

AXIAL GRAIN DRYER Continuous Flow / Automatic Batch QuadraTouch Pro[™] Dryer Control System **EU – Under Declaration of Incorporation**



OWNER'S OPERATION MANUAL

Sukup Manufacturing Co.

1555 – 255th Street, Box 677

Sheffield, Iowa USA 50475 Phone: 641-892-4222 Website: www.sukup.com E-mail: info@sukup.com

Fax: 641-892-4629

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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. That means producing top-quality products that will provide you with many years of satisfied ownership.

We back our products with experienced staff and the best customer service in the industry. Our dedicated employees have done their 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 many years of profitable, safe use of your Sukup Grain Dryer.

> Eugene, Charles, Steve and The Entire Sukup Family

> Sukup Manufacturing Co. Sheffield, Iowa, USA

Axial Fan Grain Dryer Owner's Operation Manual

This manual covers installation and operation of centrifugal fan dryers. It is comprised of several tabbed sections. The first provides safety information and identifies components of dryer. Others provide instructions for installation, operation, service and maintenance of dryer, and troubleshooting. Please read entire manual thoroughly before installation or operation. Check with dealer before each drying season for important updates.

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

Preliminary Information

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PO Box 677 Sheffield, IA USA 50475 Phone: 641-892-4222 Fax: 641-892-4629 E-mail: Info@sukup.com Visit us at: www.sukup.com

DRYER LIMITED 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, such as cosmetic (appearance) issues that will not affect life of product. 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, see reverse side.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR 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. SUKUP MANUFACTURING CO. MAKES NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

GRAIN DRYER WARRANTY PERIOD - Sukup warrants mixed-flow and cross-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.

REPLACEMENT PARTS WARRANTY PERIOD - Sukup warrants replacement parts (e.g. belts, sensors, rotating contacts, gearmotors, switches) purchased from Sukup for one (1) full drying season following purchase.

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 for a 2 year period from motor date code. Contact motor manufacturer for nearest location. If motor warranty is refused by a service center based upon date of manufacture, use the following procedure: Have motor repair shop fill out warranty report form as if they were providing warranty service. State on report reason for refusal. Send report, motor nameplate, and proof of purchase date (invoice from Sukup and invoice for your customer) to Sukup. If electric motor warranty is not satisfactorily handled by motor service center, contact Sukup for assistance. Sukup will attempt to obtain warranty from motor manufacturer, any credit obtained will be passed on. Warranty may also be obtained 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. Labor for removal of motor from fan not included.

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.

2/14/18

Safety Section



Read manual before installing or using product. Failure to follow instructions and safety precautions in manual can result in death or serious injury. Keep manual in a safe location for future reference.



On safety decals and throughout this manual, 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.

A WARNING

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

A CAUTION

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

NOTICE

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

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

FOLLOW MANUAL AND SAFETY DECAL MESSAGES

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



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

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit well maintained according to procedures in Service and Maintenance section. Keep shields in place. Replace worn or missing shields free of charge by contacting Sukup Manufacturing Co.



TRANSPORTING THIS EQUIPMENT ON PUBLIC ROADS REQUIRES PRECAUTIONARY MEASURES IN ORDER TO PREVENT AN ACCIDENT.

IMPORTANT: Trucker-transporter must provide approved safety chain when towing dryer.

If road travel is required, it is essential that safety measures are taken.

The following list offers helpful information, but it is best to consult state and local regulations to ensure complete compliance.

- Read and understand operator's manual
- 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
- Read safety procedures before moving units

Always strive to prevent accidents! Watch out for other vehicles. Use good judgment when transporting.

CHECK FOR OTHER VEHICLES WHEN TURNING

Be aware that two-thirds of roadway farm accidents occur while turning.

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

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 FOLLOW SAFETY GUIDELINES COULD CAUSE AN ACCIDENT RESULTING IN DEATH OR SERIOUS INJURY.



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 death or serious injury.

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.

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

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

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





Always LOCK OUT main power switch (Mains Isolater)

whenever equipment is not in use or when servicing unit. Check with voltage meter before servicing unit.



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 death or serious injury. 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 heed these warnings may result in death or serious injury.



WARNING: Augers, fans, and heaters will start without warning at appropriate times. Please use caution around dryer. **Failure to heed this warning may result in death** or serious injury.



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 death or serious injury.**







CAUTION: Metal edges are sharp. To avoid injury, wear protective clothing and handle equipment and parts with care. Failure to do so may result in minor or moderate injury.

PERSONAL PROTECTIVE EQUIPMENT

Owners/Operators are responsible for developing site-specific personal protective equipment standards.

These include, but are not limited to personal protective equipment for eyes, face, head, and extremities, as well as protective clothing and respiratory devices.

For a complete listing of OSHA's personal protective equipment standards go to www.osha.gov (29CFR 1910.132).



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 QUESTIONS OR CONCERNS

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

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

EMERGENCIES - KNOW WHAT TO DO

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

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



Risk reduction for servicing dryer

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

Please follow the safety guidelines before entering the plenum:

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



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

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

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

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

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

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



Safety Section

To prevent death or serious injury 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 death



or serious injury, follow general safety regulations.

Decal L0166 – WARNING: Keep guards and



screens in place. Disconnect electricity. Check fan blade.

5. Decal L0271 - DANGER: Shield missing, do



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



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.

7. Decal L0285 - WARNING: Not intended for Not intended for use on public roads. If road travel is required: • Read and understand operator's manual. Check and comply with state and local regulations Attach proper safety chain (see manual).

Use required warning flags, emblems or lights,

Do not exceed maximum safe transport speed (see manual).

Failure to do so may cause serious injury or death

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Reduce speed on rough ground or slopes.

0285-15

roads. If road travel is required, take these precautions:

use on public

8. Decal L02831 - WARNING: Lower and secure



parking stands before unhitching unit.



9. Decal L03061 - DANGER: Keep away when auger is ADANGER running! **KEEP AWAY when auger is running!** Entangle-Entanglement with rotating augers will cause serious injury or death! ment will ing Co. St

cause death or serious injury!

10. Decal L0520 - CAUTION: Failure to keep



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.

- Never operate heater without air flow. Heater needs to be electrically interlocked with fan to prevent a fire. ings may cause serious injury or o Gumus Maro ng Company Shaffals IA USA 1047

15. Decal L0204 - DANGER: Do not operate



with service door removed.

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L0164





AXIAL FAN GRAIN DRYER SAFETY DECAL PLACEMENT

Sukup

EU SAFETY LABELS

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

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



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



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Label #L5101 – Place near power disconnect of dryer.



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



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



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



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



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





Label #L5107 – Place near main power shut off.



L5108 Sukup Manufacturing Company Sheffield, IA USA Label #L5108 - Placed on axial fans.



Label #L5109 – Place near main power panel.



L5111 Sukup Manufacturing Company Sheffield, IA USA

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

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





HARNESS ANCHOR POINT BRACKET PLACEMENT



INSTALATION SHOWN ON SINGLE MODULE DRYER.

> SWCD0077 12/16/2011MCM



Training Register – Continuous Flow Grain Dryer

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

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

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

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



Emergency Shutdown Locations



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

Image 1 – Power distribution box

WARNING – High voltage will still present on bottom terminals of main switch in power distribution box (see Item 14 in Image 6) even if Main Disconnect is in "Off" position. To remove this voltage from power box, shut off main breaker ahead of dryer. Failure to follow this procedure could cause electrocution or shock resulting in death or serious injury.

above.



Image 2 – Main Disconnect



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 (Image 2) will shut down power to control systems. Power will still be present inside main power box as noted in warning

Image 2 shows Main Disconnect in "Off" position. Power is not present in system except as noted in warning

System Control switch is used to select between Manual or Computer (Automatic) operation of dryer. Turning to "Off" position will shut down power to both control systems. Power will still be present inside main power box as noted in warning above.

Image 3 – Emergency stop and system control switch

above.



Axial Fan Dryer Component Identification

Images 4 and 5 identify components on front (upper left) and back (lower right) of a single fan dryer.



Image 4 - Front of single-fan axial dryer

- 8. Wet bin (in transport position)
- 9. Rear door switch (EU shown -inset)
- 10. Plenum access door with viewing port
- 11. Column over-temp switch
- 12. Meter roll proximity switch
- 13. Rear junction box
- 14. Unload proximity switch
- 15. Discharge chute switch
- 16. Discharge moisture sensor

- 1. Main power box
- 2. Emergency Stop & System Control switches
- 3. Manual operation box (inside front panel)
- 4. Auxiliary box
- 5. Grain column over-temp switch
- 6. Air switch, plenum high limit capillary switch
- 7. RTD (plenum thermometer) box



Image 5 – Back of single-fan axial dryer



Power Box Component Location

Image 6 identifies major components of the power box.



Image 6 – Power box components

- 1. Variable frequency drive
- 2. Control transformer
- 3. Load contactor
- 4. Unload contactor
- 5. Hour meter
- 6. 24V power supply
- 7. Control/Heater circuit breakers (1- or 2-pole)
- 8. 24V DC relays
- 9. Fan starter protector
- 10. Programmable logic control (PLC)

- 11. Soft start w/ built-in bypass contactor
- 12. Feed-through terminals (AC or DC)
- 13. 5-port Ethernet switch
- 14. Main switch
- 15. Power distribution block
- 16. RTD transmitter
- 17. Meter roll starter protector
- 18. Load starter protector
- 19. Unload starter protector
- 20. Load, unload and meter roll connections

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

NOTICE

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



Pipe Train Component Identification

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



Image 7 – Pipe train components

- 1. LP inlet
- 2. Shut-off valve
- 3. Wye strainer
- 4. High-pressure pop-off valve
- 5. Liquid solenoid valve
- 6. Liquid vaporizer hose
- 7. LP vaporizer inlet (lower) and outlet (upper)
- 8. Vapor hose
- 9. Vapor over-temp switch location

- 10. Main (upstream) gas valve and actuator
- 11. Blocking (downstream) gas valve and actuator
- 12. High-pressure gas switch fitting
- 13. Electronic actuator (under cover) and butterfly valve
- 14. Pressure gauge
- 15. Pressure gauge
- 16. Valve-proving switch fitting location





Axial Fan Dryer Heater Component Identification

Image 8 – Burner, vaporizer coil and flame sensor rods

Image 8 shows octagon burner and vaporizer coil in axial-fan dryer. Also shown are flame sensor rod, spark plug/igniter and orifice location, all circled, and vane for side-to-side air flow/temperature adjustment.

Image 9 shows starfire burner and vaporizer coil for a 28" axial fan (flame sensor in oval).

NOTE: Difficulties may arise if heater on dryer is operated at low temperatures (60°F temperature rise or less). If there are rumbling sounds and/or flames are burning yellow instead of blue, pressure is too low and flame is burning back into port cup. If sustained operation at lower temperature range is desired, orifice and port cup on heater must be changed. Contact your Sukup dealer and see instructions in Service & Maintenance section of this manual.



Image 9 - Starfire burner for 28" fan



Heater Component Identification



Image 10 - Flame sensor



Image 11 – Plenum RTD and overtemp capillary



Image 12 – Plenum RTD tube and static air pressure switch

Image 10 shows flame sensor in H burner (on centrifugal dryer).

Image 11 shows plenum RTD (Resistance Temperature Detector) aluminum tube and plenum overtemp capillary (copper).

Image 12 shows plenum RTD tube and static air pressure switch.



Door Switch & Unload Auger Proximity Switch



Image 13 – Rear door switch

Image 13 shows rear door switch



Image 14 – Unload proximity switch

Image 14 shows unload auger proximity switch (at right in box) and rotating target.



Image 15 – Unload proximity switch mounted on jump auger

Image 15 shows unload auger proximity switch and rotating target mounted on jump auger



Main Switch, Emergency Stop Button



Image 16 – Latch and switch in "Off" position



Image 17 – Latch and switch in "On" position



Image 18 – Emergency stop button and system control switch

Image 16 shows power box latch (upper right) in open position and main switch (lower left) in "Off" position.

Image 17 shows power box latch (upper right) in closed position and main switch (lower left) in "On" position.

Image 18 shows emergency stop button and system control switch.



Moisture Sensor, Paddle Switch Box



Image 19 – Discharge moisture sensor

Image 19 shows moisture sensor mounted on bottom of discharge chute. It may also be mounted on optional jump auger assembly during dryer operation.



Image 20 – Paddle switch box in shipping position



Image 21 – Paddle switch box in operating position

Image 20 shows paddle switch box in shipping position.

Image 21 shows paddle switch box installed. It is placed on end of dryer opposite from fill hopper.



Component Identification

Cleanouts



Image 22 - Cleanout/inspection door



Image 23 – Inner plenum cleanout slide gate



Image 24 – Unload auger cleanout door cam lock



Image 22 shows lower plenum cleanout/inspection door.

Image 23 shows inner plenum cleanout slide gate.

Image 24 shows handle for unload auger cleanout door cam lock.

Image 25 shows partially open rear door for plenum cleanout/blowout.

Image 25 – Plenum cleanout/blowout doorEU – Axial Dryer Manual1 - 24



Take-Away Auger, Meter Roll Motor



Image 26 – Take-away auger



Image 27 – Meter roll motor



Image 28 – Meter roll proximity switch

Image 26 shows take-away auger with hanger bearing (circled).

Image 27 shows meter roll motor with gear reducer.

Image 28 shows meter roll proximity switch.



Service Doors, Shields

door



Image 29 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 30 – Unload auger service door

Image 30 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 31 – Load auger shield

Image 31 shows load auger shield. It is installed in field after motor is installed.



Touch Screen Controller Location

QuadraTouch Pro Controller



Image 32 – QuadraTouch Pro control screen

QuadraTouch Pro controller (see Image 32) should be mounted away from dryer and connected by industrial, direct-bury Ethernet cable. Cable is available in 50', 100', 150', and 200' lengths (J8720, J8721, J8722, J8723). Panel needs its own, independent 100VAC – 240VAC power supply.

Main power switch is on bottom, right-hand portion of box. See Image 42. When turned on, switch will illuminate to a green color. 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 corners of swing panel. See Image 32.

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

QuadraTouch Pro controller has an operating temperature of 10°F to 135°F (-12°C to 57°C) and a storage temperature of -4°F to 150°F (-20°C to 66°C). Outdoor placement is acceptable in most locations, but controller must not be left where temperature may be outside of storage range above. Cover of controller must be closed when unit is not in use.

QuadraTouch Pro controller comes with molded mounting brackets. These allow controller to be mounted directly onto wall or bench using four (4) screws.

NOTICE: If location where controller is mounted is not heated, unit must be taken into a temperature-controlled environment when not in use.



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 914.4mm (3 feet) clearance from other structures on side of dryer and 1524mm (5 feet) minimum clearance from other structures at fan inlet.
- 6. Minimal handling distances needed for load and unload systems
- 7. Locate dryer and storage bins 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 .914mm (3-feet) minimum clearance, or where load and unload augers can contact power lines.



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

Foundation

DISCLAIMER: Sukup Manufacturing Co. assumes no responsibility regarding the foundation specifications. This is not an engineered foundation and shall not be constructed as such. The specifications given are intended for quoting and estimating purposes only. It shall be the sole responsibility of the customer to obtain actual foundation drawings designed by and constructed to the specifications of a licensed professional structural engineer with knowledge of the actual soil and load specific to the project and location. Consideration should also include, but not be limited to, live loads, dead loads, wind loads, soil bearing loads, seismic zone, proper moisture run-off on top of base, and types of aeration applied for the project.

Sukup Manufacturing Co. will not be responsible for any damage to a product, including, but not limited to, any damage that results from poor soil conditions or inadequate concrete type, grade, bearing strength, and construction method. Soil bearing tests must be performed by a competent, independent, engineering firm. Concrete foundation construction must be done by a competent concrete contractor.



Concrete Pad for Single-Module Dryers

A reinforced concrete pad is recommended for dryer stability. Table 2-1 provides basic quoting guidelines for materials required for each size dryer pad. Quantities are approximate and requirements may vary due to site elevations. See Fig. 2-1 for foundation rebar quoting specifications.

See pages 2-9 through 2-11 for support leg locations for axial dryers.

Dryer Size In Feet	Concrete Pad Size Centimeters (Feet)	Cubic Meters (Yards) of Concrete
16'	366 cm x 792 cm (12' x 26')	5.6 (7.3)
20'	366 cm x 914 cm (12' x 30')	6.4 (8.4)
24'	366 cm x 1036 cm (12' x 34')	7.2 (9.4)
28'	366 cm x 1158 cm (12' x 38')	8.0 (10.5)

Table 2-1 – Concrete pad dimensions for axial dryer

Foundation



Fig. 2-1 – Foundation specifications for single-module dryer (requirements may vary due to site elevations)



Concrete Pad for Stacked Dryers

A reinforced concrete pad is mandatory for dryer stability. Table 2-2 provides basic quoting guidelines for materials required for each size dryer pad. Quantities are approximate and requirements may vary due to site elevations. See Fig. 2-2 for foundation rebar quoting specifications.

Dryer Size In Feet	Concrete Pad Size Centimeters (Feet)	Cubic Meters (Yards) of Concrete
16'	366 cm x 792 cm (12' x 26')	17.8 (23.3)
20'	366 cm x 914 cm (12' x 30')	20.4 (26.7)
24'	366 cm x 1036 cm (12' x 34')	23 (30.1)

See pages 2-11 through 2-12 for support leg locations for stacked axial fan dryers.

Table 2-2 – Pad dimensions for stacked axial dryer










Plan View for Stacked Dryers

- 1. Pad must be 10" deep with 36" wide by 36" deep footings along each side.
- 2. Use #4 reinforcing rods 1 ft. on centers. Use in both directions in pad and bottom of footing.
- 3. Minimum soil bearing capacity = 2000 PSF
- 4. Concrete specifications:
 - A. Compressive strength at 28 days = 4000PSI
 - B. Minimum cement content = 6 sacks per yard
 - C. Maximum slump = 4 inches +/- 1 foot

See Fig. 2-4 for minimum rebar specifications and recommended fuel and electrical service locations for **stacked axial dryer**.



Fig. 2-4 – Minimum rebar specifications and recommended fuel and electrical service locations for stacked axial dryer



Dimoneional Drawinge





Fig. 2-4 – Dimensional drawing



Dryer Hitch with 24" Extension

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



Fig. 2-5 – Dryer hitch with extension

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T16310D	HITCH RECEIVER WELDMT, JACK
2	1	T43711	HITCH INSERT WELD, 24" EXT
3	1	T4372	CLEVIS WELD
4	3	J0822	SCREW, ¾-10 X 5" LG.
5	3	J1220	³ ⁄ ₄ " LOCKWASHER
6	3	J1051	¾-10 HEX NUT
7	2	J08361	BOLT, 7/8-9 X 6 ½" LG
8	2	J1222	7/8" LOCKWASHER
9	2	J1059	7/8-9 HEX NUT
10	6	J0730	SCREW, 1/2 -13, 1.50,PLT,GR5,HHCS
11	6	J1215	1/2" LOCKWASHER,PLT,SPLIT
12	6	J1040	NUT, ½ - 13,PLT,GD5,HEX

Table 2-3 – Dryer hitch with extension – Parts list

Dryer Set-up/Supports

NOTICE

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. See Fig. 2-6.

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



Fig. 2-6 - Cross support braces and rear stand

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 (1828.8 mm).
- Support under front hitch
- Fasten dryer down to foundation using brackets or turnbuckles.

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

Ladder extensions are included with the 3-foot (910mm) and 4-foot (1220mm) leg extension kit. The same length of ladder extension is supplied with the 4-foot kit as the 3-foot kit. For the 3-foot kit, cut off excess ladder length for your application.

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



Support Leg Locations for Axial-Fan Dryers

Drawings on this and following pages show proper support leg and lift bracket locations for 16', 20', 24' & 28' axial dryers. Lift ONLY with Sukup lift bracket or equivalent.



Fig. 2-8 – Leg locations for 20' axial dryer



Support Leg Locations for Axial-Fan Dryers (continued)

SPT0052 10/19/05DDV





Fig. 2-10 – Leg locations for 28' axial dryer



Lift Bracket Locations for Axial Dryers

WARNING: Do not station a crew member at a location where he/she could be struck by a module that is being lowered into place. Workers should be aware that wind can blow modules lifted by crane, potentially striking or crushing a person. Failure to follow this precaution could result in death or serious injury.

Drawings on this and following pages show proper lift bracket locations for 16', 20', 24' and 28' axial dryers. Lift ONLY with Sukup lift bracket or equivalent.



Fig. 2-11 – Lift bracket locations for 16' axial dryer (Approx. dryer weight: 9,000 lbs.)







Fig. 2-13 – Lift bracket locations for 24' axial dryer (Approx. dryer weight: 14,000 lbs.)



Lift Bracket Locations for Axial Dryers (continued)



6 lift points are required.

(Approx. dryer weight: 16,000 lbs.)



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 and national code requirements.

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

Fuel Information

LIQUID PROPANE

Sukup dryers using liquid propane must be connected to a supply tank to draw liquid from bottom of tank. Tank should be 3785.4 liters (1,000 gallons). Connection to dryer should be with a flexible hose designed for LP gas. Have LP gas supplier make proper connections and install safety controls.

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

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

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

Fuel System Specifications for AXIAL DRYERS

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW L/HR (GAL/HR)	FUEL LINE SIZE (MINIMUM UP TO 100') MM (IN)
16 FT, SINGLE HEATER	6,000,000	246 (65)	12.7 (1/2")
16 FT, 2 MODULE	13,000,000	537.5 (142)	19.1 (3/4")
20 FT, SINGLE HEATER	7,000,000	287.7 (76)	12.7 (1/2")
20 FT, 2 MODULE	16,500,000	681.4 (180)	19.1 (3/4")
24 FT, Single Heater	10,000,000	412.6 (109)	19.1 (3/4")
24 FT, 2 MODULE	20,000,000	825.2 (218)	25.4 (1")

LIQUID PROPANE

Table 2-4 – Liquid propane specifications



Image 2-1 - LP-fueled axial dryer

- 1. See Liquid Propane table above for recommended line size.
- 2. Open LP shut-off valves slowly to prevent inadvertent closing of excess flow valves.
- Fuel flow and line size in table above assume a temperature of 10°F (-12.2°C) or higher.

Connection to liquid manifold on dryer

NATURAL GAS

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

Fuel System Recommendations For AXIAL DRYERS NATURAL GAS

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW L/HR (CUBIC FEET/HR)	FUEL LINE SIZE Minimum up to 100' MM (IN)
16 FT, SINGLE HEATER	6,000,000	169,901 (6000)	38.1 (1-1/2")
16 FT, 2 MODULE	13,000,000	368,119 (13,000)	63.5 (2-1/2")
20 FT, SINGLE HEATER	7,000,000	198,218 (7000)	50.8 (2")
20 FT, 2 MODULE	16,500,000	467,228 (16,500)	63.5 (2-1/2")
24 FT, SINGLE HEATER	10,000,000	283169 (10,000)	50.8 (2")
24 FT, 2 MODULE	20,000,000	566,337 (20,000)	63.5 (2-1/2")

Table 2-5 – Natural gas specifications



See table above for recommended line size.

Connection to natural gas manifold on dryer

Image 2-2 – Natural gas-fueled axial dryer



Wet Bin Assembly



Fig. 2-15 – 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. 2-15.
- 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. See Fig. 2-16.

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

NOTICE

NOTICE

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



Fig. 2-16 – 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. 2-16.



Wet Bin Assembly (Continued)



Fig. 2-17 – Fill hopper installation at front of wet bin (16' dryer shown)

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. 2-17 for front-fill and Fig. 2-18 for rear-fill dryer.



Fig. 2-18 – Fill hopper installation at rear of wet bin (16' dryer shown)



Top Load Auger Motor and Shields



Fig. 2-19 – 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. 2-19.



Fig. 2-20 - 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. 2-20.



Top Load Auger Motor and Shields (Continued)



3. Slide shaft collars on each side of wet holding bin plate. See Fig. 2-21.

Fig. 2-21 - 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. 2-20.
- 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. 2-20.
- 7. Bolt motor to motor mount using 5/16 x 1" bolts and 5/16" nuts and washers. See Fig. 2-20.
- 8. Bolt inner shield to upper and lower brackets using 5/16" bolts, washers, and nuts. See Fig. 2-20.
- Attach a 10.8 cm O.D. pulley to motor shaft with a key and attach pulley to top load auger with a taper lock bushing. Use straight edge to align pulleys. Attach two B95 belts between auger pulley and motor pulley. Tighten turnbuckle to tighten belts See Fig. 2-21. Tension belts so it takes about 2.7 kg. (6 lbs.) pressure to deflect belt 1/2" at center of belt span.
- 10. Final assembly should appear as in Fig. 2-20 (Shown without front shield).



