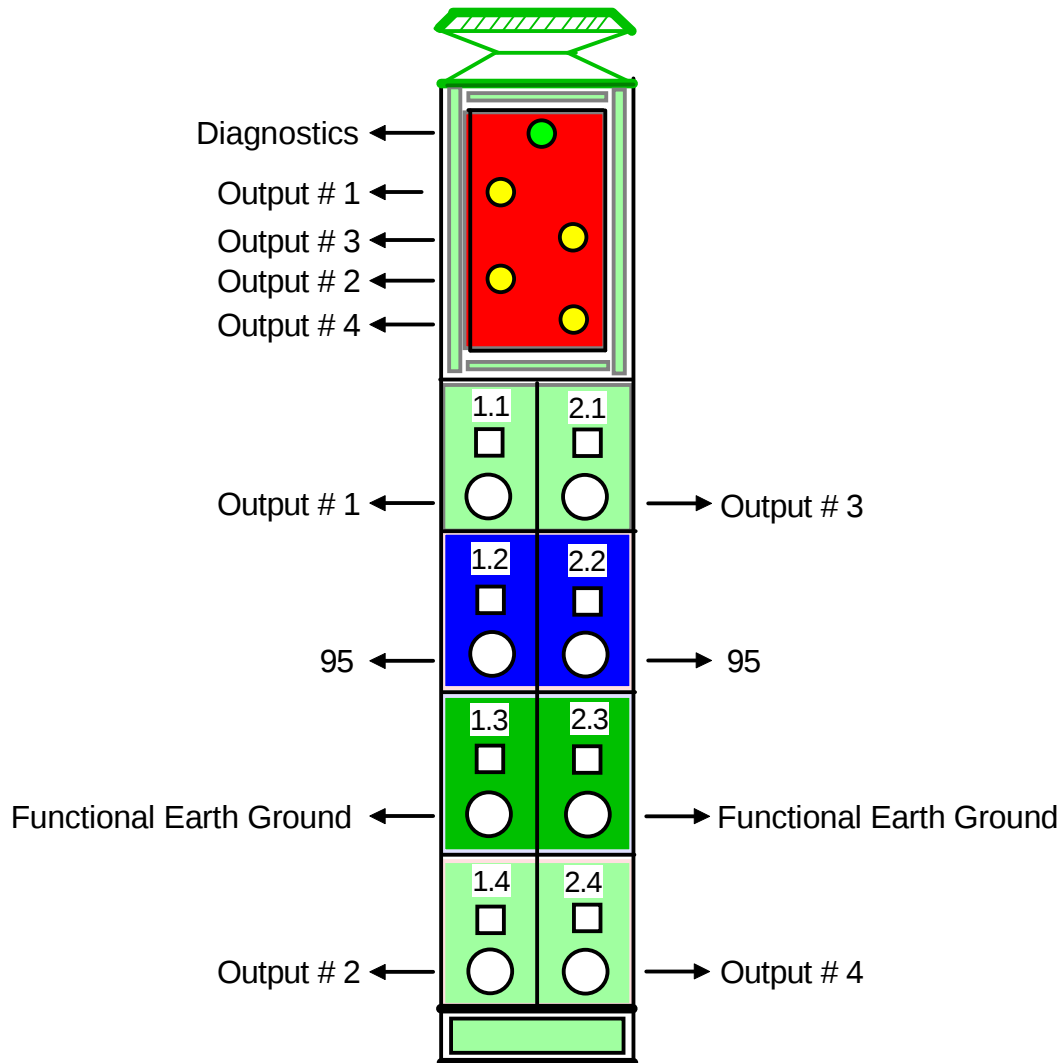
INPUT WIRING ARM - ILC 150 (ORANGE)



INPUT WIRING MODULE

Title: PORTABLE DRYER: TWO FAN & HEAT INPUT WIRING MODULE	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.36
Revision:	SOFT START

DIGITAL OUTPUT MODULE PLC - ILC - 150 (RED)



DIGITAL OUTPUT MODULE

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: TWO FAN & HEAT
DIGITAL OUTPUT MODULE