Fig. 2-22 - Final assembly (without front shield)

- 11. Slide outer shield around inner shield and attach with six (6) 5/16 x 1" bolts. See Fig. 2-22.
- 12. Check and retighten all fasteners.



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.

Fig. 2-23 - Sticker L0903

Overload circuit is intentionally disconnected in motor because overload protection (starter protector) is located in power box on dryer. A sticker, L0903, is attached to motor showing how to make wiring connections. See Fig. 2-23.



QuadraTouch Pro Controller



Image 2-4 – QuadraTouch Pro controller

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

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

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

Cable L	Comp #		
Meters	Feet	Comp. #	
15	50'	J8720	
30.5	100'	J8721	
46	150'	J8722	
61	200'	J8723	

Table 2-6 – 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 Pro controller is contained in a sealed enclosure, it's a good idea to mount controller in a shed or other shelter.

QuadraTouch Pro controller has an operating temperature of 10°F to 135°F (-12°C to 57°C) and a storage temperature of -4°F to 150°F (-20°C to 66°C). Outdoor placement is acceptable in most locations, but controller must not be left where temperature may be outside of storage range above. Cover of controller must be closed when unit is not in use.

4. QuadraTouch Pro controller comes with molded 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, unit must be taken into a temperature-controlled environment when not in use.



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, 2.44 m (8 feet) long and 1/2-inch diameter.

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

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



Operation

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DATE	REVISIONS	PAGES
02/07/2018 - Updated location of manual or	peration controls	8
08/17/2017 – Added moisture sensor calibra	ation instructions	
08/17/2017 – Added moisture sensor calibra	ation instructions	o 3



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

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

Introduction

Sukup Grain Dryers are 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 a Sukup Grain Dryer. QuadraTouch Pro control 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 Software Manual in appendices of this manual.** Most every question can be answered by consulting that section.

NOTE: Grain variety, maturity level, cleanliness, weather conditions and operation can all affect performance and/or capacity of dryer. To the extent possible, be aware of different varieties of grain being fed into dryer, as no two varieties dry identically.

DISCLAIMER: In addition to general capacity ratings and disclaimers, drying capacity of centrifugal dryer may decrease significantly from values in product literature as air intake louvers increase vacuum pressure. Adjust position of louvers to change vacuum pressure to optimal levels of grain temperature and moisture content.

General Dryer Operation

This section briefly describes normal dryer operations.

IMPORTANT: Before starting dryer, refer to Dryer Startup section in Appendix E. To follow processes step by step, consult Software Manual in appendices 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 Pro 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.



Calibrating Discharge Moisture Sensor

IMPORTANT: Calibrating discharge moisture sensor to desired output moisture will help ensure proper drying of grain. It works best to calibrate sensor when actual grain moisture is as close to desired target moisture as possible. For instance, if 16% corn is desired, sensor should be calibrated when actual grain moisture is 16%.

It may be necessary to do an initial calibration when actual grain moisture is wetter or dryer than desired target, then another calibration when grain is at or near target moisture. Do this by running dryer in Continuous Flow for 30 minutes (or after Stabilization period) and then taking a sample from spout and checking it with an external moisture sensor known to be accurate. If readout is more than half a percentage point different than what dryer is showing (for instance, 17.5% moisture vs. 16.5%), dryer's sensor must be recalibrated. See recalibration steps under Tools Menu heading in Software Manual (Appendix G).

Take samples and check dryer's moisture sensor a few times a day. If it's off by .5% or more, put unload on pause, remove sensor from dryer and check for any dust or debris buildup on sensor or metal tube around sensor. Replace sensor and resume unloading. Check moisture again. If it's still off by .5% or more, calibrate sensor again.

During continuous flow mode, QuadraTouch Pro 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, user simply enters Final Dry function and follows instructions on control panel screen.

When resuming 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. 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 grain 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 use 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. Refer to software manual for additional options in this mode.

Manual Operation

Manual operation serves many purposes. If operator wants complete control of dryer, manual operation fulfills this need. After pressing "Start" on main screen, user can select

"Manual Operation" to run dryer as desired. User can turn on fan(s), heater(s), load and unload motors. Dryer uses paddle switches to automatically load dryer during manual operation while user has control of meter roll speeds and plenum temperature.

Final Dry

In "Final Dry" mode, dry time and unload time are set by operator to finish drying grain. Temperature is based on previous settings. When wet bin is empty and dryer can no longer be filled with wet grain, Final Dry is used to dry last batch of grain through drying system. Dryer will heat the last batch and then shut fans and heaters off and unload the grain.

Dry Fire

"Dry Fire" mode provides a way to run dryer when there is no grain. It is recommended this mode be used to test dryer at start of **EVERY SEASON**. "Dry Fire" allows use of burner without need for air switch to confirm air pressure. This mode is NOT to be used for drying grain; only as a means of inspecting pipe train for leaks and component integrity and confirming overall heater operation.



Vaporizer Coil Adjustment (LP Models Only)



CAUTION: If vaporizer is not adjusted correctly, piping could be hot. Ensure proper adjustment to avoid burn resulting in minor or moderate injury.



Image 3-1 – Vaporizer adjustment bracket on axial-fan dryer

Select Dry Fire mode to operate fan and heater when there is no grain in dryer. After dryer has been allowed to run and plenum temperature has stabilized, vaporizer outlet (top) should be warm but not hot to touch.



Fault Condition Vapor Over-Temp

If vapor side of pipe train is hot, or if dryer has shut down due to a "Vapor Over-Temp" fault, vaporizer may need to be moved away from flame. To adjust vaporizer on axial or centrifugal dryer, loosen both pivot bracket bolts (top and bottom) and then pivot vaporizer out of flame as necessary to regulate temperature at vaporizer outlet. U-bolts that hold vaporizer to adjustment bracket

can also be loosened and vaporizer can be moved in or out. Viewing hole is provided to watch vaporizer adjustment.

If vaporizer is freezing up, loosen bolts as described above and move vaporizer toward flame instead of away from it.

Tighten all hardware after adjustment.



Manual Operation Controls

Images 3-2 and 3-3 show controls found in Main Power Box.



Image 3-3 – Manual electronic mod valve control board

To operate in Manual mode, System Control Switch on side of main power box must be turned to Manual.

See Plenum Temperature table in Appendix A for initial approximate meter roll speed and plenum temperature based on amount of moisture to be removed.

NOTE: Discharge moisture sensor will not be functional in Manual mode. Moisture of grain will need to be checked by an alternate means.

If a fault light comes on, see Troubleshooting section to fix fault. To reset manual control board, make sure all toggle switches are turned down, then press white Reset button.

IMPORTANT: Be sure to push Auto/Man switches back up to run dryer in Automatic mode.

Service & Maintenance

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Sensor Removal and Installation

Discharge Moisture Sensor T6035



Image 4-1 – Discharge moisture sensor

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. Disconnect cable from sensor using quick-connect coupler. See Image 4-2.
- 6. Replace protective caps on sensor and cable.



Image 4-2 – Quick-connect coupler

- 1. Remove protective caps from cable and sensor.
- 2. Finger-tighten cable to quick-connect coupler on new sensor.
- 3. Place new sensor into grain discharge tube. Secure sensor by tightening holding clamp.
- 4. Connect ground strap to dryer frame and tighten nut.



Grain Discharge Chute Switch T17988



Image 4-3 – Grain discharge chute switch

Installation:

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

This device is used to detect a plugged takeaway 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 4-22.
- 3. Remove cover.
- 4. Disconnect switch wires from dryer wiring.
- 5. Remove switch.



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

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

Removal:

- 1. Turn power off at power box.
- 2. Locate paddle switch junction box, found on right side of wet bin. See Image 21 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.



Fig. 4-1 – Grain discharge chute switch

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



Unload Auger Proximity Switch

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



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 4-4.
- 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 4-22) and remove cover.
- 6. Disconnect proximity switch wires from dryer wiring.

Image 4-4 – Unload auger proximity switch

- 1. Obtain a new switch and remove first lock nut. Slide switch into hole and secure with lock nut just removed.
- 2. Adjust gap between proximity switch and rotating target. **IMPORTANT:** Gap between tip of rotating target and proximity switch must be no greater than 1.6mm (approximate width of Kroner or Euro).
- 3. Route wiring in same manner as before and connect proximity switch wires to dryer wiring: blue to # 95 black; brown to # 18 orange; black to # 96 red.
- 4. Turn power on at power box and turn system control switch to COMPUTER. Go to Start Menu on QuadraTouch Pro and select Manual Operation. Touch 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 J5901



Image 4-5 - Vaporizer over-temp switch

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

Removal:

- 1. Turn power off at power box.
- 2. Locate vaporizer over-temperature switch on heater pipe train. See Image 4-5.
- 3. Loosen U-bolt and screws that hold sensor in position.
- 4. Follow wiring to heater box and remove cover.
- 5. Disconnect red # 18 wire attached to heater housing hi-limit switch. A new crimp terminal end can be used.
- 6. Disconnect other red wire.

- 1. Put new over-temperature switch in same position as old switch. Secure by tightening switch screws and U-bolt nuts. Be careful not to over-tighten.
- 2. Route new switch wiring to heater control box.
- 3. Attach red # 18 wire to heater housing hi-limit switch.
- 4. Re-attach other red wire.
- 5. Replace cover.



Image 4-6 - Vapor Over-Temp Switch



Rear Door Interlock Switch J4487 Key with chain F6991



Image 4-7 – Rear door interlock switch

Installation:

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

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

Removal:

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



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



There is one on each side of dryer, running horizontally through grain columns to monitor temperature. Junction boxes containing switches are located outside front end of plenum.

Junction boxes housing other ends of sensors are shown as Item 11 in Image 5 of Component Identification section.

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

Image 4-8 – Grain column over-temperature switch

Removal:

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

- 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 hi-limit switch

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

Removal:

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

- 1. Position new switch and secure with two hold-down screws.
- 2. Attach crimped connectors to tabs on switch. There will be a pink # 103 on one side and a red # 18 and blue # 18 on other side of heater housing hi-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 main power box to OFF.
- 2. Locate sensor junction box mounted on front of dryer.
- 3. Open junction box and disconnect wires from sensor.
- 4. Remove self-drilling screws holding junction box to dryer.
- 5. Remove conduit fittings from 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. 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. Loosely reattach conduit fittings to junction box.
- 2. Uncoil new sensor carefully. Any kinks will damage new sensor.
- 3. Feed sensor into plenum.

4. Attach sensor tube to inside wall of plenum area, in same manner old tube was attached.

During installation of sensor tube, reinstall plenum overtemperature capillary. Over-temperature capillary and plenum temperature sensor are designed to be mounted to same clip inside plenum area.

- 5. Reattach junction box to dryer and tighten conduit fittings.
- 6. Connect wires to sensor in same way previous sensor wires were connected.
- 7. Reattach lid to junction box.


Meter Roll Proximity Switch

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



Image 4-12 – Meter 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 meter 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 prox switch wires 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.
- **NOTICE:** Adjustment of proximity switch is critical. See Proximity Sensor Calibration in Component Calibration section. Gap between tip of switch and rotating target must be no greater than 1.6mm or 1/16". See Image 4-12. **Damage to proximity switch may occur if it comes into contact with rotating target.**
- 2. Reinstall box covers.



Static Air Pressure Switch J5862 & J6019



Image 4-13 – Air pressure switch

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

Removal:

- 1. Locate junction box on front plenum area.
- 2. Remove cover and disconnect switch wires from terminals.
- 3. From inside of plenum, remove screen filter (J6019) from backside of sensor (J5862).
- 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.
- 3. Replace junction box cover.



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



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

Removal:

- 1. Locate sensor junction box mounted to front of plenum area on front of dryer.
- 2. Remove junction box cover and disconnect wires from terminals.
- 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. Reusing clips from inside of dryer, string new sensor capillary along inside wall of plenum. Over-temperature capillary and plenum temperature sensor are designed to be mounted to same clip inside plenum area.
- 4. After installation, reconnect wires and replace junction box cover.



Component Calibration

Discharge Moisture Sensor T6035

QuadraTouch Pro Moisture Settings

To enter input and output moisture setpoints using touch screen, follow instructions in 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 9.0 VDC (while in tube). If voltage is out of range of 8.90 and 9.10 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

Removal of back plate is not necessary for calibration. Sensor shown in Image 4-15 has plug over adjustment screw.



- Touch Sukup logo at upper left of screen. Analog screen will appear.
- 2. With sensor clean and inside of tube, MST voltage reading should be 9.0 VDC. If not, continue with following steps.

Image 4-15 – Plug over moisture sensor calibration hole

- 3. Remove plug from calibration hole in back of sensor. See Image 4-15.
- 4. Using a small straight-blade screwdriver, put blade into hole and into screw head.
- 5. Rotate adjustment screw until a reading of 9.0 VDC is displayed (while inside of tube). Replace plug in calibration hole.



Air Switch Adjustment Calibration J5862 & J6019



Image 4-16 – Air pressure switch

Follow these instructions if it becomes necessary to adjust static air pressure switch:

- Find switch in junction box located on upper front of plenum. 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.
- To increase pressure setpoint, turn adjustment screw counterclockwise. See Image 4-17.
- 3. To decrease pressure set point, turn adjustment screw **clockwise**.

To adjust without running dryer, use a meter to check signal between switch wires. Turn screw clockwise until switch closes, then turn it counterclockwise until switch opens.



Image 4-17 – Adjustment screw



Meter Roll Proximity Switch Adjustment



Image 4-18 – Meter roll proximity switch box

- 1. Locate proximity switch box on back of dryer. Proximity sensor and rotating target will be located inside this box. See Image 4-18.
- 2. To calibrate proximity switch, loosen locking nut on switch.
- 3. Adjust switch so it is no more than 1.6mm or 1/16" from target. See Image 4-19. This distance is important for reliable sensing.



Image 4-19 – Meter roll proximity switch

4. 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.
- Attached to lid of discharge chute is a metal bracket with this box fastened to it. Using 7/16 socket wrench, loosen screw holding box in place. See Image 4-21.
- Adjust box so that when discharge chute lid is opened 2" to 3" (51mm-76mm), a fault occurs. Box can be adjusted by rotating it. Once position has been found, tighten screw to hold box in place.



Image 4-21 – Screw and metal bracket



Adjusting Meter Roll Flow Gates

Flow gates in columns of axial and centrifugal dryers are factory-set as shown in Fig. 4-2 and Table 4-1.

Sukup Manufacturing Co. is not responsible for damage resulting from improper adjustment of flow gates.



Fig 4-2 – Flow gates in axial & centrifugal dryers

COLUMN	DIM. A	DIM. C
Front 3	2"	1-3/4"
Rear 1	1-3/4"	2"
Front 4	2"	1-3/4"
Rear 1	1-3/4"	2"
Front 4	2"	1-3/4"
Rear 2	1-3/4"	2"
Front 6	2"	1-3/4"
Rear 2	1-3/4"	2"
Front 7	2"	1-3/4"
Rear 3	1-3/4"	2"
Front 9	2"	1-3/4"
Rear 3	1-3/4"	2"
Front 11	2"	1-3/4"
Rear 3	1-3/4"	2"
	COLUMN Front 3 Rear 1 Front 4 Rear 1 Front 4 Rear 2 Front 6 Rear 2 Front 7 Rear 3 Front 9 Rear 3 Front 11 Rear 3	COLUMNDIM. AFront 32"Rear 11-3/4"Front 42"Rear 11-3/4"Front 42"Rear 21-3/4"Front 62"Rear 21-3/4"Front 72"Rear 31-3/4"Front 92"Rear 31-3/4"Front 112"Rear 31-3/4"

Table 4-1 – Flow gate settings for axial & centrifugal dryers

NOTE: One full turn of adjustment bolt changes flow gate opening 1/16". Outer flow gate adjustment bolt turns clockwise to open outer flow gate. Inner flow gate adjustment bolt turns counterclockwise to open inner flow gate.

NOTICE: If Dim. A reaches 3-1/4" or Dim C reaches 3-1/8", a free-flow condition may occur. It must be avoided as it will impair dryer operation.

Reinstall cleanout/access doors after adjustments are made.

NOTE: If dryer has small-grain flow control gates, see Assembly Instructions L1896.



Axial Fan Blade Replacement & Maintenance

Follow these instructions when replacing fan blades on dryer or maintaining blades at start of drying season. Sukup axial-fan dryers use Trantorque GT keyless bushings, which offer flexible and easy installation while providing exceptional holding power. To ensure a Trantorque GT unit performs as specified, it must be installed properly.



DANGER: Failure to properly tighten blades may cause death or serious injury:

- **USE TORQUE WRENCH** with settings capable of attaining correct torque specifications.
- DO NOT over-tighten. It may cause hub to crack and threads to strip.
- **NEVER** run fan without screen guard properly installed.
- **DO NOT** stand in front of fan when running.

1. Insert Trantorque GT unit into fan hub, making sure mating hub is flush against shoulder at hex flats. See Fig. 4-3. **NOTICE:** Do not lubricate Trantorque GT bushing or shaft. Use of any lubricant on contact surfaces could result in bushing failure and will void all warranties.

2. Hand-tighten nut (clockwise) until assembly becomes snug on shaft. **NOTICE:** Do not hammer or use any type of impact to force Trantorque GT assembly along shaft.

IMPORTANT: Shaft must fully engage gripping area of Trantorque GT unit.

3. Using a torque wrench, tighten nut to proper installation torque. See Table 4-3 for required torque. Hex flats on outer ring are provided for counter-torque, eliminating need to hold component or shaft while applying installation torque. **NOTICE:** Over-tightening nut could damage Trantorque GT unit and/or mounted component, resulting in slippage of fan blade from shaft.



Fig. 4-3 – Attaching fan blade with Trantorque GT bushing

NOTE: At full installation torque, assembly will have moved approximately 1/16" axially along shaft away from nut. If axial position is critical, it may be necessary to loosen nut and reposition assembly.

4. Install screen guard and run fan for a minute. Remove screen and re-check torque. Inspect hub for cracks.

DANGER: Make sure screen guard is in place before operation. Contact with spinning blades will cause death or serious injury.

PART #	FAN SIZE	HP	BUSHING	BORE SIZE	NUT SIZE	TORQUE
J0436	28"	15	TRANTORQUE	1-1/8"	1-3/4"	165 FT-LBS
J0437	28"	20	TRANTORQUE	1-3/8"	2"	190 FT-LBS
J0437	38"	10	TRANTORQUE	1-3/8	2"	190 FT-LBS
J0435	38"	15	TRANTORQUE	1-5/8"	2-1/4"	230 FT-LBS
J0435	38"	20	TRANTORQUE	1-5/8"	2-1/4"	230 FT-LBS
J0435	44"	15	TRANTORQUE	1-5/8"	2-1/4"	230 FT-LBS
J04371	44"	30	TRANTORQUE	1-7/8"	2-1/2"	400 FT-LBS
J04372	44"	40	TRANTORQUE	2-1/8"	2-3/4"	440 FT-LBS

rable - z = Required torque for frantorque businings
--



Modifying Axial Dryer Starfire Burner for use at Lower Plenum Temperatures

Difficulties may arise if starfire burner on 28" fan on axial dryer is operated at low temperatures (60°F temperature rise or less). If there are rumbling sounds and/or flames are burning yellow instead of blue, pressure is too low and flame is burning back into port cup. If sustained operation at lower temperature range is desired, orifice and port cup on heater must be changed. Contact your Sukup dealer.



WARNING: Modification of gas line orifice and/or port cup is to be performed by qualified service personnel only. Failure to properly modify could result in gas leak. Gas leak could cause explosion or fire resulting in death or serious injury.



Image 4-22 - Shutoff valve in Off position

- 1. Operate dryer fan and burner. While it is running, turn fuel shutoff lever to Off position. See Image 4-22. Purge gas line by allowing burner to flame out.
- 2. Lock out all electrical power and gas lines.
- 3. Locate orifice pipe train assembly. See Image 4-23.
- 4. Loosen union located at bottom of orifice pipe train assembly.





Image 4-24 – Orifice pipe train disconnected from heater

Image 4-23 – Orifice pipe train & union

- 5. Remove orifice pipe train assembly by lifting out and up at bottom of assembly and pulling top of assembly straight out of heater housing.
- 6. With orifice pipe train removed from heater housing, locate threaded orifice. See Image 4-24.
- 7. Remove threaded orifice by rotating it counterclockwise.
- 8. Using Table 4-3, select appropriate orifice for dryer. Choose from column labeled "Low Temp. Orifice & Part #."



HEATER TYPE	FUEL TYPE	STANDARD ORIFICE & PART #		LOW TEMP. ORIFICE & PART #		STANDARD PORT CUP & PART #		LOW TEMP PORT CUP & PART #	
20" 15 LID	LP	13/64"	D7110	11/64"	D7125	0/16"	D4027	2/0"	D4025
20 13 11	NG	25/64"	D71125	19/64"	D7112	9/10	D4027	3/0	04025

Table 4-3 – Orifice & port cup sizes and part numbers

- 9. Install new orifice into pipe train assembly.
- 10. Re-install orifice pipe train assembly into heater housing by reversing sequence in steps 4 and 5.



WARNING: Ensure union is re-tightened properly to prevent gas leak. Gas leak could cause explosion or fire resulting in death or serious injury.



Image 4-25 – Starfire burner for 28" fan, with flame sensor in oval and port cup in circle

- 12. Access dryer heater housing area by entering through rear door of dryer. Locate burner assembly.
- 13. To ensure proper reinstallation later, note position of flame sensor prior to removal, then remove flame sensor from mounting bracket. Remove two port cup retention bolts and remove port cup.
- 14. Use Table 4-3 to select appropriate port cup for dryer. Choose from column labeled "Low Temp. Port Cup & Part #."
- 15. Install new port cup by reversing sequence in Step 13.

IMPORTANT: When re-installing flame sensor rod, ensure that it is not grounded out and that rod is in flame path.

- 16. Restore electrical power to dryer and open fuel valves.
- 17. Start fan and heater. When heater turns on, inspect for gas leaks around union by using soapy water.
- 18. Re-adjust vaporizer coil as needed.
- 19. Inspect burner flame. Look for nice clean flame, blue in color. Minor yellow coloring at tips of flame is acceptable.

Dryer can now be returned to operation.



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.

WARNING: When using ladder attached to dryer, make sure ladder is dry before climbing. Ladder may be slippery when wet. Falling from ladder could cause death or serious injury.

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

Check and retighten all fasteners.

WARNING: Lock out electrical power before removing any safety shields. Contact with moving parts could cause death or serious injury.

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.

DANGER: NEVER run fan without screen guard securely attached to fan housing! Contact with spinning fan will cause death or serious injury.

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 4-26 – Flame rod (shown on octagon burner)

- 4. Examine flame rod (J5747) for cracked porcelain insulation and verify it is not touching metal burner. See Image 4-26.
- 5. Flame rod should be examined periodically throughout drying season.



- 6. Inspect port cup (applicable only to axial-fan dryers with 28" starfire burners) for any accumulation of foreign material. See Image 4-25. Clean if required. Foreign material in port cup will not burn out and will impair burner operation.
- 7. Remove and clean gas strainer as shown in Fig. 4-4.



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

- 8. Inspect all pipe train components for physical integrity. See Pipe Train Component Location page elsewhere in this manual.
- 9. 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.
- 10. Be sure to check vaporizer coil for leaks yearly. See Image 4-27. Vaporizer should be replaced every five (5) years.



Image 4-27 – Vaporizer coil



WARNING: 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. Gas leak could cause explosion or fire resulting in death or serious injury.



Daily Maintenance Requirements



Image 4-28 – Fan inlet, top exhaust slope and lower grain column slope



Image 4-29 – 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 4-30 – Rear cleanout door

- 5. Open rear cleanout door. See Image 4-30.
- 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 cleanout.
- 7. Turn fan off.
- 8. Close rear clean-out door.
- 9. Sweep fines/debris off discharge chute screen. See Image 4-31.



Image 4-31 - Grain discharge chute screen





Image 4-32 – Discharge moisture sensor



Image 4-33 – Discharge moisture sensor flag, tube & moisture drain plug



Image 4-34 - RTD Temp sensor wire

- 10. Remove discharge moisture sensor located under discharge tube as shown in Image 4-32 or on optional jump auger assembly (not shown). Clean sensor flag and tube. See Image 4-33. Reinstall moisture sensor.
- 11. Inspect temperature sensor wire (RTD) as shown in Image 4-34. Clean if necessary.
- 12. Restart dryer operation per automatic control or manual control.



Semi-weekly Maintenance Requirements



Image 4-35 – Unload auger inside access/cleanout door removed



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

 Remove floor plates and open outside access/cleanout doors and inspect unload auger area for obstructions, fines, and debris. Clean as necessary. Replace floor plates and close inner and outer unload auger cleanout/access doors. See Images 4-35 and 4-36.

Image 4-36 – Unload auger outside access/cleanout door handle



Image 4-37 – Grain column inside cleanout sliding door

3. Open inner and outer grain column access/cleanout doors and remove debris. Close doors. See Images 4-37 and 4-38.





Image 4-38 – Grain column outside cleanout door handle



Image 4-39 – Plenum divider door removed

4. Remove plenum divider door and clean out any debris. Replace door. See Image 4-39.



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. Power washing may be required after unusually dirty drying seasons. Ensure cleaning of wet bin trash pan.

NOTICE: Do not blow compressed air directly into static air pressure switch. Damage to switch may occur.

- 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.
- Remove discharge moisture sensor from grain discharge chute. Remove moisture drain plug (shown at far right in Image 4-41) and store sensor in a cool, dry place. *NOTICE:* Sensor could be damaged by standing water if left inside tube. Be sure to cap both coupler fittings as shown in Images 4-40 and 4-41.



Image 4-40 – Moisture sensor cord capped

sor T6035 ain DW

Image 4-41 – Cord connector capped

7. Ensure that cover of QuadraTouch Pro is closed. Remove Ethernet cable, disconnect from power, and store control unit indoors during offseason.



Troubleshooting Guide

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Fault Troubleshooting

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.

 Is discharge chute open? Determine cause of door being open and return door to closed position.

2. Is switch out of adjustment?



Fault Condition Discharge Chute is Open All dryer models use wire #42

This can be determined by watching input light #42 on PLC. 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.



Image 5-1: Placement of sensor on dryer

- 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 measured on wire # 18, check for voltage on wire # 42. If 24VDC is not present, it may be necessary to tilt sensor to allow contact with switch. If unable to detect 24VDC on wire # 42, switch 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.
- 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.

Grain Level Ball Switch



Image 5-2 - Grain Level Ball Switch

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

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

- Is wet bin out of grain?
 If this is last load for season, press Reset and Start→Final Dry.
- 2. Has an auxiliary load malfunctioned? Repair 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.

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



Grain Level Ball Switch positioned on dryer



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. When properly installed, switch should be between 1.6mm (1/16") and 3mm (1/8") from rotating target.



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 touch screen.

- 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 P3C 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 5-4 – 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.





Image 5-5 - Unload Auger Proximity Sensor Installed on Dryer



Vapor Over-Temperature Switch



Image 5-6 - 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 6th switch uses wire #602 5th switch uses wire #502 4th switch uses wire #402 3rd switch uses wire #302 2nd switch uses wire #202 1st switch (bottom) uses wire #102

- This fault indicates when output of vaporizer coil has become too hot [above 60°C (140°F)].
 - Tubing near fault device should be fairly warm to the touch but not hot.
 - a. Check fuel supply is tank low on fuel?
 - b. Air inlet obstruction clean debris from fan grill.
 - c. Vaporizer coil might be too close to flame adjust vaporizer coil.
- 2. Has Vaporizer Coil had sufficient time to cool down? This device will automatically reset when device has cooled down.
- 3. Is PLC Input light on?
 - a. After device has cooled down and reset, PLC Input light should now be ON.
 - b. If not, follow wiring from coil to heater box and measure for 24VDC on wire # 18.
- 4. If 24VDC is not found on wire # 18, go to power box and measure 24VDC on terminal strip.

If 24VDC is measured 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, measure for 24VDC on other wire (not # 18) coming from O/T switch.
 - a. If 24VDC is NOT found on other wire, O/T switch must be replaced.
 - b. If 24VDC is found on other wire coming from O/T switch, take note of wire number and go to power box and measure 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 5-7 - Vapor Over-Temperature Switch Installed on Dryer



Rear Door Interlock Switch



Image 5-8 - Rear Door Switch

The rear door interlock switch is located to right of each rear door on dryer. This switch prevents dryer from running when rear door is open and a person might be in plenum of dryer.



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

- 1. Check rear door or 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.



Image 5-9 - Rear Door Interlock Switch Installed

on Dryer

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 then route back to PLC input.

- If 24VDC is not present on input wire, check that 24VDC is measured on wire #18.
 - a. If 24VDC is present on input wire, but 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, measure 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 measured on power box terminal strip, check #36 on PLC for 24VDC.
- 5. If 24VDC is measured on PLC input terminal but input light is not on, and you have a rear door fault, the PLC is malfunctioning.



Grain Column Over-Temperature Sensor



Image 5-10 – 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 149°C (210°F).



All dryer units use wire #41 for left side

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

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

- 2. If no obstruction is found and grain is flowing freely through each column, the plenum temperature may need to be reduced.
- **NOTE:** To check for an obstruction, go to Manual operation and turn 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 5-11 - Grain column over-temp switch (right side)

- If column temperature has cooled down and RESET button has been pressed on touch screen, 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.
- At this point, 24VDC should be present on wire #18 at O/T sensor. Measure for 24VDC on other wire (not # 18) coming from sensor.
 - a. If 24VDC is NOT found, O/T sensor is defective.
 - b. If 24VDC is measured on wire coming from O/T sensor but PLC Input light is NOT on, note wire number and go to power box and measure for 24VDC on terminal strip.
 - c. If 24VDC is NOT measured on terminal strip in power box, check wiring connections between junction box & power box.
- d. If 24VDC is detected on terminal strip in power box, go to PLC and measure 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 being presented (after pressing RESET), PLC is malfunctioning.



Heater Housing Hi-Limit Switch



Image 5-12 - Heater housing hi-limit switch

Heater Housing Hi-Limit switch is the reset button located in the 5x5 box mounted on the top side of the fan barrel. This switch trips when heater reaches a temperature of 93°C (200°F).

Fault Condition	
Housing Over-Temp	
 6 th switch uses wire #603	
5 th switch uses wire #503	
4 th switch uses wire #403	
3 rd switch uses wire #303	
2 nd switch uses wire #203	
1 st switch (bottom) uses wire #103	

- 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, the RED reset button on hi-limit switch should push in and latch.
 - a. If reset button will not latch, hi-limit switch is defective.
 - b. If reset button will latch but fault remains after RESET is pressed, check voltage.
- 3. Locate the two wires plugged into hi-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 measured on wire # 18 at hi-limit switch.
 - a. Measure for 24VDC on other wire connected to hi-limit switch. With RED reset button latched in, 24VDC should be present.





Image 5-13 - Heater Housing Hi-Limit Switch Installed on Top of Fan Barrel after pressing RESET on touchscreen, PLC is malfunctioning.

- c. If 24VDC is found but PLC Input light is not ON, take note of wire number and go to power box and measure 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 measured on power box terminal strip, go to PLC Input terminal and measure for 24VDC.
- If 24VDC is NOT found on PLC input f. terminal, check wiring connections from PLC Input terminal to power box terminal strip.
- g. If 24VDC is found on PLC input terminal on PLC but input light is NOT on, and fault message is still being displayed



Meter Roll Proximity Switch



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



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

- 1. Go to Start Menu and select Manual Operation.
- 2. Set Meter Roll speed to 15%.
- 3. Touch Unload button.
- 4. Observe chain on meter rolls DC motor for movement.

Image 5-14 - Meter Roll Proximity Switch

- 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, remove cover from box housing proximity switch. See Image 5-15. 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 iunction box cover.
 - d. Measure for 24VDC on wire # 18.
 - e. If 24VDC is not found on wire # 18, go to power box and measure for 24VDC on terminal strip.
 - f. If 24VDC is measured 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 drver (brown sensor wire). This voltage is referenced to ground (blue sensor wire).
- 7. Make sure sensor is over the proximity sensor head and adjusted to 1/8th inch or less.



Image 5-15 - Meter Roll Proximity Switch Installed on Dryer

- 8. The light on back of proximity sensor should be on, and 24VDC should be measured on output (black sensor wire). If not, sensor is defective.
- 9. If 24VDC is measured 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 measured 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 measured on power box terminal trip, go to PLC and measure for 24VDC on PLC Input terminal.
- d. If 24VDC is measured on PLC Input terminal but light is NOT ON, PLC is malfunctioning.



Static Air Pressure Switch



Image 5-16 - Static Air Pressure Switch - Apart

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

The Static Air Pressure sensor is located in junction box with air switch (see below). It monitors static pressure in plenum and will shut down dryer if there is not enough present. Dryer must be full of grain to satisfy this sensor!!



- 1st switch (bottom) uses wire #105
- 2. Using Start Menu, select Manual Operation, turn Fan ON. Check fan for proper operation and airflow.
- 3. If a fault message is displayed, air switch may not be adjusted properly.
 - a. Remove junction box cover containing air switch.
 - b. With dryer full of grain, and fan switch turned to ON, check PLC Input light. Input light should be ON at this time.
 - c. If input light is NOT on, using a small straight screw-driver, 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 has slowed, turn adjustment screw clockwise slowly until input light turns off.
 - f. While watching PLC Input, turn fan ON and then OFF, making sure that input light is turning on and off with fan.



Image 5-18 - Static Air Pressure Switch

- 4. If, after going through the above procedure, PLC Input light remains in either the ON or the 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 measure for 24VDC on terminal strip.
- c. If 24VDC is found on terminal strip, go to PLC and measure for 24VDC.
- d. If 24VDC is found on this wire, use a small screwdriver and turn adjustment clockwise until 24VDC is no longer present.
- e. If turning adjustment screw clockwise fails to

turn OFF Air Switch, switch is malfunctioning.

- 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 malfunctioning.



Fault Troubleshooting

- 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 5-19 - Static Air Pressure Sensors Installed on Dryer (Located in same box as Plenum Over-Temp Sensor.)



Plenum Over-Temperature Sensor



The Plenum Over-Temperature Sensor is located inside the plenum of the dryer. Its function is to protect plenum from overheating.

> **Fault Condition Plenum Over-Temp** 6th switch uses wire #604 5th switch uses wire #504 4th switch uses wire #404 3rd switch uses wire #304 2nd switch uses wire #204 1st switch (bottom) uses wire #104

- 1. Check fan for obstruction and remove any accumulated debris.
- 2. With dryer shut down, open door and inspect plenum for any problems.
- 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 malfunctioning.
 - 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.





Image 5-21 - Plenum Over-Temperature Sensors Installed on Dryer (Located in same box as Static Air Pressure Sensor.)


Device Troubleshooting

Discharge Moisture Sensor



Image 5-22 – Discharge moisture sensor

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

- 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 brown, blue, black and white.
- c. Using a voltmeter, check for 24VDC voltage between brown and white. If 0VDC is found, check connection between power box and junction box.
- d. Assuming brown wire has 24VDC, check for DC voltage between black and white 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 5-23 – Discharge moisture sensor installed



QuadraTouch Pro Controller

If connection between QuadraTouch Pro panel and PLC is lost, Communication Error screen will appear.



Fixing a Communication Error

NOTE: Requires software version 1.19 or later.

Make sure touch-screen and PLC are both ON.

- On Power Box, make sure E-Stop is pulled out and illuminated RED, and that System Control Switch is on COMPUTER and is illuminated GREEN. Make sure PLC lights are on.
- Check LNK (or LINK) lights on Ethernet ports of both QuadraTouch Pro console and PLC. To check on console, loosen knurled thumb screws below touch-screen and lift screen. Ethernet cable should be plugged into the "X2 ETH" port.
- If one LNK light is illuminated on either the X2 ETH port or PLC, Ethernet cable should be good.
- If one of the Ethernet couplers is bad, both LNK lights will be off.
- If LNK light is lit on one device (PLC or console) but not the other, use a cable known to be good and connect the device with no LNK light into another device such as a laptop computer. If no light illuminates, Ethernet port on device is likely bad.

Checking Communications Settings on QuadraTouch Pro

- Ensure that Ethernet cable connecting dryer to QuadraTouch Pro console is plugged into port "X2 ETH" and that LNK lights are ON in both the PLC and touch-screen console.
- If another cable is plugged into "X3 ETH," unplug it and reconnect after the communication error has been resolved.
- Go to Tools→System Tools→Maintenance Tools→Network Configuration→Network Repair Utility→Start Network Repair. This will reset the touch-screen console's Ethernet ports to factory settings.
- After process is complete, press Reset to return to main page.



Plenum Temperature Sensor RTD and Transmitter



Image 5-24 – Plenum temperature sensor RTD and transmitter

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 Pro 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 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 terminals 18 and 95.
- 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 (Pink and 95). Voltage between 1.0VDC and 5.0VDC should be found.
- 7. With 24VDC on terminals 18 and 95 but no voltage between terminals Pink and 95, transmitter is defective.
- 8. If voltage is detected, use table on next page to determine if resistance is reasonable.
- 9. If voltage is detected between terminals Pink and 95, go to other terminal strip and remove two wires coming from RTD (blue and purple).
- 10. 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.

- 11. If reading shows infinite (open) resistance, RTD is defective. Compare resistance reading to Table 5-1 on next page to determine if resistance is reasonable.
- 12. 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.



Plenum Temperature Sensor (RTD) (continued)

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

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

Table 5-1





Burner Control Box for EU dryers

Ref #	Description	Comp #
1	Air Switch Solenoid, 1/4"	J6032
2	Air Switch, Dungs	J5868
3	Ignition Transformer	J5710
4	Burner Control Unit, LME73	J57146
5	Relays, 110VAC, Phoenix	J8774



Electronic MOD Valve

General Information

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



QUICK REFERENCE:

SETTING ELECTRONIC MOD VALVE POSITION

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



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





Automatic Axial Grain Dryer

QuadraTouch Pro™ Dryer Control System

Appendices

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Appendix A

Specifications

Estimated tonnes per hour Unload times Dryer holding capacities

Specifications for axial and centrifugal dryers are provided in tables on this and following pages. Many factors, such as grain variety, maturity levels, grain cleanliness, weather conditions and operation/management, can affect the performance of your dryer and results may vary. This information is calculated and is not a guarantee of product specifications or performance. Based on these factors, Sukup specifications should only be used as estimates, and not as a warranty, express or implied, of how a particular Sukup unit will perform under your operating conditions. Because we are continually advancing Sukup products, changes may occur that may not be reflected in the specifications.



Appendix A

Metric Tonnes Per Hour Information

	Single Axial Fan/Heater Dryer Models						
Estimated Drying	Metric Tonnes/Hour						
Capacities	T16	T20	T24	T163	T203	T243	T283
Full Heat 20% - 15%	up to 16.5	up to 23.5	up to 26.7	up to 18.8	up to 24.6	up to 26	Up to 30.5
Full Heat 25% - 15%	up to 10.3	up to 14.6	up to 16.8	up to 11.4	up to 15.2	up to 18	Up to 19.7

	Two Module Axial Fan/Heater Dryer Models					
Estimated Drying	Metric Tonnes/Hour					
Capacities	T165 T205 T24					
Full Heat 20% - 15%	up to 36.6	up to 51.3	up to 62.2			
Full Heat 25% - 15%	up to 25.4	up to 31.8	up to 38.7			
Pressure Heat/Vacuum Cool 20% - 15%	up to 27.4	up to 35.1	up to 42.4			
Pressure Heat/Vacuum Cool 25% - 15%	up to 17.3	up to 21.8	up to 26.2			

Numbers in tables above are APPROXIMATE.

Determining Meter Roll Speed

Use table below to select meter roll speed for a dryer running in full-heat mode, 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.

	D	DETERMINING METER ROLL SPEED PERCENTAGE					
Desired Boints of			PLEN	ЈМ ТЕМРЕ	RATURE		
Moisture Removed	160°F (71°C)	170°F (77°C)	180°F (82°C)	190°F (88°C)	200°F (93°C)	210°F (99°C)	220°F (104°C)
15	7%*	7%*	8%*	9%*	9%*	10%*	11%
12.5	8%	9%	10%	11%	11%	12%	13%
10	10%*	11%	12%	13%	14%	15%	16%
7.5	15%	16%	18%	19%	21%	22%	24%
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.

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		

Unload Time Based on Meter Roll Speed Percentage

Dryer Holding Capacities

Driver Medel	Holding Capacity			
	Bushels	Metric Tonnes		
T16	440	11.2		
T163	440	11.2		
T20	550	13.9		
T203	550	13.9		
T24	660	16.8		
T243	660	16.8		
T28	770	19.6		
T283	770	19.6		





Appendix B

Electrical Requirements

Three-phase dryers Single module



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

IMPORTANT: Grain Dryer power box contains a molded case disconnect switch for incoming power. **IT IS NOT A CIRCUIT BREAKER!** A service-rated, fused disconnect needs to be installed ahead of grain dryer power distribution box. This disconnect is not included with dryer and should be installed by a qualified electrician in accordance with local and national standards. **Grain Dryer should be only device connected to this disconnect.**

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

All electrical work should be completed by a qualified electrician.

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

Dryer Electrical Specifications:

SINGLE FAN MODELS

TE1211D - 12 Foot Dryer - Single Fan/Heater - 380 Volt - 3 Phase - 50HZ - LP Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 Kw/#14 5 FLA	3 Kw/#14 5 FLA	15 Kw/#10 28 FLA	38 Amps	250 Amps

TWO FAN MODELS

TE1631D - 16 Foot Dryer - 2 Fan / 2 Heater, 2/3 - 1/3 Plenum, 380V - 3 Phase – 50 Hz - LP Main Switch = 250 Amps

	Top	Bottom	Upper Fan	Lower Fan	Minimum	Maximum
	Auger	Auger	38"	28"	Amps	Amps
Motor/Wire	3 Kw/#14 5 FLA	3 Kw/#14 5 FLA	15 Kw/#10 28 FLA	15 Kw/#10 28 FLA	66 Amps	250 Amps

TE2831D - 28 Foot Dryer - 2 Fan / 2 Heater, 2/3 - 1/3 Plenum, 380 Volt - 3 Phase - 50 Hz - LP Main Switch = 250 Amps

	Top	Bottom	Upper Fan	Lower Fan	Minimum	Maximum
	Auger	Auger	44"	28"	Amps	Amps
Motor/Wire	5.5 Kw/#10 11.1 FLA	5.5 Kw/#10 11.1 FLA	30 Kw/#3 55 FLA	18.5 Kw/#4 35 FLA	112 Amps	250 Amps

Appendix C

Optional Dryer Accessories

Dryer aspirator GSM modem Remote mobile app access Personalized sign Moisture sensor jump auger



This page is left blank in order to match drawings and parts lists on facing pages.



Dryer Aspirator Component Instructions

Assembly

- Attach aspirator base assembly to side of dryer discharge housing. Mark and cut a 3¾" x 7¼" hole (about 2 inches from top) in side of dryer discharge housing and drill (6) ¾" 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	Сар, 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

Appendix C

GSM Modem Kit (T24999) Installation for QuadraTouch Pro

Kit Contents

Antenna SIM card (pre-installed) Ethernet 3G GSM modem SMA male to female connector 4" DIN rail1/4" Metal screws6' Ethernet Cat5e STP cable8' 24VDC power wires



Installation



WARNING: Lock out power to main power box before installation to eliminate potential for electrocution or shock. Modem operates on 24VDC, but higher voltage is present in power box. Failure to take this precaution could result in death or serious injury.



1. Antenna requires a 5/8" hole for through-panel mounting. Drill hole in top of auxiliary box as shown.





 Ethernet 3G GSM modem mounts easily on DIN rail. If there is no space on DIN rail in auxiliary box, use self-drilling metal screws to attach a small piece of DIN rail (provided) in top left of auxiliary box. To avoid any water-related failures, do not mount modem directly below antenna hole.



- 3. Connect antenna to Ethernet 3G GSM modem using threaded connection. Make sure SMA male to female coupler is between antenna and modem as shown.
- Connect 3G modem to power using provided orange (+24VDC to #18 terminal) and black (– to #95 terminal) Wires.
- Connect GSM Modem to Ethernet switch with provided 6' Ethernet cable.



Ensure PLC and QuadraTouch Pro HMI are connected to Ethernet switch, shown at left in adjacent photo.

PLC, Ethernet 3G GSM modem, and QuadraTouch Pro should now each be connected to Ethernet switch.



Activation

Activation of GSM cellular service can be done in two ways.

OPTION 1:

SIM card provided with T24999 kit comes preinstalled in Ethernet 3G GSM modem. Contact your Sukup dealer for activation through Sukup Manufacturing Co. Dealers can electronically request GSM activation from Sukup using their dealer access at <u>www.sukup.com</u>.

OPTION 2:

You are also welcome to get GSM service on your own. There are typically at least two options for GSM service no matter where you live, such as AT&T, T-Mobile, iWireless, SmartTalk Wireless and Simple Talk Wireless. Here is a brief description of what to do if you want your own GSM service.

- 1. Check for GSM coverage in your area. Check each one for best coverage/price.
- 2. Buy a **standard sized** SIM card from company selected. Some companies offer multiple kinds of SIM cards. Get one that can be activated on any phone. For instance, standard AT&T SIM card and GoPhone SIM card are available. While AT&T is the provider of both, AT&T SIM card is the one to use.
- Remove existing SIM card and install new SIM card into back of Ethernet 3G GSM modem. Use SIM#1 (left slot). Use a paper clip or SIM tool to eject SIM tray.
- 4. Activate new SIM card online (usually easiest) or over phone.
 - a. You will need to know the 20 digit SIM# on the SIM card.
 - b. You may need 15-digit IMEI# found on sticker on inside of GSM modem.

Prepaid is usually the easiest way to go. Each company has different plans. GSM modem operates with text messages over *VOICE NETWORK*. Do not get a data plan. DON'T ADD A LINE if it's not necessary! It will be much less expensive to use prepaid option. Keep in mind that if service expires at end of drying season, SIM will expire in 60 days and can never be reactivated.



GSM Modem Operation Instructions

GSM Modem interacts with 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 per 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 10 minutes, simply send a text response of "00" to the GSM modem.

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

If you wish to shut the dryer down without being there, a remote shutdown feature can be used. Text "8888" to GSM modem to shut down dryer remotely. You will not, however, be able to remotely start the dryer.

V2.60 and above software allows changing of plenum temperature setpoint(s) and discharge moisture setpoint.

Text "P#XXX" to give 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. PLC will send an acknowledgement SMS after setpoint has been changed.

Text "MSTXXX" to give dryer a new discharge moisture setpoint. Example: "MST145" would give dryer a new setpoint of 14.5%. This command *is slightly* case sensitive. "MST", "Mst", and "mst" will work. PLC will send an acknowledgement SMS after setpoint has been changed.

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



Remote Mobile App Access

Requires QuadraTouch Pro[™] Software V1.14 or later.

Talk to your Sukup Dealer about buying a Remote Access Key **T7101** from Sukup Manufacturing. This can be done online by your dealer with immediate digital delivery. The key will give you full remote access to the system for 1 full calendar year. You will also get free text message notifications with remote access. You will be able to renew the key annually.

Provide your dealer with the Device ID, located in the QuadraTouch $\operatorname{Pro}^{\mathsf{TM}}$ panel under **Tools** \rightarrow **System Tools** \rightarrow **Maintenance Tools** \rightarrow **Enter Remote Access Key**. (*This can also be done from the app interface after it's successfully connected*). Once you've obtained the Remote Access Key, enter it below the Device ID.

Go to the App Store or Google Play Store and search for "Phoenix Contact Visu + Mobile". The APP logo is shown on the top right.

Download and Open the App.

Click "+" on the top left corner.

For "**Profile Name**" insert something like "My Dryer" or whatever you want to name the connection.

"Server Address" is very important. This is the device ID you have on your panel followed by the domain space: mysukup.com

Example: 11111111.mysukup.com (shown right)

"Server Port": Always 12233 unless otherwise specified by Sukup Manufacturing Co.

"Startup Screen": "Mobile Dashboard" – No exceptions, case sensitive.

After the settings have been entered correctly, touch the "<" button on the top left. This will save your configuration.

Touch the new profile you created. The app will try to connect the with address you entered.