Author: SUKUP MFG CO

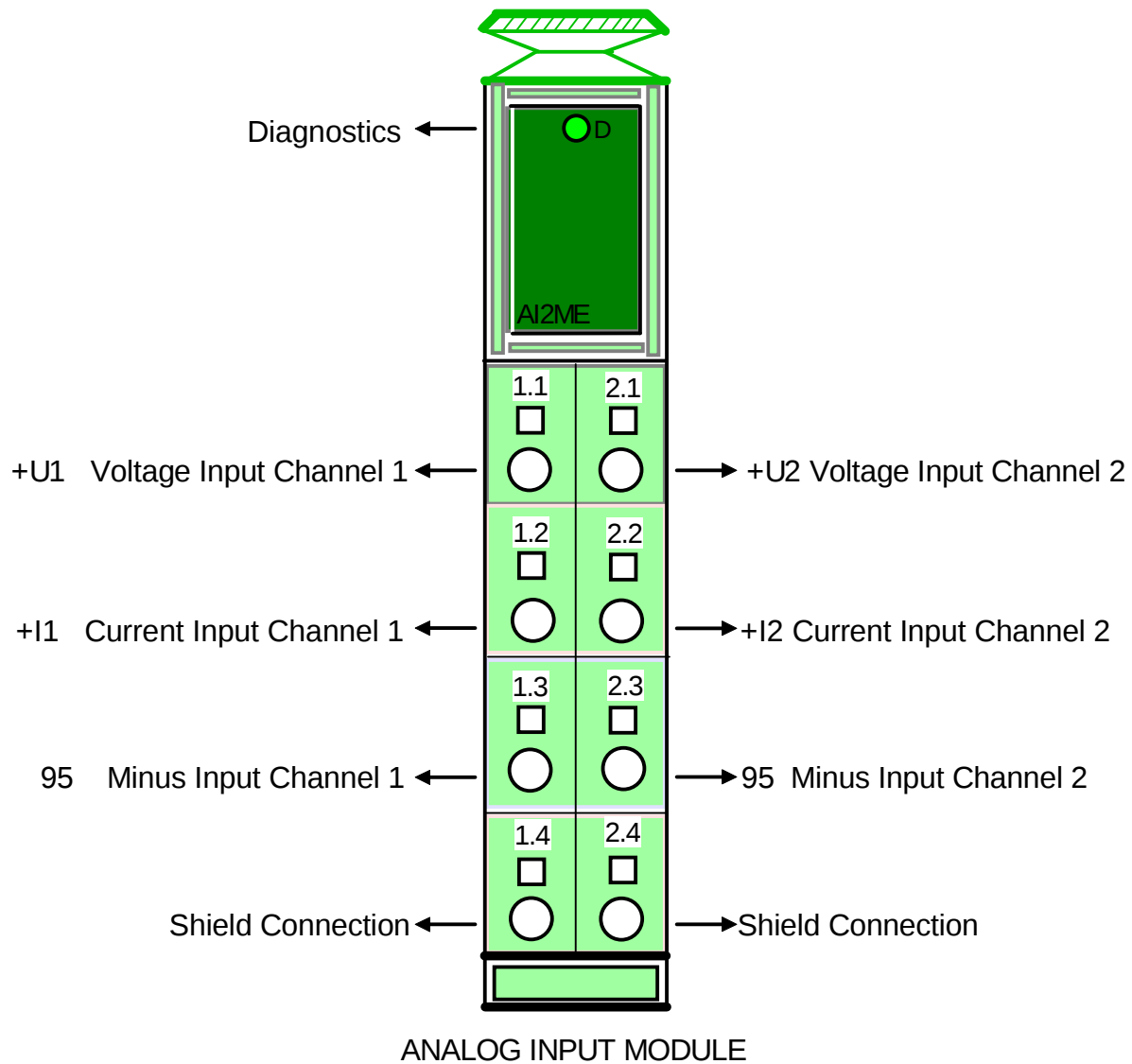
Date: 01/12

Sheet: 102.37

Revision:

SOFT START

ANALOG INPUT MODULE PLC - ILC 150 (GREEN)



Title: PORTABLE DRYER: TWO FAN & HEAT
ANALOG INPUT MODULE

Author: SUKUP MFG CO

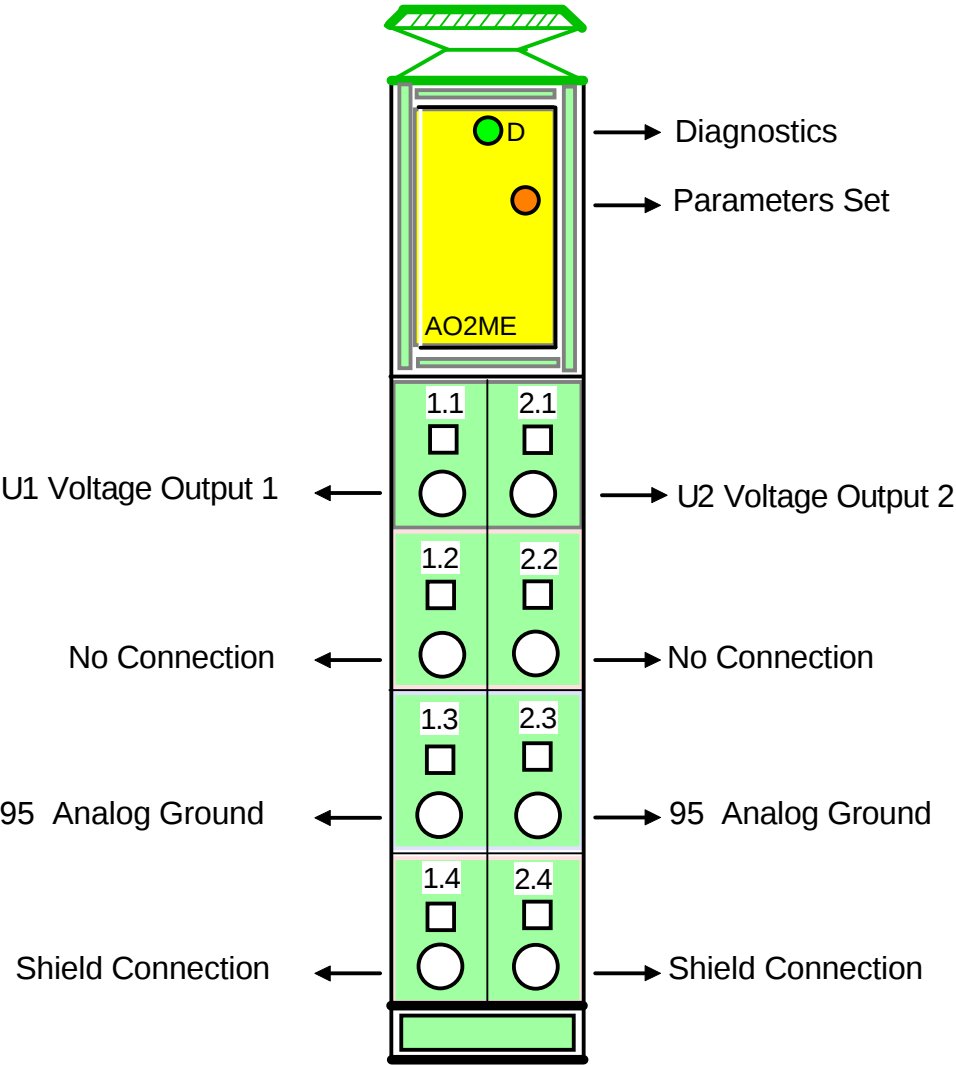
Date: 01/12

Sheet: 102.38

Revision:

SOFT START

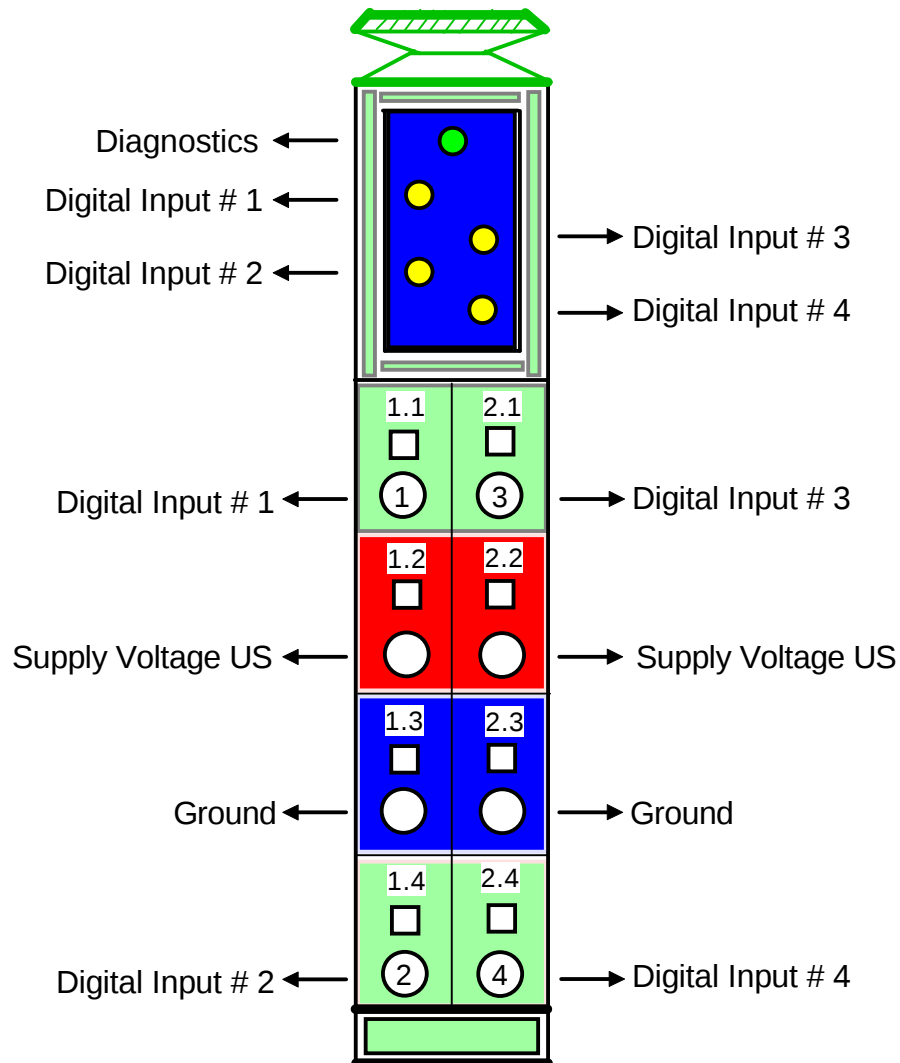
ANALOG OUTPUT MODULE PLC - ILC 150 (YELLOW)



ANALOG OUTPUT MODULE

Title: PORTABLE DRYER: TWO FAN & HEAT ANALOG OUTPUT MODULE	
Author: SUKUP MFG CO	
Date: 01/12	Sheet: 102.39
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: TWO FAN & HEAT
DIGITAL INPUT MODULE