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*The APP is designed for Landscape orientation. It will be helpful to use the "Lock Orientation" feature on your phone or tablet to reduce the amount of times the information refreshes.



Example -- Remote Access from anywhere in the world!



The QuadraTouch Pro[™] system with V1.14 software is designed to be plug and play with any router. The software automatically configures the router to allow remote access*.

Go to Tools \rightarrow System Tools \rightarrow Maintenance Tools \rightarrow Network Configuration

And choose the option for: "Auto-Configure Internet Access for Customer Provided Broadband"

There are two Ethernet ports on the back of the touchpanel. Use the open "X3" port on the back of the panel (pictured above) for remote access. The "X3" port is designated for DHCP assignment. This is meant to be used to connect the touchpanel to your home network. The "X2" port is already used to communicate directly to the PLC located in the power box. It has a static address of 192.168.1.98.

Important

*UPNP must be supported/enabled on your router. Otherwise, a manual port forwarding rule will need to be added to your router's configuration. If you get internet access from a wireless provider and/or are behind an additional firewall or private network, you will need to contact your internet provider directly and provide this instructions sheet to them.

Note to internet providers: This system relies on port fortwarding to provide customers direct access to the system via the app. <u>A provisioned Public IP is preferred</u> as Sukup Manufacturing use a DDNS in conjuction with their Remote Access Key (see server address on first page) to direct web traffic to the QuadraTouch Pro[™] panel. The UPNP ports are <u>12233</u> (if using DHCP Ethernet Adapter X3) and <u>12234</u> (if using Statically Assigned Ethernet Adapter X2). If the private network must stay intact, special routing rules will need to be setup on the front end to make sure incoming traffic on the WAN side reaches the QuadraTouch Pro[™] panel. This is all the information needed to properly configure remote access. Sukup Manufacturing will not be able to assist in setting up / troubleshooting custom network solutions.

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Personalized Sign



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

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



Moisture Sensor Jump Auger

For instructions to install moisture sensor jump auger, ask for document L1801.



Appendix C



Soft Start & VFD Programming & Troubleshooting

ATS22 Soft Start Altivar 312 Variable Frequency Drive

DATES	REVISIONS	PAGES
01/05/2017 - Updated Soft Start programm	ning	- 2, 3, 4
01/05/2017 – Added VFD programming an	d troubleshooting	7

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 UIn (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 the down arrow until **In (Motor Rated Current)** is shown on display.
- 8. Press Enter.
- 9. Press up or down arrows until you find appropriate motor current using the Full Load Amps table on page D-4.
- 10. Press Enter. Display should blink indicating that new value is set into memory.
- 11. Press down arrow until LAC (Advanced Mode) is shown on screen.
- 12. Press Enter.
- 13. Press down or up arrow until **on** is shown on screen.
- 14. Press Enter. Display should blink indicating that new value is set into memory.
- 15. Press Escape.
- 16. Display should show **ConF**.
- 17. Press down arrow until **SEt (Settings Menu)** is shown on screen.
- 18. Press Enter.
- 19. Display should show **t90** (Initial voltage). If not, press down arrow until it appears on screen.
- 20. Press Enter.
- 21. Press down or up arrow until **50** is displayed on screen.
- 22. Press Enter. Display should blink indicating that new value is set into memory.
- 23. Press down arrow until **tLS (Max Start Time)** is shown on screen.

24. Press Enter.

- 25. Press down or up button until **50** is displayed on screen.
- 26. Press Enter. Display should blink indicating that new value is set into memory.
- 27. Press down arrow until ACC (Acceleration time) is displayed on screen.
- 28. Press Enter.
- 29. Press down or up arrow until **15** is displayed on screen.
- 30. Press Enter. Display should blink indicating that new value is set into memory.
- EU Axial Dryer Manual



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

Sof	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		

Troubleshooting ATS22 Soft Start

NOTE: The following pages are from Altistart 22 Soft Start User Manual, BBV51330, dated 09/2015. A complete copy can be found at www.schneider-electric.com.

Diagnostics / Troubleshooting

Soft starter does not start, no trip code displayed

No display:

- check that the line supply is present on the control supply CL1/CL2,
- check if a short circuit is not existing on the Modbus network cable (especially between RJ45 pin 7 and RJ45 pin3 or pin8. See pages <u>35</u> and <u>36</u>).
- Check that the code displayed does not correspond to the normal state of the soft starter (see page 46).
- Check for the presence of the RUN/STOP commands (see page <u>37</u>).

Soft starter does not start, trip code displayed

- · Trip code flashes on the display.
- Storing of the last 7 trips, visible with SoMove software workshop.
- · The soft starter locks and the motor stop with to freewheel mode.

🛦 🛦 DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

• Read and understand the precautions in "Before you begin" chapter, before performing any procedure in this section.

Failure to follow these instructions will result in death or serious injury.

Trip code displayed	Name	Remedy
ЬPF	Bypass contactor detected fault	 Switch-off the soft starter and contact Schneider Electric services.
EFF	Invalid configuration on power-up	 Revert to the factory setting in the soft starter <u>UE IL</u> menu Reconfigure the soft starter
EEF	External detected fault	Clear the cause of the detected fault
GrdF	Ground leakage current detected fault	 Check the electrical insulation of the motor Check the installation Check the values of <u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>
InF	Internal detected fault	 Disconnect and reconnect the control supply. If the detected fault persists, contact Schneider Electric product support
DEF	Motor overcurrent	Check the values of D I d and D I L parameters in P r D menu page 56
DHF	Over heat detected fault Low temperature detected fault	 Check the sizing of the soft starter in relation to the motor and the mechanical requirement Check the operation of the fan (if the Altistart 22 used has one), ensuring that the air passage is not obstructed in any way and the heatsink is clean. Ensure that the mounting recommendations are observed Wait for the Altistart 22 cooling before restarting, keeping the starter powered on
OLF	Overload motor	 Check the mechanism (wear, mechanical play, lubrication, blockages, etc.) Check the sizing of the soft starter motor in relation to the mechanical requirement Check the value of <i>L H P</i> parameter in <i>5 E L</i> menu page <u>52</u> and <i>I n</i> parameter in <i>c n F</i> menu page <u>50</u> Wait for the motor to cool before restarting
05F	Overvoltage	 Check UL r parameter in r r r r menu Check the power supply circuit and voltage Check 0 5 d and 0 5 t parameters in P r 0 menu
DEF	Motor Over Temperature Motor thermal trip detected by the PTC probes 	 Check the mechanism (wear, mechanical play, lubrication, blockages, etc.) Check the sizing of the soft starter motor in relation to the mechanical requirement Check the value of <i>P E L</i> setting in <i>P r D</i> menu page <u>59</u> Wait for the motor to cool before restarting



Diagnostics / Troubleshooting

Trip code	Name	Remedy
displayed		
РНЬЈ	Phase unbalance	 Check the line voltage. Check the values of <u>Ubd</u>, <u>Ubb</u> parameters in <u>Pr</u> <u>D</u> menu page <u>57</u>.
PHF	Loss of a line phase	 Check the line voltage, the connection to the soft starter and any isolating devices located between the line and the soft starter (contactors, fuses, circuit breakers, etc.). Check the motor connection and any isolating devices located between the soft starter and the motor (contactors, circuit breakers, etc.). Check the motor state.
	Line frequency, out of tolerance This detected fault can be configured in <i>P</i> _r <u>D</u> menu	 Check the line frequency. Check the configuration of <i>P H L</i>.
PIF	Phase inversion Line phase inversion does not conform to the selection made by <i>PHr</i> in <i>Pr</i> I menu	• Invert two lines phases or set $PH_{\Gamma} = {}_{\Box}FF$.
ErAP	Trap code	 Disconnect and reconnect the control supply. If the detected fault persists, contact Schneider Electric support.
5 C F	Short circuit: • short-circuit on soft starter output	 Switch-off the soft starter. Check the motor connections and the motor insulation. If connections and insulation are OK, contact Schneider Electric services.
SLF	Modbus Time Out	 Serial link detected fault. Check the RS485 connection.
5 n b F	Too many starts	 The number of soft starts has exceeded the maximum allowed by <u>5 n b</u> in <u>5 L b</u> period. See <u>5 n b</u> page <u>53</u>.
55 <i>C</i> r	Shorted thyristor or wrong connection	 Switch-off the soft starter. Check the motor connections and the motor insulation. If connections and insulation are OK, contact Schneider Electric services.
5 <i>E F</i>	Starting time detected fault • Too long start time	 Check the mechanism (wear, mechanical play, lubrication, blockages, etc.) Check that <i>L L</i> 5 (Max start time) is bigger than <i>H L L</i> (Acceleration time). See <u>5 E L</u> menu page <u>51</u>. Check the sizing of the soft starter motor in relation to the mechanical requirement Check ILt value : if the value is too low, the motor may not reach acceleration and full speed.
£ 6 5	Too many starts	 Wait 5 minutes for frame size A. Wait 15 minutes for frame sizes B, C, D and E. <i>L b</i> 5 appears after 5 <i>n b F</i> trip message, when trying to reset the soft starter before end of the timer.
UEF	Motor underload (undercurrent)	• Check the values of <i>U I d</i> and <i>U I k</i> parameters in <i>P r D</i> menu page <u>57.</u>
USF	Under voltage or no voltage	 Check <u>U</u> In, <u>U</u> 5 d and <u>U</u> 5 L parameters in <u>P</u> r <u>D</u> menu Check line voltage.

Remote keypad messages

Disp	play	Message	Description
In IE		On initializing itself	Microcontroller initializing. Communication configuration searching.
ΕΟΠΕ	flashing	Communication interruption	It has 50 ms time out. This message is shown after 20 times retrying.
H- 17	flashing	Key alarm	 Key has been held consecutively more than 10 seconds. Membrane switch disconnected. Keypad waked up while a key is holding.
ELr	flashing	Confirm trip reset	This is shown when : First time STOP key has been pressed while the soft starter has tripped in detected fault.
deue	flashing	Soft starter mismatch	Soft starter type (brand) did not match with keypad type (brand).
r D N E	flashing	ROM trip	Keypad ROM detected fault.
г АПЕ	flashing	RAM trip	Keypad RAM detected fault.
EPUE	flashing	CPU trip	Keypad CPU detected fault.

Programming Altivar 312 Variable Speed Drive

Jog dial: Used for navigation by turning clockwise or counterclockwise. Pressing jog dial enables user to make a selection or confirm information.

STOP/RESET button: Enables detected fault to be reset; can be used to control motor stopping.

RUN button: Controls powering up of motor for forward running in LOCAL configuration and in REMOTE configuration if the [2/3 wire control] (tCC) parameter in [INPUTS /OUTPUTS CFG] (I-O-) menu is set to [Local] (LOC).

MODE button: 3-second press of MODE button switches between REMOTE and LOCAL configurations.

ESC button: Used to quit a menu or parameter or to clear value displayed in order to revert to value in memory. In LOCAL configuration, 2-second press of ESC button switches between Control and Programming modes.

Settings for 230V 3HP

UNS	(Rated Output Motor Voltage)	230
BFR	(Std. motor frequency)	60

Settings for 380V 3HP 50HZ

UNS	230
BFR	50

Settings for 460V 3HP

UNS	230
BFR	60

Settings for 230V 1PH

UNS	230
BFR	60


Troubleshooting Altivar 312 Variable Speed Drive

NOTE: The following pages are from Altivar 312 Variable Speed Drives Programming Manual, BBV46385, dated 07/2014. A complete copy can be found at <u>www.schneider-electric.com</u>.

[FAULT MANAGEMENT] (FLt-) menu



The parameters can only be modified when the drive is stopped and no run command is present. On the optional remote display terminal, this menu can be accessed with the switch in the \bigcap position.

Code	Description	Adjustment range	Factory setting
AFL	[Automatic restart]		[No] (nO)
	A	DANGER	
	 UNINTENDED EQUIPMENT OPERATION The automatic restart can only be used on mapersonnel or equipment. If the automatic restart is activated, R1 will only in restart sequence has expired. The equipment must be used in compliance with Eailure to follow these instructions will result in 	chines or installations which do not pose idicate a fault has been detected once the t national and regional safety regulations.	any danger to eithe ime-out period for the
9 E 5	The motor's automatic restart function will [2 wire] (2C), and [2 wire type] (tCt) = [Lev [No] (nO): Function inactive [Yes] (YES): Automatic restart if the fault h restart. The restart is performed by a serie periods: 1 s, 5 s, 10 s, then 1 min for subs	only be active in 2-wire level control ([2/3 v rel] (LEL) or [Fwd priority] (PFO)). has been cleared and the other operating co is of automatic attempts separated by increa- requent ones.	vire control] (tCC) = onditions permit the usingly longer waiting
	In the restart has not taken prace once the procedure is aborted and the drive remain This function is possible with the following [NETWORK FAULT] (CnF): Communication [CANopen com.] (COF): CANopen communic [External] (EPF): External fault [4-20mA] (LFF): 4-20 mA loss [Overbracking] (OPF): DC hus overceltage	conditions: on detected fault on the communication car unication detected fault	d
	[Drive overheat] (OHF): Dive overheating [Motor overload] (OLF): Motor overload [Mot. phase] (OPF): Motor phase loss [Mains overvoltage] (OSF): Line supply ov [Mains phase loss] (PHF): Line phase loss [MODBUS FAULT] (SLF): Modbus commu	rervoltage s unication	
	Relay R1 remains activated if this function be maintained.	is active. The speed reference and the ope	erating direction mus

[FAULT MANAGEMENT] (FLt-) menu

Code	Description Adjust range	nent Facto settin	tory
EAr	[Max. restart time]	[5 mi	nin] (
* 5	Parameter is only visible if [Automatic restart] (Atr) = [Yes] (YES). It can be used to limit the number of consecutive restarts in the event of a re- [5 min] (5): 5 minutes [10 min] (10): 10 minutes [30 min] (30): 30 minutes	current detected fa	fault.
14 24 34 52	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [Unlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max, duration of the restart process is limited to 3 hours) 	PUT PHASE LOS	SSJ
14 24 34 54 54	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [3 hours] (3h): 3 hours [Unlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max. duration of the restart process is limited to 3 hours) [Fault reset] 	PUT PHASE LOS	ss] (
14 24 34 55 r 55	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [Unlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max. duration of the restart process is limited to 3 hours) [Fault reset] [No] (nO): Not assigned 	PUT PHASE LOS	SS] (
14 24 36 55 55 1,1	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [Junlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max. duration of the restart process is limited to 3 hours) [Fault reset] [No] (nO): Not assigned [L11] (L11): Logic input L11 [L12] (L12): Logic input L12 	PUT PHASE LOS	ss]] (nC
14 24 34 55 r 55 L , 1 L , 2 L , 3	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [Unlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max. duration of the restart process is limited to 3 hours) [Fault reset] [No] (nO): Not assigned [L11] (L11): Logic input L11 [L12] (L12): Logic input L12 [L13] (L13): Logic input L13 	PUT PHASE LOS	ss] (
14 24 34 55 757 1,12 1,12 1,13 1,14	 [1 hour] (1h): 1 hour [2 hours] (2h): 2 hours [3 hours] (3h): 3 hours [Unlimited] (Ct): Unlimited (except for [MOTOR PHASE LOSS] (OPF) and [IN the max. duration of the restart process is limited to 3 hours) [Fault reset] [No] (nO): Not assigned [L11] (L11): Logic input L11 [L12] (L12): Logic input L12 [L13] (L13): Logic input L13 [L14] (L14): Logic input L14 	PUT PHASE LOS	ss]] (nC

*

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and set from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.



[FAULT MANAGEMENT] (FLt-) menu

Code	Description	Adjustment range	Factory setting
FLr	[Catch on the fly]		[No] (nO)
9 8 9 E 5	Used to enable a smooth restart if the run command is maint - Loss of line supply or simple power off - Reset of current drive or automatic restart - Freewheel stop The speed given by the drive resumes from the estimated spe follows the ramp to the reference speed. This function requires 2-wire control ([2/3 wire control] (tCC) = (LEL) or [Fwd priority] (PFO). [No] (nO): Function inactive [Yes] (YES): Function active When the function is operational, it activates at each run com (1 second max.). [Catch on the fly] (FLr) is forced to [No] (nO) if brake control [E	tained after the following eed of the motor at the tim = [2 wire] (2C)) with [2 wire nmand, resulting in a slig! Brake assignment] (bLC) i	events: e of the restart, then e type] (tCt) = [Level] ht delay s assigned, page <u>84</u>
EEF	[External fault ass.]		[No] (nO)
L . 1 L . 2 L . 3 L . 4 L . 5 L . 5 L . 5 L . 5 L . 5 L . 6 L . 1 L . 2 L . 2 L . 2 L . 2 L . 2 L . 2 L . 3 L . 4 L . 5 L . 5	 [No] (nO): Not assigned [L11] (L11): Logic input L11 [L12] (L12): Logic input L12 [L13] (L13): Logic input L13 [L14] (L14): Logic input L14 [L15] (L15): Logic input L15 [L16] (L16): Logic input L16 If [ACCESS LEVEL] (LAC) = [Level 3] (L3), the following ass [CD11] (CD11): Bit 11 of the control word from a communica [CD12] (CD12): Bit 12 of the control word from a communica [CD13] (CD13): Bit 13 of the control word from a communica [CD14] (CD14): Bit 14 of the control word from a communica [CD15] (CD15): Bit 15 of the control word from a communica 	ignments are possible: tion network tion network tion network tion network tion network	
LEE	[External fault config]		[Active high] (HIG)
L # H 16	 [Active low] (LO): The external fault is detected when the log changes to state 0. Note: In this case, [External fault ass.] (EtF) cannot be assign network. [Active high] (HIG): The external fault is detected when the log ass.] (EtF) changes to state 1. Note: Where [External fault config] (LEt) = [Active high] (HIG control word bit from a communication network, and where the detection, switching to [External fault config] (LEt) = [Active log detection. In this case, it is necessary to turn the drive off an 	ic input assigned to [Exte ed to a control word bit fro ogic input or the bit assign 6), [External fault ass.] (Efficience is no [External fault ass.] w] (LO) triggers [External d then back on again.	mal fault ass.] (EtF) om a communication and to [External fault (F) is assigned to a ass.] (EtF) fault fault ass.] (EtF) fault
EPL	[External fault mgt]		[Freewheel] (YES)
	[Ignore] (nO): Ignore	el ston	

[FAULT MANAGEMENT] (FLt-) menu

Code	Description	Adjustment range	Factory settin		
#PL	[Output Phase Loss]		[Yes] (YES)		
	A A DANGER				
	HAZARD OF ELECTRIC SHOCK EXPLOSION OF ARC EL	ASH			
	If [Output Phase Loss] (OPL) is set to nO loss of cable is not detected				
	Check this action will not endanger personnel or equipment in any wa	У			
	Failure to follow these instructions will result in death or serious in	jury.			
965 680	 [No] (nO): Function inactive [Yes] (YES): Tripping on the [MOTOR PHASE LOSS] (OPF) [Output cut] (OAC): No tripping on a [MOTOR PHASE LOSS] (O in order to avoid an overcurrent when the link with the motor is re even if [Catch on the fly] (FLr) = [No] (nO). To be used with out [Output Phase Loss] (OPL) is forced to [Yes] (YES) if [Brake as page <u>84</u>. 	PF), but management -established and catch put contactor. ssignment] (bLC) is no	of the output volta n on the fly perform it set to [No] (nO),		
IPL.	[Input phase loss]		[Yes] (YES)		
	This parameter is only accessible on 3-phase drives.				
965	 [No] (nO): Ignore [Yes] (YES): Stop mode when fault detected: freewheel 				
¤ H L	[Overtemp fault mgt]		[Freewheel] (YES)		
	CAUTION				
	RISK OF DAMAGE TO THE MOTOR		12.1		
	Inhibiting drive overheating fault detection results in the drive not being p Check that the possible consequences do not present any risk. 	protected. This invalid	ates the warranty.		
	Failure to follow these instructions can result in equipment damage	e.			
985 598 598 598	 [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel [Ramp stop] (rMP): Detected fault management with stop on ra [Fast stop] (FSt): Detected fault management with fast stop 	stop mp			
e L L	[Overload fault mgt]		[Freewheel] (YES)		
	CAUTION				
	RISK OF DAMAGE TO THE MOTOR	up provided by the dr	ivo. Provido an		
	alternative means of thermal protection.	uer provided by the dr	ive. Provide an		
	Failure to follow these instructions can result in equipment damage	э.			
yes raP	[Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel [Ramp stop] (rMP): Detected fault management with stop on ra	stop mp			
FSE	[Fast stop] (FSt): Detected fault management with fast stop				

[FAULT MANAGEMENT] (FLt-) menu

Code	Description Adjustment range	The Factory setting				
SLL	[Modbus fault mot]	[Freewheel]				
	in finder as four migh	(YES)				
	A WARNING					
	LOSS OF CONTROL					
	If [Modbus fault mgt] (SLL) = [Ignore] (n0), communication control will be inhibited. For inhibiting the communication fault detection should be restricted to the debug phase or to	safety reasons, special applications.				
	Failure to follow these instructions can result in death, serious injury, or equipmen	t damage.				
yes rnP FSE	 [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (rMP): Detected fault management with stop on ramp [Fast stop] (FSt): Detected fault management with fast stop This parameter does not apply to PC-Software. 					
EaL	[CANopen fault mgt]	[Freewheel] (YES)				
	WARNING					
	LOSS OF CONTROL					
	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to	or safety reasons,				
700 965 F52	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipmen [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (rMP): Detected fault management with fast stop [Fast stop] (FSt): Detected fault management with fast stop]	or safety reasons, special applications. t damage.				
пр УЕ5 ГпР F5L ЕпL	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipmen [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (fMP): Detected fault management with fast stop [Fast stop] (FSt): Detected fault management with fast stop [Autotune fault mgt]	or safety reasons, special applications. t damage. [Yes] (YES)				
YES FSE EnL YES	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipment [Ignore] (nO): Ignore [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (rMP): Detected fault management with stop on ramp [Fast stop] (FSt): Detected fault management with fast stop Image: Im	or safety reasons, special applications t damage. [Yes] (YES) ng is unsuccessful [AU (tnL) is forced to [Yes]				
yes rnP FSE EnL YES LFL	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipment [Ignore] (nO): Ignore [Ignore] (nO): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (rMP): Detected fault management with stop on ramp [Fast stop] (FSt): Detected fault management with fast stop Image: Im	for safety reasons, special applications t damage. [Yes] (YES) ng is unsuccessful [AU (tnL) is forced to [Yes [Freewheel] (YES)				
9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. F inhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipmer [[Ignore] (nO): Ignore [[Freewheel] (YES): Detected fault management with freewheel stop [[Ramp stop] (fMP): Detected fault management with stop on ramp [[Fast stop] (FSt): Detected fault management with fast stop [[Autotune fault mgt]] This parameter can be used to manage drive behavior in the event that auto-tuni TUNING FAULT] (tnF) [[No] (nO): Ignored (the drive reverts to the factory settings) [[Yes] (YES): Detected fault management with drive locked If [Cold stator resist.] (rSC), page 42, is not set to [No] (nO), [Autotune fault mgt (YES). [[Ignore] (nO): Ignored (only possible value if [A13 min. value] (CrL3) < 3 mA, page [[Freewheel] (YES): Detected fault management with freewheel stop [[failback spd] (LFF): The drive switches to the fallback sped ([failback spd] (LFF) [Spd maint.] (rLS): The drive maintains the speed at which it was operating whe This speed is saved and stored as a reference until the fault has disappeared. [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Detected fault management with fast stop [[Fast stop] (FSt): Dete	for safety reasons, special applications t damage. [Yes] (YES) ng is unsuccessful [AU (tnL) is forced to [Yes [Freewheel] (YES) e 48) F) parameter). In the loss was detecte ection of input Al3. played.				
YES FSE EnL YES LFL YES LFF FSE LFF	LOSS OF CONTROL If [CANopen fault mgt] (COL) = [Ignore] (n0), communication control will be inhibited. Finhibiting the communication fault detection should be restricted to the debug phase or to Failure to follow these instructions can result in death, serious injury, or equipmer [Ignore] (n0): Ignore [Freewheel] (YES): Detected fault management with freewheel stop [Ramp stop] (rMP): Detected fault management with stop on ramp [Fast stop] (FSt): Detected fault management with fast stop Image: Image	ior safety reasons, special applications t damage. [Yes] (YES) ng is unsuccessful [AU (tnL) is forced to [Yes [Freewheel] (YES) e 48) F) parameter). n the loss was detecte ection of input Al3. played. : 10 Hz				

[FAULT MANAGEMENT] (FLt-) menu

Code	Description	Adjustment range	Factory setting
dra	[Derated operation]	marks the	[No] (nO)
2s yES	Lowers the tripping threshold of [Undervoltag voltage drops. [No] (nO): Function inactive [Yes] (YES): Function active In this case, drive performance is derated.	je] <mark>(USF): in</mark> order to operate on line su	pplies with 50%
	CA	UTION	
	RISK OF DAMAGE TO DRIVE When [Derated operation] (drn) = [Yes] (YES), use a Failure to follow these instructions can result in ed	a line choke (see catalog). quipment damage.	
5 <i>E P</i>	[UnderV. prevention]		[No] (nO)
n 9 n 9 r 11 P F 5 E	This function can be used to control the type [No] (NO): Locking of the drive and freewheel [DC Maintain] (MMS): This stop mode uses th possible. [Ramp stop] (rMP): Stop according to the vali [Fast stop] (FSt): Fast stop, the stopping time	of stop where there is a loss of line sup I stopping of the motor he inertia to maintain the drive power s id ramp ([Deceleration] (dEC) or [Decel e depends on the inertia and the brakin	oply. upply as long as leration 2] (dE2)) g ability of the drive
in H	[Fault inhibit assign.]		[No] (nO)
		DANGER	-
2 s	 LOSS OF PERSONNEL AND EQUIPMENT PROTECT Enabling the fault inhibition parameter [Fault inhibite features. InH should not be enabled for typical applications of InH should be enabled only in extraordinary situation presence of adjustable speed drive protection poses Failure to follow these instructions will result in determinant. 	CTION bit assign.] (inH) will disable the drive f this equipment. ions where a thorough risk analysis do s a greater risk than personnel injury or eath or serious injury.	controller protection emonstrates that to equipment damag
L : 1 L : 2 L : 3 L : 4 L : 5	This function disables drive protection for the SLF, CnF, EPF, CrF, LFF, OHF, OBF, OLF, d [No] (nO): Not assigned [L1] (L11): Logic input L11 [L12] (L12): Logic input L12 [L13] (L13): Logic input L13 [L14] (L14): Logic input L14 [L15] (L15): Logic input L15	following detected faults: OSF, OPF, PHF, SOF, tnF, COF, bLF	



The jog dial (ENT) needs to be pressed and held down (for 2 s) to change the assignment for this parameter.