Author: SUKUP MFG CO

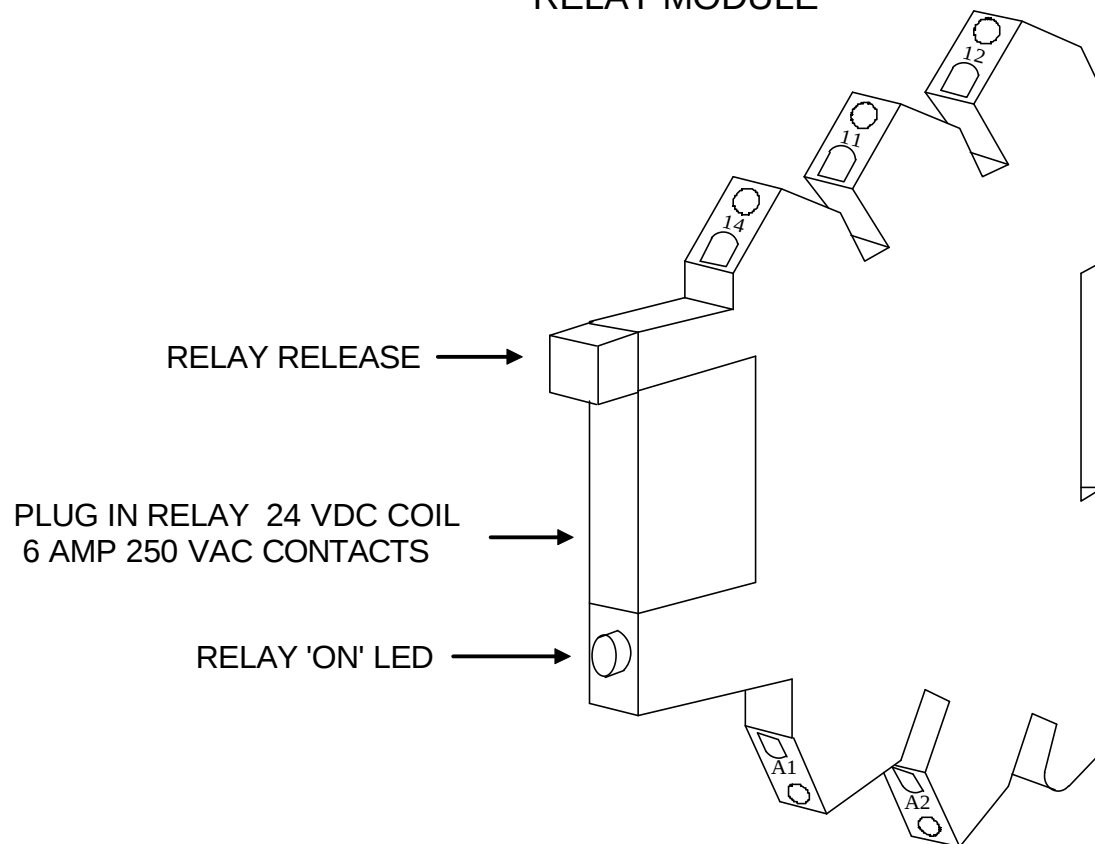
Date: 01/12

Sheet: 102.40

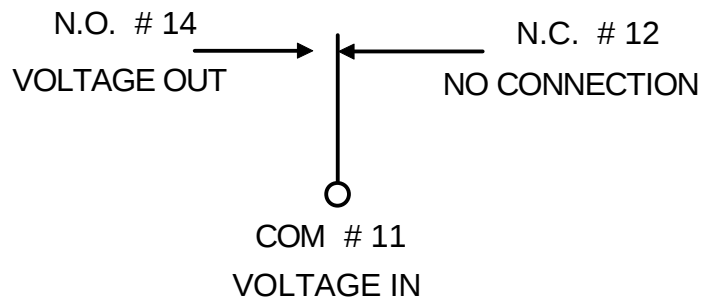
Revision:

SOFT START

RELAY MODULE



COIL - 24 VDC CONNECTIONS



Title: PORTABLE DRYER: TWO FAN & HEAT
RELAY 24V COIL, SINGLE POLE

Author: SUKUP MFG CO

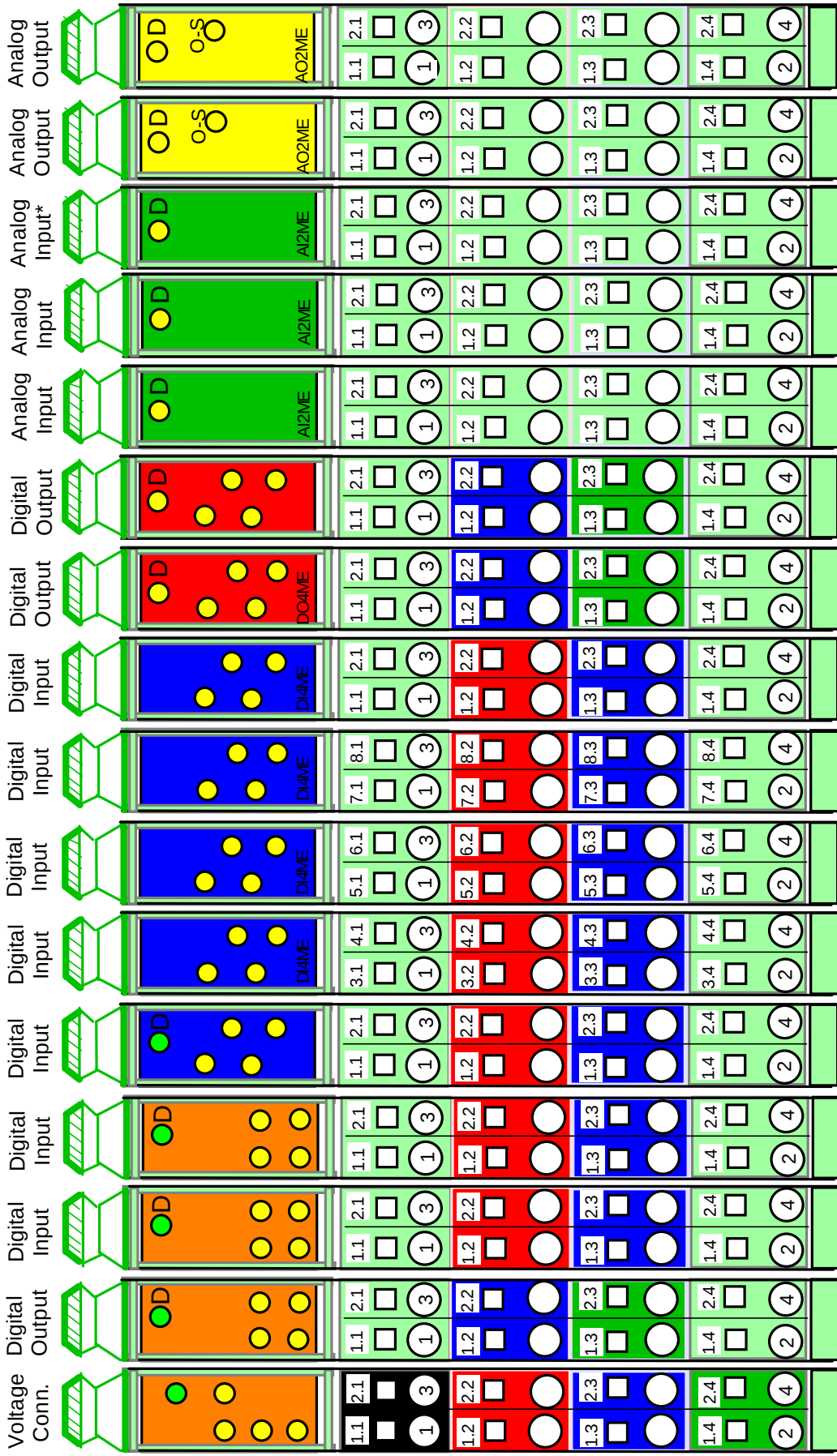
Date: 01/12

Sheet: 102.41

Revision:

SOFT START

BASE NUMBERING - TWO FAN PLC



	0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1
0.1.1	0.2.1	0.3.1	0.4.1		1.1.1	1.2.1	1.3.1	1.4.1	2.1.1	3.1.1	4.1.1	5.1.1	6.1.1	7.1.1	8.1.1	9.1.1
0.1.2	0.2.2	0.3.2	0.4.2		1.1.2	1.2.2	1.3.2	1.4.2	2.1.2	3.1.2	4.1.2	5.1.2	6.1.2	7.1.2	8.1.2	9.1.2
0.1.3	0.2.3	0.3.3	0.4.3		1.1.3	1.2.3	1.3.3	1.4.3	2.1.3	3.1.3	4.1.3	5.1.3	6.1.3	7.1.3	8.1.3	9.1.3
0.1.4	0.2.4	0.3.4	0.4.4		1.1.4	1.2.4	1.3.4	1.4.4	2.1.4	3.1.4	4.1.4	5.1.4	6.1.4	7.1.4	8.1.4	9.1.4

NOTE: 1st number = module #, 2nd number = segment # in that module, 3rd number = I/O # on that segment

* The third Analog input card just used when it is a two fan stack dryer or when a input moisture sensor is installed on the dryer.