[FAULT MANAGEMENT] (FLt-) menu

Code	Description Adjustment range	Factory setting
rPr	[Operating t. reset]	[No] (nO)
r E H	 [No] (nO): No [rst. runtime] (rtH): Operating time reset to zero The [Operating t. reset] (rPr) parameter automatically returns to [No] (nO) after reset 	etting to 0.
r P	[Product reset]	[No] (nO)
		-
		-
		L
25	LA DANGER UNINTENDED EQUIPMENT OPERATION You are going to reset the drive. • Check this action will not endanger personnel or equipment in any way.	
2 s	DANGER UNINTENDED EQUIPMENT OPERATION You are going to reset the drive. • Check this action will not endanger personnel or equipment in any way. Failure to follow these instructions will result in death or serious injury.	

The jog dial (ENT) needs to be pressed and held down (for 2 s) to change the assignment for this parameter.



Appendix E

Dryer Startup

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

Appendix E

Dryer Startup

Following are minimum actions required to successfully start dryer. **See Software Manual for detailed instructions.**

IMPORTANT: Augers, fan(s) and heater(s) on dryer, along with auxiliary fill and take-away equipment, will start without warning during dryer operation. Use extreme caution around grain handling system.

- 1. Open the power box and ensure that all internal breakers and starter protectors are turned on. Close door to power box, close latch, and turn Main Disconnect to "ON".
- 2. Pull Emergency Stop button out. It should illuminate red. If using QuadraTouch Pro[™] controller, System Control Switch needs to be turned to "COMPUTER" position. If using manual backup system, "MANUAL" needs to be selected. The System Control switch will illuminate when power has been applied.
- 3. Turn on QuadraTouch Pro control unit using green rocker switch on bottom right of console. All faults must be cleared before dryer can start.
- 4. Press "Start" to choose an operation. Display will give options of selecting Continuous Flow, Manual Operation, Grain Transfer, Dry Fire, Final Dry and Auto Batch.

NOTE: Press "Reset" to abort dryer startup or to stop any operation in progress.

NOTE: Please refer to Software Manual for a detailed description of each operation mode. Software is updated frequently, so content may differ slightly from descriptions in this manual.

For Continuous Flow

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

Initial Dry

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

Restart & Stabilization

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

Restart without Stabilization

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

For Automatic Batch

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

For Grain Transfer

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

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

Adjusting the Heater Vaporizer Coil



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



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



Fault Condition Vapor Over-Temp

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

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



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



Sukup Manufacturing Co.

1555 255th Street, PO Box 677 Sheffield, Iowa USA 50475 Fax: 641-892-4629 E-mail: Info@sukup.com

SAMPLE Sukup Grain Dryer Startup Checklist

(Use ball point pen and press firmly)

Cus	stomer:	Dealer:	
Stre	eet:	Street:	
City	//State:	City/State:	
Dry	er Model #: T	Serial #:	
Dat	e:	Tested By:	
		(Please Print Name)	Initials
1.	Tighten all gas connections and check that all electrical wi	res are inserted properly and secured.	
2.	Ensure that gas and electrical power is connected properly	and secured.	
3.	Check that all circuit breakers and starter protectors in the	power box are in the ON position.	_
4.	Check the ground rod for proper installation and secure co	nnections.	_
5.	Check that the gas supply is ready for use and all manual	valves are in the OPEN position.	
6.	Turn on main power disconnect handle, pull out E-Stop. E	-Stop should illuminate red.	
7.	Turn the system control switch to COMPUTER, it should if The QuadraTouch Pro™ Controller. Connect the Etherne The QuadraTouch Pro™ panel will take approx. 1 min to b must be cleared before proceeding.	luminate green. Plug in and turn on t cable from the controller to the dryer. boot up. Any fault conditions that exist	
8.	 Perform Dry Fire tests by pressing START → Dry Fire (Re of the Dryer Manual.) 1. Check each fan for proper rotation. 2. Check each heater for proper operation, and check for lusing soapy water. Inspect each component for structure 	fer to the Software Manual Section eaks on the gas pipe train by ral integrity and proper operation.	
9.	Perform sensor test by pressing "Sukup" logo in top left co System Diagnostics screen. The display should show amb moisture. Press the "Back" or "Reset" button to return to re	rner. This will take you to the ient temperature and little to no nain screen.	
10.	Go into manual operation by pressing START \rightarrow Manual (Operation.	
11.	Press "Load" button. It's "X" should change to a checkmar Check the leveling auger for correct rotation. Check all Au Press "Load" button again to stop the operation.	k, and start the load operation. xiliary load augers as necessary.	
12.	Press "Unload" button. Check unload auger for correct rot as necessary.	ation. Check all Auxiliary unloads	
13.	Increase and decrease the meter roll speed to confirm that	t the speed is changing.	
14.	Press "Reset" - all moving parts should stop.		
15.	Secure the Power box by turning the system control switch and turning off the main power disconnect (on the power b Lock out power.	n to "OFF", pushing in the E-Stop, lox door).	

(Signature)

Appendix E





AUTOMATIC DRYER PARTS ASSEMBLIES EU – Under Declaration of Incorporation







Sukup Manufacturing Company

1555 255th Street, Box 677 Sheffield, Iowa, USA 50475-0677

Phone: 641-892-4222 Website: www.sukup.com Fax: 641-892-4629 E-mail: info@sukup.com

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PARTS FOR FANS 2015 AND PRIOR								
REF #	DESCRIPTION	28" 20HP 50Hz	28" 25HP 50Hz	38" 20HP 50Hz	38" 25HP 50Hz	44" 40HP 50Hz	44" 50HP 50Hz	
1	Housing	T28551	T28551	T12986	T12986	T20980-50	T20980-50	
2	Blade	J3058	J3059	J3050	J3048	J3067	J3068	
3	Venturi	J3080	J3080	J3085	J3085	J3090	J3090	
4	Inlet Screen	D3824	D3824	J3132	J3132	J2957	J2957	
5	Belt	J02521 (BX94)	J02521 (BX94)	J02521 (BX94)	J02521 (BX94)	J02560 (BX96)	J02560 (BX96)	
6	Fan Pulley	J03381	J03381	J03457	J03457	J03493	Ĵ03495	
7	Fan Bushing	J04241	J04241	J04253	J04253	J04285	J0432	
8	Motor Pulley	J0358	J0358	J0358	J0358	J0356	J0356	
9	Motor Pulley Bushing	J04273	J04274	J04273	J04274	J04277	J04278	
10	Blade Bushing	J0436	J0436	J0435	J0435	J04371	J04372	
11	Shaft	T21062	T21062	T21063	T21063	T21064	T21109	
12	Shaft Bearing w/Housing	J0008	J0008	J00471	J00471	J0047	J0048	
13	Shaft Support	T21070	T21070	T21071	T21071	T21072	T21106	
	Complete Fan	T25230D	T25231D	T17184E	T24289E	T20178E	T25179E	

DRYER FAN PARTS 28" 25HP 50Hz



DRYER FAN PARTS 28" 25HP 50Hz

PARTS FOR FANS 2016 AND LATER					
REF #	DESCRIPTION	ITEM #	QTY		
1	28" Housing, 50HZ	T28660	1		
2	28" Fan Blade, 50HZ, 30Deg	J3059	1		
3	Venturi, 28 V Axial, Inlet, Painted	J3080	1		
4	Fan Screen, 28"	D3824	1		
5	Belt, BX78	J02281	2		
6	Pulley, 5.75" OD, 2B54SDS	J03381	1		
7	Bushing, 1-3/8, SDS	J04241	1		
8	Pulley, 8.95 OD, 2B86SK	J0358	1		
9	Bushing, 48mm, SK	J04274	1		
10	Bushing, 1.125, Trantorque	J0436	1		
11	Shaft, 1-3/8" 1-1/8" Trantorque	T28681	1		
12	Bearing, 1.375, Snlg Plwblk, HCP207-22	J0008	1		
13	Bearing, 1.375, Sngl Plwblk, Sph Rol	J00081	1		
14	Motor Mount Support Bracket	T21919	1		
15	Bracket, Belt Guard	T21931	1		
16	Pivot Rod, Motor Mount	T21932	1		
17	Cross Channel, Motor Mount	T28667	1		
18	Lower Channel, Motor Mount	T28668	1		
19	Belt Guard, 10-25 Hp	T28670	1		
20	Motor Mount Weldment, 10-30 Hp	T28676	1		
21	Base Plate, Motor Mount	T28678	1		
22	Door, Service, 28", VA Htr, Galv	D6311	1		
23	Screw, 5/16-18, 3/4", PLT, GR5, HHWZ	J0536	21		
24	Screw, 3/8-16, 1.00, GR8, HHWZ	J0611	17		
25	Screw, 3/4-10 X 6, PLT, GR5	J0824	2		
26	Nut, 3/8-16 Flange Whizlok	J1017	16		
27	Nut, 3/4-10, PLT, GD5, Hex	J1051	2		
28	Nut, Whiz, 5/16-18	J1110	16		
29	Washer, Flat, 1/2	J1125	1		
30	Washer, Flat, 1	J1132	2		
31	Washer, Flat, 5/16, PLT	J1140	1		
32	Pin, Cotter, 3/16, 1-1/2 PLT	J1432	2		
33	Screw, 1/4-20 X 0.50 HHWZ	J05083	5		

DRYER FAN PARTS 44" 40HP 50Hz



T21904 05/17/2016 KGJ

DRYER FAN PARTS 44" 40HP 50Hz



DRYER FAN PARTS 44" 40HP 50Hz

	PARTS FOR FANS 2016 AND LATER					
REF #	DESCRIPTION	ITEM #	QTY			
1	44" Fan Housing, Belt Drive	T21910	1			
2	Motor Mount Support Bracket	T21919	1			
3	Cross Channel, Motor Mount	T21920	2			
4	Shaft, 1-7/8" Trantorque	T21933	1			
5	Base Plate, Motor Mount	T21922	1			
6	Motor Mount Weldment, 25-50 Hp	T21923	1			
7	Belt Guard, 25-50 Hp	T21930	1			
8	Bracket, Belt Guard	T21931	1			
9	Pivot Rod, Motor Mount	T21932	1			
10	Screw, 3/4-10 X 6, PLT, GR5	J0824	2			
11	Nut, 3/4-10, PLT	J1051	2			
12	1" Shaft Collar	J1335	1			
13	Screw, 3/8-16, 1.00, GR8, HHWZ	J0611	17			
14	Nut, 3/8-16 Flange Whizlok	J1017	16			
15	Pulley, 7.35 OD, 3B70SK	J03493	1			
16	Brg, 2.125, Snlg Plwblk HCLP211-34	J0048	2			
17	Bushing, 2-1/8", SK	J0432	1			
18	Nut, Whiz, 5/16-18	J1110	16			
19	Screw, 5/16-18, 3/4", PLT, GR5, HHWZ	J0536	14			
20	Screw, 5/16-18X.75, TRS HG WZLK	J0529	1			
21	Screw, 5/16-18, 1.00, PLT, G5, HHWZ	J0537	1			
22	Washer, Flat, 1	J1132	2			
23	Pin, Cotter, 3/16, 1-1/2 PLT	J1432	2			
24	Screw, 5/8-11, 2.50, GR5	J0794	4			
25	Washer, Flat, 5/8	J1127	8			
26	Washer, Lock, 5/8, Split	J1218	4			
27	Nut, 5/8-11	J1046	4			
28	Keystock 1/2" x 2-1/2	D1681	1			
29	Screw, 1/4-20 X 0.50 HHWZ	J05083	4			
30	Washer, Flat, 5/16, PLT	J1140	1			
31	Venturi, 44", V Axial, Inlet, Painted	J3090	1			
32	Bush, 1.875, Trantorque	J04371	1			
33	Belt, B X 98	J02561	3			
34	Blade, 44" Fan, 40 Hp	J3067	1			
35	Screen, 44" Axial Fan	J2957	1			



	PARTS FOR HEATERS 2016 AND LATER								
REF #	DESCRIPTION	28" LP	38" LP	44" LP					
1	Housing	T28660	T12995	T16995					
2	Burner	D4017	T29800	T29800					
3	Vaporizer	D70321	D7034	T16194					
4	Flame Deflector								
5	Port Cup	D4025							
6	Flame Sensor	J5747	J5747	J5747					
7	Spark Plug	J5739	J5739	J5739					
8	Compression Set for Flame Sensor	J5748	J5748	J5748					



PIPE TRAIN, EL MOD VALVE 1/2", 28" FAN-HEATER
LP MODEL – T20200D

REF. #	DESCRIPTION	QTY	COMP. #
1	EYEBOLT, PIPE TRAIN, 5/8"COLLAR	2	D71162
2	NUT,HEX,3/8-16,PLT	4	J1020
3	NIPPLE,1/4X1 1/2,BLKPIPE,SCH 80	3	J2400
4	NIPPLE,1/4 X CL,SCH 80	1	J24003
5	STRAINER,LIQ,1/4"	1	J5990
6	TEE,1/4X1/4X1/4,SCH 80	2	J2470
7	PLUG,3/8,PIPE,BLACK	1	J2610
8	ELBOW,3/8FLX1/4MIP,90 DEG,E1-6B	1	J2740
9	VALVE,1/4",RELIEF,3865-250	2	J6050
10	VALVE,1/4 ,LP BALL	1	J6080
11	CONDUIT,LIQ VLV ACT 28",ASSY	1	T17092
	HOSE TO VAPORIZER (Not shown)	1	J5937

PIPE TRAIN, EL MOD VALVE 1/2", 28" FAN-HEATER LP MODEL – T18810D



REF#	DESCRIPTION	QTY	COMP#	REF#	DESCRIPTION	QTY	COMP#
1	REGULATOR, 1/2"X1584MN, CGA ONLY	1	J6110	20	UNION,3/4,BLACK,#150	1	J2710
2	NIPPLE, 1/2X2, SCH 40	3	J24061	21	NIPPLE, 3/4 X 10" SCH 80	1	J2429
3	ELBOW,1/2,90 DEGREE,SCH 40	1	J2522	22	ELBOW,3/4,90 DEGREE,SCH 40	2	J2525
4	VALVE,GAS,1/2",VGG10.154U	2	J6235	23	NIPPLE,3/4 X 8,SCH 40	1	J2418
5	KIT,NEMA 4,AGA66	2	J6241	24	COUPLING, REDUCING, 1/2X1/4, SC40	1	J2572
6	ACTUATOR,SKP15.001E1	2	J6240	25	VALVE,1/4", RELIEF,A1325,H120	1	J6171
7	NIPPLE, 1/2 X CLOSE, SCH 40	4	J2405	26	BRACKET, ELECTRONIC MOD VALVE	1	T161935
8	TEE,1/2X1/2X1/2,SCH 40	1	J2471	27	COVER, ELECTRONIC VALVE	1	T26902
9	BUSHING, REDUCING, 1/2X1/4, MAL	1	J2569	28	SCREW,#10-16,3/4,PLT,SELFDRILL	4	J0469
10	NIPPLE, 1/4 X CL, SCH 80	3	J24003	29	EYEBOLT, PIPE TRAIN, 7/8"COLLAR	2	D71161
11	UNION,1/4",SCH 40	1	J2703	30	NIPPLE,1/2X1 1/2,SCH 80	1	J2406
12	ELBOW,1/4 X 90,SCH 40	2	J2526	31	TEE,1/2X1/2X1/2,SCH 80	1	J2472
13	NIPPLE,1/4X3,SCH 40	1	J2411	32	PLUG,1/2,SQ HD,BLACK PIPE	1	J2617
14	SWITCH, HIGH PRES, ASHCROFT	1	J4432	33	NIPPLE, 1/2 X 6, SCH 80	1	J24093
15	VALVE, BUTTERFLY L/ACTUATOR, 1/2	1	J6125	34	ELBOW, 1/2, 90 DEGREE, SCH 80	1	J2523
16	TEE,REDUCING,3/4X1/2X1/2,SCH 40	1	J2481	35	UNION,1/2FLX1/2MIP,U1-8D	1	J2840
17	ELBOW,STREET, 1/4,90 DEG,SCH 40	2	J2517	36	BUSHING,REDUCING,1/4X1/8	1	J2560
18	GAUGE, PRES, 0-30, LIQ, 1/4"BTM MT	1	J5960	37	GAUGE, PRES, 30PSI, 01B XUC, PM	1	J5959
19	NIPPLE,3/4 X CLOSE,SCH 40	1	J2410		HOSE FROM VAPORIZER (Not shown)	1	J5938

PIPE TRAIN, EL MOD VALVE 1/2", 38" FAN-HEATER LP MODEL – T161872D





REF. #	DESCRIPTION	QTY	COMP. #
1	TEE,1/2X1/2X1/2,SCH 80	2	J2472
2	NIPPLE,1/2X1 1/2,SCH 40	4	J2406
3	VALVE,1/2",BALL,ITT 1550	1	J6082
4	EYEBOLT, PIPE TRAIN, 7/8" COLLAR	2	D71161
5	NUT,HEX,3/8-16,PLT	4	J1020
6	STRAINER,WYE,1/2",20 MESH	1	J5992
7	PLUG,3/8,PIPE,BLACK	1	J2610
8	VALVE,1/2",RELIEF,3129G,H135-2	2	J6170
9	RAIN CAP,7545-10	2	J6200
10	ELBOW,1/2FLX1/2MIP,90DE,E1-8D	1	J2745
11	ELBOW,STREET,1/2,90 DEG,SCH 80	1	J2519
12	CONDUIT W/J6257 SOLENOID, LIQ, W/WRS, D-C	1	T17097
	HOSE TO VAPORIZER (Not shown)	1	J5938

PIPE TRAIN, EL MOD VALVE 3/4", NG, 28" FAN-HEATER **CE MODEL – T18811D** (29) DETAIL A SCALE 1 : 5 (27) (28) (22)-(23)-(24)-(23)-(23)-(23) (25) 25 (26) 6 DETAIL B SCALE 1 : 5 (4 23 3 (24) Z (13) (7) (20)(16)(11) 6 6 3 (12) (4) THE ₿ A ∑© [6 Å 4 8 H (5) (4) (8) (2) 2 Ø 4 匝 P (1) (4) (1) (29)(19) 9 (15) (10) (10)

REF#	DESCRIPTION	QTY	COMP#	REF#	DESCRIPTION	QTY	COMP#
1	Valve, Gas, ³ / ₄ " Single, VGG10.2044	2	J6236	16	Bracket, Electronic Mod Valve	1	T161935
2	Nipple, ¾ x 2, SCH 40	2	J2420	17	Screw, #10-16, ¾, PLT, Self-drill	4	J0469
3	Elbow, ¾, 90 deg., SCH 40	3	J2525	18	Eyebolt, Pipe Trn, 1-1/16" Sft Collar	2	T18810
4	Nipple, ¾ x Close, SCH 40	7	J2410	19	Plug, ¾, Pipe	1	J2620
5	Valve, ¾, Ball	1	J6083	20	Cover, Elect. Valve, 5.625 x 3.5	1	T26902
6	Kit, NEMA 4, AGA66	2	J6241	21	Nipple, ¾ x CLS, BRS, Hex	1	J2416
7	Actuator, SKP15.001E1	2	J6240	22	Bushing, Reducing, ¾ x ¼, SCH 40	1	J2570
8	Tee, ¾ x ¾ x ¾, SCH 40	3	J2485	23	Nipple, ¼: x 7/8", SCH 40	3	J24003
9	Valve, Butterfly, L/Act., 3/4, Maxon	1	J6126	24	Union, ¼:, SCH 40	1	J2703
10	Elbow, Street, ¼, 90 deg., SCH 40	2	J2517	25	Elbow, ¼ x 90, SCH 40	2	J2526
11	Gauge, Press., 0-15, Liq, ¼" BTM, MT	1	J5967	26	Nipple, ¼" x 7/8", SCH 40	1	J2411
12	Union, ¾, Black, #150	1	J2710	27	Switch, High Pressure, 30-60 psi	1	J4432
13	Pipe, ¾ x 10, SCH 40	1	J2429	28	Bushing, Reducing, ¼ x 1/8	1	J2560
14	Pipe, ¾ x 9, SCH 40	1	J24181	29	Gauge, Press., 15 psi Liquid-filled	1	J5965
15	Coupling, Reducing, ³ ⁄ ₄ x ¹ ⁄ ₄ SC40	1	J2574		Hose from manifold (Not shown)	1	J5928

PIPE TRAIN, EL MOD VALVE 3/4", 38" & 44" FAN-HEATER LP MODEL – T18812D

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(21)

-8) -(7)

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(28)

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(16)



DETAIL B SCALE 1 : 4



REF. #	DESCRIPTION	QTY	COMP. #	REF. #	DESCRIPTION	QTY	COMP. #
1	VLVE, BTRFL L/ACTUATOR, 3/4 MAXON	1	J6126	21	GAUGE,PRES,0-30,LIQ,1/4"BTM,MT	1	J5960
2	NIPPLE,3/4 X 2,SCH 40	5	J2420	22	COVER, ELECTR VLVE, 5.625X3.5	1	T26902
3	NIPPLE,3/4 X CLOSE,SCH 40	3	J2410	23	BRACKET, ELECTRONIC MOD VALVE	1	T161935
4	NIPPLE,3/4" X 3"	1	J2423	24	VALVE,1/4", RELIEF,A1325,H120	1	J6171
5	VALVE,GAS,3/4"SNGL,VGG10.2044	2	J6236	25	NIPPLE,1/4 X 7/8",SCH 40	8	J24003
6	UNION, 1/4", SCH 40	3	J2703	26	BUSHING,REDUCING,1/4X1/8	1	J2560
7	SWITCH, PRESS., DUNGS, GW6000 A4H	2	J4443	27	GAUGE,PRES,30PSI,T6BU-1/8,PM	1	J5959
8	KIT,NEMA 4,AGA66	2	J6241	28	TEE,SIDE OUTLET, 3/4 BLACK	1	J2490
9	ACTUATOR, SKP15.001E1	2	J6240	29	BUSHING,REDUCING,3/4 x 1/4, SCH40	3	J2570
10	ELBOW,3/4,90 DEGREE,SCH 40	3	J2525	30	SWITCH, PRESS., DUNGS, GW6000 A4	1	J4437
11	UNION,3/4,BLACK,#150	2	J2710	31	ELBOW,1/4 X 90,SCH 40	4	J2526
12	ELBOW,STREET,3/4,90 DEG,SCH 40	3	J2530	32	NIPPLE, 1/4 X 2, SCH 40	2	J24001
13	REGLTR,3/4",DRILL'D+TAPP'D, ¼" NPT	1	T19015	33	SCREW, 1/4-20, 3/4 PLT, SELFDRILL	2	J0496
14	EYEBOLT, PIPE TRAIN, HEATER	1	T16224	34	STUD,WELD,RTANGLE,10-24 x 1/2" LG	1	J0975
15	NIPPLE, 3/4 X 6, SCH 80	1	J2428	35	NUT, #10-24, WING	1	J0976
16	TEE,3/4X3/4X3/4,SCH 80	1	J2491	36	NUT, HEX, 3/8-16,PLT	2	J1020
17	PLUG,3/4, PIPE	1	J2620	37	RAIN CAP, 7545-10	1	J6200
18	TEE,3/4X3/4X3/4,SCH 40	1	J2485	38	SHIM	1	T10150
19	NIPPLE, 3/4 X 6-1/2, SCH 80	1	J2427	39	CONN, DIN, ACCUATOR (SWITCH) AGA65	2	J6229
20	ELBOW,STREET,1/4,90 DEG,SCH 40	2	J2517				

PIPE TRAIN, EL MOD VALVE 1-1/2", 38" FAN-HEATER NG MODEL – T18813D



REF #	DESCRIPTION	QTY	COMP #	REF #	DESCRIPTION	QTY	COMP #
1	VALVE, 1 ¹ / ₂ ", BALL (FIREING)	1	J6087	16	ELBOW,STREET,1.5",90 DEG,SCH 40	1	J2542
2	NIPPLE, 1.5 X CLOSE, SCH 40	3	J2431	17	BRACKET, ELECTRONIC MOD VALVE	1	T161935
3	FLANGE SET, 1 1/2" NPT, AGA4U	2	J6239	18	COVER,ELECT VLV, 5.625 X 3.5	1	T26902
4	VALVE,GAS,1 1/2",DBL,VGD20.403	1	J6237	19	SCREW,#10-16,3/4,PLT,SELFDRILL	4	J0469
5	KIT,NEMA 4,AGA66	2	J6241	20	NIPPLE, 1/2 X CLOSE, SCH 40	1	J2405
6	ACTUATOR,SKP15.001E1	2	J6240	21	COUPLNG, REDUCING, 1/2X1/4, SCH 40	1	J2572
7	NIPPLE, 1 1/2 X 2,SCH 40	1	J2432	22	COUPLING, REDUCING, 1 ½ X1, SCH 40	1	J2553
8	ELBOW,1 1/2", 90 DEG,SCH 40	5	J2541	23	NIPPLE, 1/4 X 1 ½, SCH 40	10	J24001
9	UNION,1 1/2",SCH 40	2	J2707	24	ELBOW, 1/4X90, SCH 40	6	J2526
10	NIPPLE,1.5 X 6",SCH 40	3	J2437	25	UNION, 1/4", SCH 40	2	J2703
11	VLV,BUTTERFLY L/ACT,1 1/2", MAXON	1	J6127	26	SWITCH, PRESS, DUNGS, GW2000 A4	1	J4437
12	NIPPLE,1.5 X 3",SCH 40	3	J2433	27	NIPPLE, 1/4 X 7/8, SCH 40	1	J24003
13	TEE,REDUCE, 1 ½ X 1 ½ X ½	1	J2479	28	TEE,1/4X1/4X1/4,SCH 40	1	J2469
14	GAUGE,PRESS,0-15,LIQ,1/4"BTM, MT	2	J5967	29	SWITCH, HIGH PRESSURE, 30-60 PSI	1	J4432
15	NIPPLE, 1 1/2 X 2 1/2,SCH 40	1	J24084				

PIPE TRAIN, EL MOD VALVE 1-1/2", 44" FAN-HEATER NG MODEL – T18814D



REF #	DESCRIPTION	QTY	COMP #	REF #	DESCRIPTION	QTY	COMP #
1	VALVE, 1 1/2", BALL (FIREING)	1	J6087	16	ELBOW,STREET,1.5",90 DEG,SCH 40	3	J2542
2	NIPPLE, 1.5 X CLOSE, SCH 40	3	J2431	17	BRACKET, ELECTRONIC MOD VALVE	1	T161935
3	FLANGE SET, 1 1⁄2" NPT, AGA4U	2	J6239	18	COVER, ELECTRONIC VLV, 5.625 X 3.5	1	T26902
4	VALVE,GAS,1 1/2",DBL,VGD20.403	1	J6237	19	SCREW,#10-16,3/4,PLT,SELFDRILL	4	J0469
5	KIT,NEMA 4,AGA66	2	J6241	20	NIPPLE, 1/2 X CLOSE, SCH 40	1	J2405
6	ACTUATOR,SKP15.001E1	2	J6240	21	COUPLING, REDUCING, 1/2X1/4, SC40	1	J2572
7	NIPPLE, 1 1/2 X 2,SCH 40	1	J2432	22	COUPLING, REDUCING, 1 ½ X1, SC40	1	J2553
8	ELBOW,1 1/2", 90 DEG,SCH 40	4	J2541	23	NIPPLE, 1/4 X 1 1/2, SCH 40	10	J24001
9	UNION,1 1/2",SCH 40	2	J2707	24	ELBOW, 1/4X90, SCH 40	6	J2526
10	NIPPLE,1.5 X 6",SCH 40	3	J2437	25	UNION, 1⁄4", SCH 40	2	J2703
11	VLV,BUTTERFLY L/ACT,1 1/2", MAXON	1	J6127	26	NIPPLE, 1/4 X 7/8, SCH 40	1	J24003
12	NIPPLE,1.5 X 3",SCH 40	2	J2433	27	TEE,1/4X1/4X1/4,SCH 40	1	J2469
13	TEE,REDUCE, 1 1/2 X 1 1/2 X 1/2	1	J2479	28	SWITCH, HIGH PRESSURE, 30-60 PSI	1	J4432
14	GAUGE,PRESS,0-15,LIQ,1/4"BTM, MT	2	J5967	29	SWITCH, PRESS, DUNGS, GW2000 A4	1	J4437
15	NIPPLE, 1 1/2 X 2 1/2,SCH 40	1	J24084				

Manifold, 12', 1 ½", NG T25158



REF #	DESCRIPTION	QTY	COMP #
1	SOLENOID ASSY, NG, 1 1/2"	1	T25163
2	HOSE, NG, 1 1⁄2 X 36"	1	J5935
3	NIPPLE,1.5 X CLOSE, SCH 40	2	J2431
4	ELBOW,STREET,1.5",90 DEG,SCH 40	3	J2542
5	ELBOW,1 1/2",90 DEG,SCH 40	1	J2541
6	STRAINER,1 1/2"	1	J6232
7	VALVE,1 ½", BALL (FIREING)	1	J6087
8	NIPPLE,1.5 X 4, SCH 40	1	J2436
9	PLUG,1"	1	J2625
10	BRACKET, MANIFOLD, NG	1	T24183
11	UNION, 1 1/2", SCH 40	1	J2707
12	NIPPLE,1.5 X 6", SCH 40	1	J2437
13	U-BOLT,5/16-18 X 2 9/16 ID, 2 7/8 D	1	J08101

Manifold, 16' and 28' Dryer, 2/3-1/3, LP T24159C









DETAIL D SCALE 1 : 6

REF #	DESCRIPTION	QTY	COMP #	REF #	DESCRIPTION	QTY	COMP #
1	HOSE, HIGH PRESSURE, 3/4" X 48"	2	J5928	16	ELBOW, 1/2" X 90 DEG,SCH 80	2	J2523
2	SOLENOID ASSY, LP, 3/4", MANIFLD	1	T24166C	17	PIPE, 1/2" X 6', SCH 80	1	T24163
3	ELBOW,STREET,3/4",90 DEG,EX HVY	3	J2532	18	BRACKET, SHORT, MANIFOLD, LP	1	T24184
4	VALVE, ¾", BALL	1	J6083	19	BRACKET,LONG,MANIFOLD, LP	3	T24185
5	NIPPLE,3/4 X CLOSE, SCH 80	3	J2415	20	U-BOLT, 5/16-18, 1 1/16" ID, 1.75D	9	J0810
6	PIPE, ¾ X 10, SCH 40	1	J2429	21	HOSE, CGA X 28 ½", 7000808-886	2	J5938
7	TEE,3/4X3/4X3/4,SCH 80	2	J2491	22	PIPE, 3/4 X 4 1/2, SCH 80	1	J24251
8	PIPE,THREADED,3/4" ID, 36.75" LG	1	QS23970	23	NIPPLE, 3/4 X CLS, BRS, HEX	2	J2416
9	COUPLING, REDUC, 3/4X1/2, SCH 80	2	J25751	24	ELBOW, ¾, 90 DEG, SCH 80	1	J2531
10	PIPE, 1/2" X 5',SCH 80	1	T24162	25	NIPPLE, 1/2" X CLOSE, SCH 80	1	J2407
11	COUPLING, 1/2",SCH 80	3	J2577	26	STRAINER, ¾"	1	J6230
12	VALVE, 1/2", RELIEF, 3129G,H135-2	3	J6170	27	COUPLING, REDUCING, 3/4 X1/4, SC80	1	J25741
13	RAIN CAP, 7545-10	3	J6200	28	PLUG, ½, SQ HD, BLACK	1	J2617
14	PIPE, 1/2" X 2 1/2', SCH 80	1	T24161	29	NIPPLE, 1/4 X 1 1/2", BLKPIPE SCH 80	1	J2400
15	UNION, 1/2 FL X 1/2 NIP	4	J2840				



Manifold, 16' and 28' Dryer, 1 ½", 38" or 44", 2/3-1/3, NG - T25168S

REF #	DESCRIPTION	QTY	COMP #
1	SOLENOID ASSY, NG, 1 ½", MANIFOLD	1	T25163S
2	PIPE, 1 1/2 X 29", SCH 40	1	T25164
3	NIPPLE, 1.5 X CLOSE, SCH 40	5	J2431
4	ELBOW, STREET, 1.5", 90 DEG, SCH 40	2	J2542
5	ELBOW, 1 1/2", 90 DEG, SCH 40	2	J2541
6	STRAINER, 1 1/2"	1	J6232
7	VALVE, 1 ½",BALL (FIREING)	1	J6087
8	NIPPLE, 1.5 X 4" SCH 40	1	J2436
9	TEE, 1 ½ X 1 ½ X 1 ½, SCH 40	1	J2476
10	HOSE, NG, 1 ½ X 36"	1	J5935
11	PLUG, 1"	1	J2625
12	UNION, 1 1/2", SCH 40	1	J2707
13	COUPLING, REDUCE, 1 1/2 X 1 1/4	1	J2555
14	HOSE, HIGH PRESSURE, 3/4" X 48"	1	J5928
15	NIPPLE, 1.25 X CLOSE	1	J2500
16	COUPLING, REDUCING, 1 1/4 X 3/4 SCH 40	1	J2576



REF. #	DESCRIPTION	QTY	COMP. #
1	Trash Pan	1	T16235
2	Support, Trash Pan	3	T16236
3	Left Support Gusset	8	T16117
4	Right Support Gusset	8	T16118
5	RR Wet Bin End Plate	1	T17401
6	RF Wet Bin End Plate	1	T17400
7	LF Wet Bin End Plate	1	T17402
8	I R Wet Bin End Plate	1	T17403
9	Top 8' Panel Fill Switch	2	T17457
10	Wet Bin Side (Stainless Perf)	2	T17450S
	Wet Bin Side (094 Galvanized Perf)	2	T17450
	Wet Bin Side (063, Galvanized, Perf)	2	T17441W
11	I T Pivot Brace Wet Bin	<u> </u>	T17410
12	RT Pivot Brace Wet Bin	6	T17411
13	Splice Wet Bin Side	2	T17412
14	Bolt Down Lin 8' 2000	2	T17453
15	Honner Side	2	T17935
16	Hopper End	2	T17036
10	Top Auger Shield (Inner)	1	T16256
18	Top Auger Shield (Outer)	1	T16255
10	Plate Turnhuckle Connector	1	T16283
19	Top Motor Mount	1	T16277
20	Top Shield Braco	1	T16258
21	Procket LE Ten Auger Shield	1	T16961
22	Bracket, LF Top Auger Shield	1	T16960
23	Blackel, RF TOP Augel Shield	1	110000
24	Bearing, 1.25, FLG, W/LC, HCF15207-20	2	JUU IU
25	Splice Gussel Right	2	T10145
26	Splice Channel Short	2	116146
27	Turnbuckle, 3/8 X 6	1	J0904 T40450
28	Pivot, Motor Mount, Top	1	118150
29		<u> </u>	J1338
30	Busning, 1.25, SK	1	J0410
31	Pulley, 15.75 OD, DBL "B" Gr, SK	1	J03992
32	Motor (US only)	-	-
33	Pulley, 4.15 OD, DBL, B, Cast	1	J03352
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2"	2	F4499
36	Paddle, Assembly, D-C	1	T18262E
37	Lid, Extension, Wet Bin	1	T16159
38	Cover, Hopper	1	T17937
39	Splice Gusset Left	2	T16144
40	Crimp Plate	1	T16142
41	Hanger, Auger, T, 6CH2203	1	J0097
42	Splice Channel	1	T16143
43	Bushing, Wood, 1.25" ID	1	J0096
44	Spacer, T-Hanger, Top Auger	1	T16096
45	Lid, Wet Holding Bin	1	T16158
46	Top Auger	1	T16428
47	Stub Shaft	1	F4720
48	Bottom Auger Shaft	1	G73291
49	Auger Shaft, Top Front	1	T16436
50	Lid, Bin, Wet HLD. 12"	1	T12519
51	Bolt Down Lip, 4'	2	T12524
52	Side, Wet Bin, 4' (Galvanized, Perf)	2	T12525
	Side, Wet Bin, 4' (Stainless, Perf)	2	T12525S
	Side, Wet Bin, 4' (.063, Galvanized, Perf)	2	T12536W
53	Top 4' Panel (LR) 12'	1	T12526
54	Top 4' Panel (RR) 12'	1	T12527
55	4' Rear, Top Auger	1	T12503
56	Bushing, 28 mm	1	J04275

12' 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	I F Wet Bin End Plate	1	T17402
8	I R Wet Bin End Plate	1	T17403
9	Top 8' Panel Fill Switch	4	T17457
10	Wet Bin Side (Stainless Perf)	4	T17450S
	Wet Bin Side (094 Galvanized Perf)	4	T17450
	Wet Bin Side (063, Galvanized, Perf)	4	T17441W
11	I T Pivot Brace Wet Bin	12	T17410
12	RT Pivot Brace Wet Bin	8	T17411
12	Splice Wet Bin Side	2	T17412
10	Bolt Down Lin 8' 2000	<u> </u>	T17453
15	Honner Side		T17435
16	Hopper End	2	T17936
10	Top Augor Shield (Innor)	1	T16256
17	Top Auger Shield (Outer)	1	T16250
10	Dista Turnhuckia Connector	1	T16200
19	Top Motor Mount	1	T16277
20	Top Motor Mount	1	T10277
21	Top Shield Brace	1	T10208
22	Bracket, LF Top Auger Shield	1	T10801
23	Bracket, RF Top Auger Snield	1	116860
24	Bearing, 1.25, FLG, W/LC, HCF15207 - 20	2	J0010
25	Splice Gusset Right	2	116145 T10140
26	Channel, Splice, Short	2	116146
27		1	J0904
28	Pivot, Motor Mount, Top	1	118150
29	Collar, Shaft, 1-3/16"	2	J1338
30	Bushing, 1.25 SK	1	J0410
31	Pulley, 15.750D, Double "B" Gr. SK	1	J03992
32	Motor (US only)	-	-
33	Pulley, 4.15 OD, Double, B, Cast	1	J03352
34	Belt, B95	2	J0252
35	Key, 1/4 x 1/4 x 2	2	F4499
36	Paddle, Assembly, D-C	1	T18262E
37	Lid, Wet Holding Bin	1	T16157
38	Lid, 10.5", Extension, Wet Bin	1	T16159
39	Cover, Hopper	1	T17937
40	Splice Gusset Left	2	T16144
41	Crimp Plate	1	T16142
42	Hanger, Auger, T, 6CH2203	1	J0097
43	Splice Channel	1	T16143
44	Bushing, Wood, 1.25" ID	1	J0096
45	Spacer, T-Hanger, Top auger	1	T16096
46	Lid, 92-1/2" Wet Holding Bin	1	T16158
47	Top Auger	2	T16428
48	Shaft, 8' Hanger Bearing	1	F4720
49	Shaft, 1.25" x 9"	1	G73291
50	Shaft, Top Front, 12-3/4"	1	T16436
51	Bushing, 28 mm	1	J04275




Trash Pan T16235 1 1 2 3 T16236 Support, Trash Pan T16117 3 Left Support Gusset 16 **Right Support Gusset** T16118 4 10 **RR Wet Bin End Plate** 5 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 T17457 9 Top 8' Panel Fill Switch 4 10 T17450S Wet Bin Side (Stainless, Perf) 4 Wet Bin Side (.094, Galvanized, Perf) 4 T17450 Wet Bin Side (.063, Galvanized, Perf) T17441W 4 LT Pivot Brace Wet Bin 12 T17410 11 T17411 12 RT Pivot Brace Wet Bin 8 13 Splice, Wet Bin Side T17412 2 14 Bolt Down Lip 8', 2000 4 T17453 15 Hopper Side 2 T17935 16 Hopper End 2 T17936 17 Top Auger Shield (Inner) T16256 1 18 Top Auger Shield (Outer) 1 T16255 19 Plate, Turnbuckle, Connector T16283 1 20 **Top Motor Mount** T16277 1 Top Shield Brace 21 1 T16258 22 Bracket, LF Top Auger Shield 1 T16861 Bracket, RF Top Auger Shield T16860 23 1 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 J0410 1 Pulley, 15.75OD, Double "B" Gr. SK 31 1 J03992 32 Motor (US only) Pulley, 4.15 OD, Double, B, Cast 1 J03352 33 34 Belt, B95 2 J0252 35 Key, 1/4 x 1/4 x 2 2 F4499 T18262E 36 Paddle, Assembly, D-C 1 Lid, Wet Holding Bin T16157 37 1 Lid, 10.5", Extension, Wet Bin T16159 38 1 39 Cover, Hopper 1 T17937 40 Splice Gusset Left 2 T16144 41 Crimp Plate T16142 1 42 Hanger, Auger, T, 6CH2203 1 J0097 Splice Channel 43 1 T16143 44 Bushing, Wood, 1.25" ID 1 J0096 45 Spacer, T-Hanger, Top auger 1 T16096 Lid, 92-1/2" Wet Holding Bin 46 1 T16158 47 2 Top Auger T16428 48 Shaft, 8' Hanger Bearing 2 F4720 Shaft, 1.25" x 9" G73291 49 1 Shaft, Top Front, 12-3/4" 50 T16436 1 51 Side, Wet Bin, 4', 2000 2 T12525

20' WET BIN

OTY

2

2

2

1

1

1

T12536W

T20526

T12524

T16427

T20158

J04275

COMP. #

DESCRIPTION

REF. #

Side, Wet Bin, 4' (.063, Galvanized, Perf)

Top 4' Panel (LR) 12'

Top Middle Auger 20'

Lid, Wet Holding Bin 20'

Bolt Down Lip, 4'

Bushing, 28 mm

52

53

54

55

56



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

24' 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		1	T17403
9	LID 87-3/4" WET HOLDING BIN	1	T16167
10	TOP 8' PANEL	4	T17457
11	WET BIN SIDE PERE 2000	6	T17450S
	WET BIN SIDE (063 GALV PERE)	6	T1744000
12	IT PIVOR BRACE WET BIN	20	T17410
12		16	T17410
14		6	T17411
14		6	T17412
10		0	11/40. T17025
10		2	11/935
17		2	11/936
18		1	116256
19	TOP AUGER SHIELD (OUTER)	1	116255
20	PLATE, TURNBUCKLE, MTR MNT	11	116283
21	TOP SHIELD BRACE	1	T16258
22	BRACKET, LF TOP AUGER SHIELD	1	T16861
23	BRACKET, LF TOP AUGER SHIELD	1	T16860
24	BRACKET, RF TOP AUGER SHIELD	2	J0010
25	SPLICE GUSSET RIGHT	6	T16145
26	CHANNEL, SPLICE, SHORT	6	T16146
27	TURNBUCKLE, 3/8" X 6"	1	J0904
28	PIVOT, MOTOR MOUNT, TOP	1	T18150
29	COLLAR, SHAFT, 1 3/16"	2	J1338
30	BUSHING, 1 1/4" SK	1	J0410
31	PULLEY, 15.75OD, DBL "B" GR, SK	1	J03992
32	Motor (US only)	-	-
33	PULLEY, 4,15 OD, DBL, B, CAST	1	J03352
34	BELT. B95	2	J0252
35	KEY 1/4 X 1/4 X 2	2	F4499
36	PADDLE ASSY D-C	1	T18262F
37		1	T16157
38	LID 10.5" EXTENSION WET BIN	1	T16150
30	COVER HOPPER	1	T17037
		I G	T16144
40		2	T10144
41	UNIVE FLATE	3	10042
42		ა ი	JUU9/
43		3	110143
44	DUSHING, WOUD, 1.25 I.D.	3	JUU96
45	SPACER, I-HANGER, IOP AUGER	<u>১</u>	116096
46		2	116158
47	IOP AUGER	2	116428
48	SHAFT, 8" HANGER BEARING	3	F4720
49	SHAFT, 1.25" X 9"	1	G73291
50	SHAFT, TOP FRONT, 12 3/4"	1	T16436
51	AUGER, BOTTOM FRONT, 93 1/2"	1	T16430
52	TOP 8' PANEL	2	T24451
53	MOTOR MOUNT, TOP LOAD	1	T16277
54	PLATE, COVER RF GARNER END	1	T17415
55	TOP MIDDLE AUGER (20 FT)	1	T16427
56	BOLT DOWN LIP, 4 FT 2000	2	T12524
57	SIDE, WET BIN, 4FT 2000	2	T12525
	SIDE, WET BIN, 4' (.063, GALV, PERF)	2	T12536W
58	PLATE, SHORT SPLICE	6	T16141
59	LID. WET HOLD BIN 40 25"	1	T20158
60	TOP 4' PANEL (I R) 12FT 2000	2	T20526
61	BUSHING. 28 mm	1	J04275
<u> </u>	,		

METERING ROLLS & UNLOAD AUGER DRIVES



METERING ROLLS & UNLOAD AUGER DRIVES

	ESCRIPTION	QTY	COMP#	REF#	DESCRIPTION	QTY	COMP#
d C	lice, Bottom Angle (2005)	٦	T17964	26	Spacer, Sprocket	2	T16282
č	ate, Bottom Front End (2005)	-	T17963	27	Sprocket, Idler, 50-13	7	J1685
<u> </u>	ont Cross Channel	1	T16326	28	Shaft, Top Front, 12-3/4"	-	T16436
\geq	ide Vertical Support	2	T16322	29	Bearing, 1.25, FLG, W/LC, HCFTS207-20	-	J0010
Ψ	eft Frame Angle, Jacks	1	T12518	30	Pulley, 15.750D, Dbl "B" GR, SK	-	J03992
~	ight Frame Angle, Jacks	1	T12517	31	Bushing, 1-1/4" SK	-	J0410
õ	C Motor Brace	2	T16328	33	Pulley, 4.15"OD, 2B38SH	-	J03352
\sim	ount, Motor DC (2005)	1	T17284	34	Bushing, 28MM SH	-	J04275
\sim	educer, Speed, 150:1 (2005)	-	J3682	35	Unload Motor Mount Weldment	2	T16290
\sim	lotor, 1 HP, 230V AC, 1750 RPM TEFC	-	H1143	36	Belt, B x 73, (15.75 x 4.15) 28'	2	J02392
~	procket, 50B12, 1.125" BR	-	J16612		Belt, 12' + 16'	2	J0246
1 1 1	hain Tightener Bracket	1	T16274	37	Chain Tightener	2	T7367
\sim	racket Weldment, Idler Sprocket	1	T17965	38	Tightener Angle	~	T16329
_	eter Plate	4	T17920	39	Bolt, ½-13 x 6, PLT, GR5, TAP	٢	J0765
\sim	olt, 5/16-18, 1.00, PLT, G5, HHWZ	16	J0537	40	Nut, Hex, ½-13, PLT	7	J1040
_	ut, Tinnernan, 5/16-18	16	J1009	41	Chain, #40, 73 Links	2	T16800
1.4	langette, 3-hole, for 205 Brg. (BRH52MS)	8	J0098	42	Chain, Link, #40 Connector	2	J1745
\sim	rg., 1", Center, FH205-16, W/L CLR	4	J0005	43	Chain, Link, #40 Offset, ½ Link	7	J1750
	ront Shaft, Meter Roll	4	T16266	44	Chain, #50, 157 Links, 2005	٢	T16803
	1etering Roll Assy. 8', Galv.	4	T16297	45	Chain, Link, #50 Connector	~	J1760
	procket, 50B30, 1.000" BR	2	J1678	46	Shield, Motor, 7-1/2 Hp, 28'	٢	T17970
~~	procket, 40B, 30-Tooth, 1" Bore, Keyed	2	J1649		Shield, 12' + 16'	٢	T17928
0	anel, Front End, 2/3–1/3, 38"-28"	1	T24820	47	Brace, Front Shield	2	T16412
()	procket, 40B, 20-Tooth, 1" Bore, Keyed	2	J16487	48	Front Shield Mounting Bracket	~	T16411
10	crew, ½-13, 3, 6PLT, GR5, HHCS	2	J0750	49	Front Chain Shield	٢	T16410



SINGLE FAN - BACK END

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

COLUMN PARTS



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

FLOW GATE WITH ANGLE FLOW GATE SEAL

FLOW GATE WITH ANGLE FLOW GATE SEAL



SHEET 1 OF 2

Flow gate and Roll Shields for small grains

Item No.	Part No.	Description
1	T16111	UPPER DIVIDER
2	T16110	DIVIDER, SIDE
3	T16105S	PANEL, OUTSIDE TOP PERF, SS
4	T16104S	PANEL, OUTSIDE MIDDLE PERF, SS
5	T17910	INNER SIDE PERF SHEET
6	T17909S	BOTTOM OUTER PANEL
7	T16219	ACCESS, INNER, SIDE RAIL
8	T16220	BOTTOM RAIL, INNER ACCESS
9	T16225W	INNER ACCESS DOOR
10	T17903AM2	RIGID ADJUSTMENT PLATE
11	T17924	LOWER DIVIDER
12	T17904	DOOR, BOTTOM RIGID
13	T17902D	TOP FLOW CONTROL GATE, SMALL GRAIN
14	T17898	STRIP, BACKUP, TOP FLOW GATE
15	T17899	SEAL, TOP FLOW CONTROL GATE
16	J1105	WASHER, FLAT, ¼, PLT
17	J0992	NUT, LOCK, ¼-20,PLT
18	J0505	BOLT, ¼-20 X ¾
19	T17880K	GATE, FLOW CONTROL, ASSY-DC-ARK
20	T17886	ANGLE, FLOWGATE SEAL

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	Screw, 5/16-18, 2, PLT, G5, HHCS	J0585
11	Nut, 5/16-18, PLT, HHWZ	J1110
12	Bushing, Mach, 1-18GA	J1266



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



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



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



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



CAMLOCK ASSEMBLY, 28 FT SHEET 1 OF 2

> SWPD0067-CE 051128JFJ

REF. #	DESCRIPTION	QTY	COMP. #
1	RIGHT FRAME ANGLE WELD	1	T28318
2	WIDE VERTICAL SUPPORT	8	T16322
3	PLATE, MAIN CONNECTOR, BOX, CONDUIT	2	T16331
4	NARROW VERTICAL SUPPORT	7	T16323
5	MAIN CONNECTOR PLATE	13	T16324
6	GUSSET, FRONT, CAM LOCK	14	T16380
7	GUSSET, REAR CAM LOCK	1	T16381
8	SHAFT, LONG CAN-LOCK	2	T16400
9	HANDLE, CAM-LOCK	11	T16382
10	PIVOT ARM WELD, CAM-LOCK	11	T16383
11	EXTENSION ARM, CAM LOCK	11	T16386
12	COVER, PLASTIC, HANGLE, 1 1.2 X 4 LG	11	J23182
13	SCREW, 3/8 –16 X 1, JS500, GD 5	33	J06063
14	NUT, WHIZLOCK, 3/8-16	22	B5962
15	NUT, HEX, 3/8-16, PLT LOCK	11	J1025
16	HINGE, BOTTOM DOOR, CAM LOCK	11	T16387
17	BOLT, 5/16-18 X ¾" GR 5, HEX WASHER HD, JS500	9	J0536
18	NUT, LOCK, 5/16-18, PLT	11	J1010
19	SHAFT, CAM-LOCK, LONG, 12' '99	2	T12516
20	SHAFT, SHORT, CAM LOCK	1	T20401
21	CONNECTOR, SHAFT	1	T20403
22	8' DOOR, CAM-LOCK 2000	3	T17455
23	DOOR, CAM-LOCK 4' 2000	1	T12528

FRAME FOR BOTH STANDARD & STACKED DRYERS

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



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



REF. #	DESCRIPTION	QTY	COMP. #
1	Bearing, 1.25, Flange, W/LC, HCFTS207-20	2	J0010
2	Shaft, Top Front, 12-3/4"	1	T16436
3	Auger, Bottom Front, 93-1/2"	1	T16430
4	Shaft, Stub	1	F4720
5	Bushing, Wood, 1.25", I.D.	1	J0096
6	Hanger, Auger, T, 6CH2203	1	J0097
7	Shaft, 1.25" x 10", Bottom Auger	1	T17251
8	Screw, 7/16-14, 2, PLT	12	J0718
9	Nut, Lock, 7/16"-14, PLT	12	J1034
10	Bearing Shim Plate	2	T25682
11	Screw, 1/2-13, 1.5, GR 5 HHCS	4	J0730
12	Washer, Lock, ½, PLT	4	J1215
13	Nut, Hex, 1⁄2-13, PLT	4	J1040
14	Auger, Bottom, Rear, 47.50"	1	T12492
15	Auger, Bottom, Std Unld Ext	1	T12493
16	Shaft, Auger, Moisture Sensor	1	F4723



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



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



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

DRYER HITCH WITH 24" EXTENSION



SWPD0066-CE 5/20/2009 - EAB

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	T16310D	HITCH RECEIVER WELDMT, JACK
2	1	T43711	HITCH INSERT WELD, 24" EXT
3	1	T4372	CLEVIS WELD
4	3	J0822	SCREW, ¾-10 X 5" LG.
5	3	J1220	³ ⁄ ₄ " LOCKWASHER
6	3	J1051	¾-10 HEX NUT
7	2	J08361	BOLT, 7/8-9 X 6 ½" LG
8	2	J1222	7/8" LOCKWASHER
9	2	J1059	7/8-9 HEX NUT
10	6	J0730	SCREW, 1/2 -13, 1.50, PLT, GR5, HHCS
11	6	J1215	1/2" LOCKWASHER,PLT,SPLIT
12	6	J1040	NUT, 1/2 - 13,PLT,GD5,HEX

QuadraTouch Pro™ Update Instructions:

Download the newest QuadraTouch Pro[™] software from <u>http://www.sukup.com/Products/QuadraTouch</u>



After downloading the .zip file, extract the contents.

1			🕞 🗄 Estract Compressed (Zipped) Folders	
Quarter	Open		Select a Destination and Extract Files	
In Page V	Extract All		Files will be extracted to this folder:	
7.11.20	Scan with Sophos Anti-Virus		CAUsers Desktop/QuadraTouch Pro V1.08 7.1.2015	Browse
1	Open with WinRAR		Show extracted files when complete	
3	Extract files			
1	Extract Here			
	Extract to QuadraTouch Pro V1.08 7.1.2015			
	Open with	- H		
	Share with			
	Restore previous versions			
	Send to	- 16		Extract Cancel
			U	

A new folder will appear, double click it.



Right-Click and Copy the folder called "Project"



Paste the "Project" folder onto the root directory of a USB stick.



After the file transfer is complete to the USB stick, you are ready to take the USB stick to the QuadraTouch Pro[™] display.

To perform the update:

Insert the USB stick into the external USB service port on the bottom of the box.

Navigate to Tools \rightarrow System Tools \rightarrow QuadraTouch Update \rightarrow and choose STEP 1. The transfer will begin automatically (original versions 1.06 and 1.07 of QuadraTouch Pro software will ask you to continue)

After the panel automatically updates itself, it will prompt you for the PLC update after it reboots. Then perform step 2.

Manually Updating QuadraTouch Pro™

In the event an automatic update will not work, Insert the programmed USB stick

Go to Tools \rightarrow System Tools \rightarrow Maintenance Tools \rightarrow Stop HMI

This will close the program and take you back to the HMI's Desktop.

Press and Hold the screen until a circle appears – release the screen.



The Right-Click menu will appear, choose "Personalize"



On the top of the screen, choose "All Control Panel Items"





In the left navigation pane, choose the USB DISK (Probably (E:), but not always)



Press and hold the folder called "Project" until a circle appears.



When the Right-Click Menu appears, choose "Copy."

In the left navigation pane, choose "Local Disk (D:)"

Double-Click on the folder called CFROOT

Organize + Include	in library Share with New folder)# • 🔟 🔞
* 🔆 Favorites	Name	Date modified	Туре	Size
E Desktop	APPS	8/18/2015 4:00 PM	File folder	
Downloads	L CFROOT	7/14/2015 12:00 PM	File folder	
S Recent Places	EWFAdminLogs	7/21/2014 7:58 PM	File folder	
	images .	12/1/2014 4:03 PM	File tolder	
Eibraries	A Regfiles	8/13/2014 3:51 PM	File folder	
Documents	B RESOURCES	8/18/2015 4:00 PM	File folder	
> Music	MovCE.boot	10/3/2014 12:01 PM	BOOT File	1 KB
> Fictures				
Videos				
- Homegroup				
Computer				
🛛 🏭 Local Disk (C:)				
Disk (D:)				
> USB DISK (E)				

You will see the folder called Project, DO NOT go into the folder.

Press and hold the screen somewhere in the white area.



Choose "Paste"



Select "Yes" and merge the folders. Overwrite all existing files and folders by checking the "Do this for the next # conflicts" and choose "Copy and Replace"



QuadraTouch Pro[™] Software Manual

Dryer Control System



Software is constantly changing. Make sure you are up to date with Sukup's newest software. New software and manuals are available for download at:

http://www.sukup.com/Products/QuadraTouch



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Pressing the "Start" button on the main screen will bring up the start menu. From here, the dryer can be used in many different drying modes, the most common of which will be continuous flow. This section will describe each mode and how it's accessed.

Start \rightarrow Continuous Flow

Continuous Flow is divided into 3 smaller processes when grain is loaded into the dryer for the first time. Initial dry essentially warms up the grain for a set period of time depending on the user input. The fans and heaters will turn on, and a timer will appear on the screen. This is essential for creating a steady flow of grain through the next step of stabilization.

To begin initial dry, the dryer needs some information to get started for the first time. To give it an idea of how long to heat the first batch of grain, enter in the values of the incoming and desired output moisture. Press "Next" to continue on to the loading phase.

Now that the dryer has been programmed with a few basic settings, we are ready to load the dryer with grain and start initial dry. After the dryer has been loaded with grain, a button will appear to start initial dry cycle.





Start → Stabilization

After Initial Dry is finished, Stabilization is the next phase of Continuous Flow Mode. Stabilization is designed to go through 1 full cycle of grain, discharging at a calculated roll speed. The first step of stabilization is to select which fans and heaters should be utilized. Heaters will not be enabled unless its corresponding fan is used.

Stabilization/Restart

All previous settings will be stored from the last time the dryer was running, so make any changes necessary on this page before calculating the stabilization speed.

The stabilization speed in the green box is the last recorded speed when the dryer was running in continuous flow mode. If the dryer was running well the last time it was used, using this value for Stabilization is recommended.

If you are currently coming out of Initial Dry, the screen will automatically switch to Stabilization mode. If you have not performed Initial Dry, the load menu will appear. After the dryer has been loaded with grain, a button will appear to start Stabilization.





Start → Dry Fire

Dry Fire mode allows the dryer to turn its fan(s) and heater(s) on when the dryer is empty. This mode should be run every year before operation to test for functionality. Be sure to inspect each heater and pipe train for component integrity and functionality.

Start \rightarrow Dry Fire

Dry Fire mode lasts for 10 minutes and that status of the signals will be displayed. When the dryer is empty, the air switch will most likely not be closed.

Start \rightarrow Final Dry

Final Dry mode is used to finish off the last "batch" when there is no more grain to dry in continuous flow. The dryer will batch dry the last grain in the dryer, then turn its fan(s) and heater(s) off and unload the dryer for a set period of time.

Start \rightarrow Final Dry

Final Dry mode will automatically exit when the timers have expired.




Start → Auto Batch

Due to very high moisture content, Auto Batch mode may be required. After selecting Auto Batch, the system will prompt you about restarting from the last batch. If no previous batch has been recorded, it will start you from the new batch settings.

Start \rightarrow Auto Batch

Input the settings for Auto Batch.

Start \rightarrow Auto Batch

Choose the heat or heat/cool operation and control method.

Start \rightarrow Auto Batch

Based on your settings, the dryer will calculate a base point to start from.





Start \rightarrow Auto Batch

Auto Batch will start with the Dry Cycle. After the timer expires, the Cool Cycle will be used (if heat/cool operation was selected), then the dryer will start unloading the batch.

Start \rightarrow Auto Batch

The Unload Cycle can be paused during operation, but needs to be resumed before the next cycle starts. Each of the mode times can be changed using the settings menu.





Settings Menu

The Settings menu houses most of the drying settings that are commonly used during operation.

Settings \rightarrow Plenum Temperature

The Plenum Temperature menu contains settings for each individual plenum/heater.

Settings \rightarrow Plenum Temperature \rightarrow Min/Max

The minimum and maximum plenum temperatures can be found here. When choosing the low temp option, the values can be adjusted even further.

Settings \rightarrow Plenum Temperature \rightarrow Low Temp Option

If enabled, the low temp option allows the plenum to be set as low as 100°F. It may result in permanent damage if a low temp kit is not installed in the dryer. The port cup and orifice may need to be changed out on axial fan heaters.





Settings \rightarrow Meter Roll Settings

The Meter Roll Settings (Unload Settings for Tower Dryers) contain the minimum and maximum speed settings as well as loop control settings

Settings \rightarrow Meter Roll Settings \rightarrow Min/Max

The minimum and maximum settings dictate how fast or slow the system is capable of running. Make sure to never unload faster than your takeaway system is capable of running.

Settings \rightarrow Meter Roll Settings \rightarrow Moisture Gain

The Moisture Loop Gain settings are important for optimum operation when discharging, based on moisture. Choosing a higher setting will mean more aggressive changes in a shorter amount of time. When the dryer is running at slower speeds, this number should stay around 40 or so. Conversely, at higher speeds, it may yield better control to boost this setting up higher.

Settings \rightarrow Meter Roll Settings \rightarrow Meter Roll Deadband

For some systems, it may be preferable to lock in the unload speed when grain is discharging very near the target setpoint. This is referred to as the loop deadband.





Settings \rightarrow Meter Roll Settings \rightarrow Temperature Gain

The Temperature Gain settings are important for optimum operation when discharging based on temperature. Choosing a higher setting will mean more aggressive changes in a shorter amount of time. When the dryer is running at slower speeds, this number should stay around 40 or so. Conversely, at higher speeds, it may yield better control to boost this setting up higher.

Settings \rightarrow Meter Roll Settings \rightarrow Temperature Deadband

For some systems, it may be preferable to lock in the unload speed when grain is discharging very near the target setpoint. This is referred to as the loop deadband.

Settings \rightarrow Heat Delay Timer

Sometimes, it may be necessary to put a delay between when the fan starts, and when power is applied to the heater box.

Settings \rightarrow Moisture Settings

The moisture settings are important for internal calculations as well as the target moisture for grain discharge. These can be accessed almost anytime the dryer is running.





Settings → Fan Shutdown Delay

In addition to the standard 3-second fan shutdown delay, additional time can be added to cool off the grain when stopping operation or fault shutdowns that aren't related to temperature or direct safety.

Settings → Fan Start Delay

This setting dictates the amount of time between fan starts. Stretching this time out may be a good idea if power is limited or motor current draws are very high.

Settings \rightarrow EMOV Settings

The electronic mod valve settings generally never need to be touched, however, if needed, they are here. The Low Fire Position is the percentage the valve stem will be open when heater ignition takes place.

Settings → Unload Delay

During operation, it sometimes becomes necessary to shut the unload system down to change takeaways, air system distributors, or like situations. This timer will begin counting when the unload is paused, and will cause a fault condition if the unload isn't resumed in time.





Settings → Out of Wet Grain Timer

Defaulted to 10 minutes, this timer begins counting when both paddle switches are down (calling for more grain) and will trigger a fault condition if they aren't satisfied within that period of time.

Settings \rightarrow Fill Timer

Defaulted to 15 minutes, this timer begins counting when the paddles switches are satisfied and haven't dropped back down. This timer will trigger a fault condition if it expires before the switches drop down again.

Settings \rightarrow Load Delay

The Load Delay timer is an additional period of time put between when the load auger starts and when the auxiliary devices are energized.

Settings \rightarrow Unload Cleanout

Additional time for the unload auger to run after a standard shutdown. It provides an opportunity for the unload to clean itself out before shutting down.





Settings \rightarrow Set Defaults

If the need ever arises, setting defaults will return all values in the QuadraTouch Pro panel back to factory default settings.





Tools Menu

The Tools menu provides many helpful system settings and options to enhance the drying experience. From using the GSM modem to looking at live and historical graphs, the Tools menu is an important section of the QuadraTouch Pro platform.

Tools \rightarrow Calibrate Sensors

The dryer's moisture sensor(s), as well as the bushel counter, can be calibrated here. The bushel counter must be calibrated in order to access the counting and bushel shutdown features shown in the Tools menu.

Tools \rightarrow Calibrate Sensors \rightarrow Discharge Moisture

The dryer's moisture sensor may need to be calibrated during operation. It's important that the dryer is operating under good, usable data.

In a nutshell, the dryer will tell you when to go take a sample -- a period of 10 seconds after you are ready to sample. Take a bucket out to the discharge of the dryer and get samples over the course of the next minute. Then enter those samples in on the next page. The dryer retrieves data stored during the previous minute, and then compares it with your data.





Tools \rightarrow Calibrate Sensors \rightarrow Discharge Moisture

1-minute sampling period

Tools \rightarrow Calibrate Sensors \rightarrow Discharge Moisture

The Locked, Uncalibrated Moisture value is what the sensor recorded over the past minute. Fill in the 5 values on the left with samples you have taken from the bucket. The dryer will do the math for you and store the calibration.

Tools \rightarrow Calibrate Sensors \rightarrow Bushel Counter

The bushel counter can be calibrated automatically or manually. Automatically is generally the most accurate way to calibrate the counter.

In automatic bushel counter calibration, the dryer needs to be discharging grain into a measurable space like a grain cart or semi load. Press the timer button to start the timer, then when the load is finished, press it again to stop the timer. Then enter the amount of bushels discharged during the time period. The dryer will do the bushel calculation for you.





In manual bushel counter calibration, the user inputs a meter roll speed and an approximate yield at that speed. The dryer will do the bushel/hr calculation for you.

Tools → History Log

The history log contains all the alarms, settings changes, and fault history of the dryer.

Tools \rightarrow Graphs

The QuadraTouch Pro system allows the user to look at graphs both in real-time and historical methods. Because this screen can contain a lot of data, a stylus may be required to touch the small sections of the screen.

You can also build your own graph where multiple values can be compared.



Tools → GSM Options

If equipped, the GSM modem options give you an opportunity to receive text alerts from the dryer. Up to 2 people can receive them. Further information on the GSM modem can be found by pressing the .PDF logo on this page. It contains installation and operational instructions.

New with QuadraTouch Pro, there is also a GSM diagnostics section that helps with first time setup to ensure the modem is operating correctly.

Tools \rightarrow Auto Temp Adjust

If enabled, the Auto Temp adjust feature will turn down the temperature inside the plenum when the dryer reaches its upper roll speed limit. Therefore, when the dryer is trying to run faster than is allowed, it will automatically turn down its drying temperature.

Tools \rightarrow Language Selection

Coming 2016





Tools \rightarrow System Diagnostics

The System Diagnostics menu provides an overview of all the main system signals and those of the ones relating to the individual fan(s) and heater(s). A green light means that that circuit has 24vdc on it. This menu can be accessed at almost any time by pressing on the SUKUP logo on the top left of your screen.

The individual fan inputs/outputs are shown here.

Tools \rightarrow System Diagnostics \rightarrow Analog Signals

The QuadraTouch Pro system provides real-time feedback of all the analog input sensors and output reference signals. Pressing "Plenum Diagnostics" will show each plenum feedback value, and the reference signal and percentage opening on the EMOV.

Tools \rightarrow System Diagnostics \rightarrow Analog Signals \rightarrow Plenum Diagnostics

Values for each individual plenum are shown here.



	QuadraTouch™ Pro		
	SYSTEM TOOLS MENU		
Влск 🧹	QUADRATOUCH UPDATE		SYSTEM DIAGNOSTICS
	System Information	DRYER TYPE SELECTION	ADMIN TOOLS
	MAINTENANCE TOOLS	CHECK COMMS	MANUALS & WIRING DIAGRAMS
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- 2			

Tools \rightarrow System Tools

The System Tools menu is very important to the QuadraTouch Pro system. It provides a wide range of functionality and has many features that help maintain and update the system.

Tools \rightarrow System Tools \rightarrow QuadraTouch Update

Download the newest QuadraTouch Pro software from our website, extract the contents. You will find a folder called "project" in the extracted contents. Copy that folder onto the root directory of a USB stick. Insert that stick into the external USB port of the QuadraTouch Pro (located on the bottom of the box), and press "Step 1" – if the files were put onto the USB stick correctly, the file transfer will begin automatically.

After the QuadraTouch Pro has restarted, it will prompt you to perform step 2. Here, you'll select which PLC is being programmed. Make sure the PLC setup you choose matches what's inside the power cabinet! If you choose the wrong one, it will tell you, and get you back to programming page to try again.

Tools \rightarrow System Tools \rightarrow System Information

This page shows the software versions of the PLC and the HMI. They are released together, so they should always match. If the HMI version is older than the PLC version somehow, make sure to perform a QuadraTouch[™] update.



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ВАСК	MENU DRYER TYPE SELECTION PORTABLE DRYER MANUALS & WIRING DIAGRAMS		
- 3			
Sukup Vanulasturing Co.	QuadraTouch [™] Pro		
Васк	ADMIN TOOLS		
	UPDATE OVERRIDE SIMULATOR		
	CALIBRATIONS FLAME OUT TIMER AIM SWITCH COVENIDOE		
- 3	Column Calibration EMOV TIME DELAY		
Sukup Sukup Vanutasturing Co.	QuadraTouch™ Pro		
BLOK	BUS DIAGNOSTICS		
BACK	224 MASTER DIAGNOSTICS STATUS CODE (224 IS NORMAL)		
	0 Bus Diagnostics Failure Location		
	Bus Diagnostics Failure Code		
	MASTER DIAGNOSTICS BIT VIEW		
- 3	PLC Bus View		

Tools \rightarrow System Tools \rightarrow Time and Date

Set system time and date information. It will be used for all graphing and historical data.

Tools \rightarrow System Tools \rightarrow Dryer Type

The QuadraTouch Pro software contains enough information to run an 8' single fan dryer and a 10,000 bu/hr Tower Dryer. Your system should be factory-preset for your specific dryer, but if needed, you can select that here. The QuadraTouch Pro needs to be restarted when changing this setting. It will do so automatically.

Tools \rightarrow System Tools \rightarrow Admin Tools

The Admin Tools menu provides the option to change critical settings inside the QuadraTouch Pro environment.

NOTICE: DO NOT CHANGE any of these settings without thorough knowledge of dryer operation and very close attention to detail. Changing settings and/or using the overrides can result in permanent damage to the dryer!

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Bus Diagnostics

This section provides critical information about the PLC. This menu would only need to be accessed in the event of a PLC or I/O card failure.





Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Bus Diagnostics \rightarrow PLC Bus View

This shows a picture of your PLC and identifies any problems with it. In the event a device is not functioning properly, it will be highlighted for easy serviceability.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Bus Diagnostics \rightarrow Master Diagnostic Bit View

The information contained here will most likely only be needed by a Sukup Service Technician.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Load System Override

Sometimes it becomes necessary to run the load auger or auxiliary devices independently of each other irrespective of the paddle switch position. This mode allows you to do that. However, permanent damage can occur if it's not used properly.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Air Switch Timer

The air switch will need to be satisfied within 5 seconds after the fan contactor closes. With a Soft Start, the air switch is given until the fan reaches run state. In the event that the fan doesn't get up to speed during that amount of time, this timer can be adjusted to allow for longer ramp time.





Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Flame Out Timer

In the event the heater ignition isn't taking place within 45 seconds of heater power, a longer flame fault time may be needed.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Auxiliary Timer Delays

This feature allows the user to select how much time delay takes place between when the load auger, aux 1, and aux 2 relays are pulled in. This feature is especially helpful in large incline situations.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow EMOV Time Delay

During Dry Fire mode, the heater will ignite, but wait a period of time before allowing the EMOV to take control of burner temperature. This time delay can be used to set the STEM valve of each heater. The factory setting is 5 PSI at low fire of 25% open.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Column Calibration

Here is a quick menu to calibrate the column RTD if equipped. This sensor is generally very accurate, so exercise caution when adjusting this value.





Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Discharge Grain Temp Calibration

Here is a quick menu to calibrate the discharge grain temp on the moisture sensor. This sensor is generally very accurate, so exercise caution when adjusting this value.

Tools \rightarrow System Tools \rightarrow Admin Tools \rightarrow Plenum Temperature Calibration

Here is a quick menu to calibrate the individual Plenums. These sensors are generally very accurate, so exercise caution when adjusting these values.

Tools \rightarrow System Tools \rightarrow Maintenance Menu

The QuadraTouch Pro System is equipped with many special Apps to make operation as reliable as possible. Most of these tools will never need to be used, but in the event they are needed, they are preloaded on your system for added convenience.

Tools \rightarrow System Tools \rightarrow Maintenance Menu \rightarrow IP Assign

The IP Assign tool is used to give a PLC an IP address when it's reset to out-of-box condition. Consult your dealer before using this tool. A USB keyboard will be needed.





Tools \rightarrow System Tools \rightarrow Maintenance Menu \rightarrow Launch Touch Calibration

In the event the cursor doesn't align exactly where your finger touches the screen, you can easily calibrate the touch panel to your desired specifications. Choose "Launch Touch Calibration" to open the calibration screen.

Touch the 4 Corners on the panel calibration shown left.

Tools \rightarrow System Tools \rightarrow Maintenance Menu \rightarrow Mobile App Code

Coming in 2016: a full-blown remote access interface will be available from any phone or tablet. Directly access and partially control your dryer from anywhere in the world.

Tools \rightarrow System Tools \rightarrow Maintenance Menu \rightarrow Comm Check

This value should read 192 when the OPC server is running. The xPLC Toggle Bit should be turning ON and OFF when the PLC and Touch Panel are talking to each other.





Tools \rightarrow System Tools \rightarrow Maintenance Menu \rightarrow Manuals and Diagrams

Here, entire copies of the system manuals and wiring diagrams can be found. Information related to specific components and frequently asked questions is located here.





Tower Dryer Operation

When operating the Tower Dryer, the program flow is similar to that found on previous pages for portable dryers, with a few exceptions. They are described here.

The first key difference is in the "Start" menu. It will prompt you to answer if the burner tarp has been removed.

Choosing Control Method

In Tower Operation, you will first choose the control method (automatic or manual). The control method can be changed by pressing either of the two red rectangles.

Choose how you'd like to operate the Tower Dryer.



Automatic Operation

Choosing Automatic Operation, the larger of the two red rectangles disappears, leaving the controls for the load and unload systems, fan(s) and heater.

Notice to the right there is a blinking button indicating you are discharging based on moisture or grain column temperature.

Axial/Centrifugal and Tower Dryer





Changing from Moisture to Temperature Control

Toggling the blinking button will change from moisture to temperature control. You'll notice the temperature setpoint will appear on the bottom in place of the moisture setpoint.

Manual Operation

Choosing the red rectangle, you can change the operation method to manual operation, as shown here. Notice the temperature and moisture setpoints are removed, and they are replaced with a manual unload speed setting.

Turning the load, unload, fan(s), and heat on, you can see the devices turning on in order. The fans will start up in sequence along with the load and unload systems. An animated blue flame will show up when the burner control unit senses flame.

As soon as the unload table has started, any applicable countdown timers will be displayed. Notice the Fill Timer displayed in the bottom center of the screen.



Sukup	QuadraTouch [™] Pro
State - states of the se	Settings Menu
ВАСК	PLENUM SETTINGS UNLOAD SETTINGS HEAT DELAY TIMER
	MOISTURE SETTINGS FAN SHUTDOWN FAN START DELAY DELAY TIMER TIMER
	EMOV SETTINGS UNLOAD DELAY OUT OF WET GRAIN TIMER TIMER
	LOAD DELAY TIMER UNLOAD CLEANOUT FILL TIMER
3	LOAD AUXILIARY TIMERS UNLOAD AUXILIARY TIMERS SET DEFAULTS
Sukup Vanulasturing Co	QuadraTouch [™] Pro
~	LOAD AUXILIARY TIMER DELAYS
ВАСК	THE TOWER DRYER IS EQUIPPED WITH 4 SETS OF DRY CONTACTS TO MANAGE THE LOADING SYSTEMS. THE 4 LOAD AUXILIARY RELAYS ENERGIZE FROM 1 TO 4 IN NUMERICAL ORDER.
	TIME DELAY BETWEEN LOAD AUX I AND LOAD AUX 2 5 SECONDS
	TIME DELAY BETWEEN LOAD AUX 2 AND LOAD AUX 3
	TIME DELAY BETWEEN LOAD AUX 3
- 3	
	QuadraTouch [™] Pro
BACK	UNLOAD AUXILIARY TIMER DELAYS
	THE TOWER DRYER IS EQUIPPED WITH 4 SETS OF DRY CONTACTS TO MANAGE THE UNLOADING SYSTEM. THE 4 UNLOAD AUXILLARY RELAYS ENERGIZE FROM 4 TO 1 IN REVERSE NUMERICAL ORDER.
	TIME DELAY BETWEEN TOWER UNLOAD TABLE AND UNLOAD AUX 1
	TIME DELAY BETWEEN UNLOAD AUX 1
-	TIME DELAY BETWEEN UNLOAD AUX 2
narr 👌	TIME DELAY BETWEEN UNLOAD AUX 3
Sukup Vanulacturing Co.	QuadraTouch TM Pro
BACK	CONFIGURE AUX INPUT
	WHAT WOULD YOU LIKE TO USE THE AUXILIARY INPUT FOR?
	CONFIGURE THE STATIC PRESSURE SETTINGS FOR NOMINAL OPERATING CONDITIONS.
	Min Pressure 2.0 Inches W.C.
1 min 3	MAX PRESSURE 3.5 INCHES W.C.

Settings Menu

The settings menu is relatively the same as the portable dryer software with an exception at the bottom of the page for load and unload auxiliary timers. (Settings menu for portable dryers begins on page 9 of this Software Manual.)

Time delays between load auxiliaries can be programmed here.

Time delays between unload auxiliaries can be programmed here.

Tools \rightarrow System Tools \rightarrow Maintenance Tools \rightarrow Configure Aux Input

New for QuadraTouch Pro, the available analog input can be configured for an additional temperature readout or static air pressure sensor. Ask your local Sukup dealer about this feature.





Sukup Manufacturing Co.

1555 255th Street, Box 677 Sheffield, Iowa, USA 50475-0677 Phone: 641-892-4222 Website: www.sukup.com Email: info@sukup.com

Fax: 641-892-4629

Appendix H

Electrical Drawings

Wire numbers and uses Electrical drawings



Common System Wires		
Wire #	Description	Use
LINE	110VAC supply from transformer to CB8	Line power from Transformer
0	110VAC from bottom of CB8 to E-Stop	Conductor between CB8 and E-Stop
1	110VAC supply after E-Stop	Emergency Switched Control Supply
2	Neutral Wire	Provides Return for 110V circuits
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
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

Wire Numbers and their Uses: Q	QuadraTouch Pro™ 2015
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Common System Wires		
Wire #	Description	Use
36	Rear door signal wire	24V present = Door closed, provides voltage at PLC for rear door status (Doors are in series)
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
44	Lower Grain paddle switch	24V present = status grain not empty, lower grain switch
47	PLC load ON input	24V present = load auger ON, provides PLC with status of load operation (on or off)
49A	Motor overload- Meter Rolls	24V present = status ok, provides voltage back to PLC for overload status of Meter Rolls
49B	Motor overloadLoad Motor	24V present = status ok, provides voltage back to PLC for overload status of Load Motor
49C	Motor overload- Unload Motor	24V present = status ok, provides voltage back to PLC for overload status of Unload Motor
49D	Motor overload- Auxiliary Box	24V present = status ok, provides voltage back to PLC for overload status of device(s) in the auxiliary box (series wired)
53	Upper Grain paddle switch	24V present = Status Dryer FULL
70	Automatic batch RTD signal wire	Provides signal to processor for autobatch temperature drying, 0 – 5 volt DC reference
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	24VDC ground. DC Common.
96	Unload Auger Proximity Signal Wire	24VDC oscillating square wave = unload auger rotation confirmed.
U	User Fault Circuit	24VDC = User Fault OK – Jumped out from the factory.
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 9VDC moisture signal to the PLC	Provides the processor with a voltage signal corresponding to moisture
D5	Moisture sensor black, 0 to 9VDC moisture signal to the PLC	Provides the processor with a voltage signal corresponding to moisture
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 Main Gas Valve Relay K10

Wire Numbers and their Uses:	QuadraTouch Pro™ 2015
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Fan / Heat #1		
Wire #	Description	Use
100	Fan Soft Start Monitoring (pos. #1)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring
101	Differential Air Switch (pos. #1)	24V = status ok, provides voltage at PLC for Differential Air switch closure
102	Vapor high limit switch (pos. #1)	24V = status ok, provides voltage at PLC for vapor high temperature
103	Housing high limit switch (pos. #1)	24V = status ok, provides voltage at PLC for heater housing high temperature
104	Plenum over-temp switch (pos. #1)	24V = status ok, provides voltage at PLC for plenum high temperature
105	Plenum static air switch (pos. #1)	24V present = status ok, provides voltage back to PLC for static air status
106	Heater flame sense (pos. #1)	24V present = status ok, provides voltage back to PLC for flame sense status
107	PLC fan ON input (pos. #1)	24V present = fan ON, provides PLC with status of fan operation
108	PLC heat ON input (pos. #1)	24V present = ON, tells the PLC the system is calling for the heater to turn on
109	Motor Overload Fan (pos #1)	24V present = ON, tells the PLC the fan breaker is OK
110A	24VDC from PLC to K3 Fan#1 Relay	24V present energizes Fan1 Relay K3
111A	24VDC from PLC to K4A, K4B Heat#1 Relay	24V present energizes Heat1 Relays K4A, K4B
110C	110V power from K3 Fan1 Relay to Fan #1 Coil	110V present energizes Fan#1 contactor or soft start and supply power Fan#1 NO contact
110H	110V power from Fan#1 NO contact to K4A Heat#1 relay	110V present supplies 110V power to K4A Heat#1
111	110V power from Heat1A relay to CB9 breaker	110V present supplies CB9 with power
112	110V from CB9 breaker to heater box (pos. #1)	110V present heater circuit will begin firing sequence
161	EMOV (2-10V) (pos. #1)	Reference voltage for the EMOV



Fan / Heat #2		
Wire #	Description	Use
200	Fan Soft Start Monitoring (pos. #2)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring
201	Differential Air Switch (pos. #2)	24V = status ok, provides voltage at PLC for Differential Air switch closure
202	Vapor high limit switch (pos. #2)	24V = status ok, provides voltage at PLC for vapor high temperature
203	Housing high limit switch (pos. #2)	24V = status ok, provides voltage at PLC for heater housing high temperature
204	Plenum over-temp switch (pos. #2)	24V = status ok, provides voltage at PLC for plenum high temperature
205	Plenum static air switch (pos. #2)	24V present = status ok, provides voltage back to PLC for static air status
206	Heater flame sense (pos. #2)	24V present = status ok, provides voltage back to PLC for flame sense status
207	PLC fan ON input (pos. #2)	24V present = fan ON, provides PLC with status of fan operation
208	PLC heat ON input (pos. #2)	24V present = ON, tells the PLC the system is calling for the heater to turn on
209	Motor Overload Fan (pos #2)	24V present = ON, tells the PLC the fan breaker is OK
210A	24VDC from PLC to K8 Fan#2 Relay	24V present energizes Fan#2 Relay K8
211A	24VDC from PLC to K9A, K9B Heat#2 Relay	24V present energizes Heat#2 Relays K9A, K9B
210C	110V power from K8 Fan#2 Relay to Fan #2 Coil	110V present energizes Fan#2 contactor or soft start and supply power Fan#2 NO contact
210H	110V power from Fan#2 NO contact to K9A Heat#2 relay	110V present supplies 110V power to K9A Heat#2
211	110V power from Heat9A relay to CB10 breaker	110V present supplies CB10 with power
212	110V power from CB10 breaker to heater box (pos. #2)	110V present heater circuit will begin firing sequence
261	EMOV (2-10V) (pos. #2)	Reference voltage for the EMOV



Wire Numbers and their Uses:	QuadraTouch Pro [™] 2015
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Fan / Heat #3		
Wire #	Description	Use
300	Fan Soft Start Monitoring (pos. #3)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring
301	Differential Air Switch (pos. #3)	24V = status ok, provides voltage at PLC for Differential Air switch closure
302	Vapor high limit switch (pos. #3)	24V = status ok, provides voltage at PLC for vapor high temperature
303	Housing high limit switch (pos. #3)	24V = status ok, provides voltage at PLC for heater housing high temperature
304	Plenum over-temp switch (pos. #3)	24V = status ok, provides voltage at PLC for plenum high temperature
305	Plenum static air switch (pos. #3)	24V present = status ok, provides voltage back to PLC for static air status
306	Heater flame sense (pos. #3)	24V present = status ok, provides voltage back to PLC for flame sense status
307	PLC fan ON input (pos. #3)	24V present = fan ON, provides PLC with status of fan operation
308	PLC heat ON input (pos. #3)	24V present = ON, tells the PLC the system is calling for the heater to turn on
309	Motor Overload Fan (pos #3)	24V present = ON, tells the PLC the fan breaker is OK
310A	24VDC from PLC to K11 Fan#3 Relay	24V present energizes Fan#3 Relay K11
311A	24VDC from PLC to K12A, K12B Heat#3 Relay	24V present energizes Heat#3 Relays K12A, K12B
310C	110V power from K11 Fan#3 Relay to Fan #3 Coil	110V present energizes Fan#3 contactor or soft start and supply power Fan#3 NO contact
310H	110V power from Fan#3 NO contact to K12A Heat#3 relay	110V present supplies 110V power to K12A Heat#3
311	110V power from Heat12A relay to CB11 breaker	110V present supplies CB11 with power
312	110V power from CB11 breaker to heater box (pos. #3)	110V present heater circuit will begin firing sequence
361	EMOV (2-10V) (pos. #3)	Reference voltage for the EMOV



Wire Numbers and their Uses:	QuadraTouch Pro [™] 2015
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Fan / Heat #4				
Wire #	Description	Use		
400	Fan Soft Start Monitoring (pos. #4)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring		
401	Differential Air Switch (pos. #4)	24V = status ok, provides voltage at PLC for Differential Air switch closure		
402	Vapor high limit switch (pos. #4)	24V = status ok, provides voltage at PLC for vapor high temperature		
403	Housing high limit switch (pos. #4)	24V = status ok, provides voltage at PLC for heater housing high temperature		
404	Plenum over-temp switch (pos. #4)	24V = status ok, provides voltage at PLC for plenum high temperature		
405	Plenum static air switch (pos. #4)	24V present = status ok, provides voltage back to PLC for static air status		
406	Heater flame sense (pos. #4)	24V present = status ok, provides voltage back to PLC for flame sense status		
407	PLC fan ON input (pos. #4)	24V present = fan ON, provides PLC with status of fan operation		
408	PLC heat ON input (pos. #4)	24V present = ON, tells the PLC the system is calling for the heater to turn on		
409	Motor Overload Fan (pos #4)	24V present = ON, tells the PLC the fan breaker is OK		
410A	24VDC from PLC to K13 Fan#4 Relay	24V present energizes Fan#4 Relay K13		
411A	24VDC from PLC to K14A, K14B Heat#4 Relay	24V present energizes Heat#4 Relays K14A, K14B		
410C	110V power from K13 Fan#4 Relay to Fan #4 Coil	110V present energizes Fan#4 contactor or soft start and supply power Fan#4 NO contact		
410H	110V power from Fan#4 NO contact to K12A Heat#4 relay	110V present supplies 110V power to K12A Heat#4		
411	110V power from Heat14A relay to CB12 breaker	110V present supplies CB12 with power		
412	110V power from CB12 breaker to heater box (pos. #4)	110V present heater circuit will begin firing sequence		
461	EMOV (2-10V) (pos. #4)	Reference voltage for the EMOV		



Fan / Heat #5				
Wire #	Description	Use		
500	Fan Soft Start Monitoring (pos. #5)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring		
501	Differential Air Switch (pos. #5)	24V = status ok, provides voltage at PLC for Differential Air switch closure		
502	Vapor high limit switch (pos. #5)	24V = status ok, provides voltage at PLC for vapor high temperature		
503	Housing high limit switch (pos. #5)	24V = status ok, provides voltage at PLC for heater housing high temperature		
504	Plenum over-temp switch (pos. #5)	24V = status ok, provides voltage at PLC for plenum high temperature		
505	Plenum static air switch (pos. #5)	24V present = status ok, provides voltage back to PLC for static air status		
506	Heater flame sense (pos. #5)	24V present = status ok, provides voltage back to PLC for flame sense status		
507	PLC fan ON input (pos. #5)	24V present = fan ON, provides PLC with status of fan operation		
508	PLC heat ON input (pos. #5)	24V present = ON, tells the PLC the system is calling for the heater to turn on		
509	Motor Overload Fan (pos #5)	24V present = ON, tells the PLC the fan breaker is OK		
510A	24VDC from PLC to K15 Fan#5 Relay	24V present energizes Fan#5 Relay K15		
511A	24VDC from PLC to K16A, K16B Heat#5 Relay	24V present energizes Heat#5 Relays K16A, K16B		
510C	110V power from K15 Fan#5 Relay to Fan #5 Coil	110V present energizes Fan#5 contactor or soft start and supply power Fan#5 NO contact		
510H	110V power from Fan#5 NO contact to K16A Heat#5 relay	110V present supplies 110V power to K16A Heat#5		
511	110V power from Heat16A relay to CB13 breaker	110V present supplies CB13 with power		
512	110V power from CB13 breaker to heater box (pos. #5)	110V present heater circuit will begin firing sequence		
561	EMOV (2-10V) (pos. #5)	Reference voltage for the EMOV		



Fan / Heat #6				
Wire #	Description	Use		
600	Fan Soft Start Monitoring (pos. #6)	24V = status ok, provides voltage at PLC for Soft Start Trip Monitoring		
601	Differential Air Switch (pos. #6)	24V = status ok, provides voltage at PLC for Differential Air switch closure		
602	Vapor high limit switch (pos. #6)	24V = status ok, provides voltage at PLC for vapor high temperature		
603	Housing high limit switch (pos. #6)	24V = status ok, provides voltage at PLC for heater housing high temperature		
604	Plenum over-temp switch (pos. #6)	24V = status ok, provides voltage at PLC for plenum high temperature		
605	Plenum static air switch (pos. #6)	24V present = status ok, provides voltage back to PLC for static air status		
606	Heater flame sense (pos. #6)	24V present = status ok, provides voltage back to PLC for flame sense status		
607	PLC fan ON input (pos. #6)	24V present = fan ON, provides PLC with status of fan operation		
608	PLC heat ON input (pos. #6)	24V present = ON, tells the PLC the system is calling for the heater to turn on		
609	Motor Overload Fan (pos. #6)	24V present = ON, tells the PLC the fan breaker is OK		
610A	24VDC from PLC to K17 Fan#6 Relay	24V present energizes Fan#6 Relay K17		
611A	24VDC from PLC to K18A, K18B Heat#6 Relay	24V present energizes Heat#6 Relays K18A, K18B		
610C	110V power from K17 Fan#6 Relay to Fan#6 Coil	110V present energizes Fan#6 contactor or soft start and supply power Fan#6 NO contact		
610H	110V power from Fan#6 NO contact to K18A Heat#6 relay	110V present supplies 110V power to K18A Heat#6		
611	110V power from Heat18A relay to CB14 breaker	110V present supplies CB14 with power		
612	110V power from CB14 breaker to heater box (pos. #6)	110V present heater circuit will begin firing sequence		
661	EMOV (2-10V) (pos. #6)	Reference voltage for the EMOV		


























Altivar 312 VFD Control Wiring



Wiring Pinout #95 Black ----- COM #17 Gray ----- Al1 #21D Blue ----- Ll1





Title: PORTABLE DRYER: VFE ATV312	Control Wiring
Author: SUKUP MFG CO - MRK	
Date: 03/15	
Revision:	101.15

























PLC Analog Inputs 1-6 Fan











The Rear Door Switch circuit starts in the power box. 24vdc is sent to the rear junction box on wire #18. From there, 24vdc is sent to the rear door switch. When the switch is depressed, it completes the circuit and sends 24vdc back to the rear junction box on wire #36. From there, wire #36 goes back to the power box, and into the PLC on Slice DI #1, input 1 (1.1 top left). If there are multiple door switches on the dryer, they are wired in series before returning #36 to the rear junction box.

Title: PORTABLE D	DRYER: Rear Door Circuit #36		
Author: SUKUP MFG CO - MRK			
Date: 03/15	Sheet: Rear Door #36		
Revision: 6/7/2017 - DWS (1)	106.1		





Title:	PORTABLE DRYER: Rear Discharge Chute

Author: SUKUP MFG CO - MRK

Date: 03/15 Sheet: Disharge Chute #42

Revision: 6/17 DWS 106.3





The Paddle Switch on the dryer is a 2-position switch that helps the dryer with its automated loading procedure. It also assists in telling the dryer when the wet bin is empty or full for too long. As grain fills the wet bin, the lower paddle switch (#44) will gently lift up and close the circuit (24vdc). This will also tell the dryer to disengage the Aux #2 relay K7. Next, as the wet bin is almost full, the upper paddle switch (#53) will gently lift up and close the circuit (24vdc). When the upper paddle switch closes, the Load Relay K1 and Aux #1 Relay will also disengage.

Title:	PORTABLE DRYER: Paddle Switch Circuit	

Author: SUKUP MFG CO - MRK

Date: 03/15

Revision: 6/7/2017 - DWS (1) 106.4







Revision: 6/7/2017 - DWS (1) 106.7







Jute. ee.		
Revision:	6/7/2017 - DWS (1)	106.10












Revision: 6/7/2017 - DWS (1) 106.16











Title:	e: PORTABLE DRYER: Fan Confirmation Circuit		
Author	r: SUKUP MFG CO - MRK		
Date:	03/15		
Revisi	on: 6/7/2017 - DWS (1)	106.21	





Plenum RTD Transmitter





3-6 Fan



Pink - DC voltage Reference to PLC (171, 271, 371, 471, 571, 671)

Wire #18 - 24vdc Power Wire #95 - dc common (-)

Purple - Resistance from RTD Blue - Resistance from RTD

Title: PORTABLE DRYER: Plenum RTD Transmitter			
Author: SUKUP MFG CO - MRK			
Date: 03/15	Sheet: 106.24		
Revision:			



Moisture Sensor











Black Wire: Moisture Reference (D4 or D5)

Blue Wire: Temperature Reference (D3)

Brown: #18 - 24vdc Supply

White: #95 - DC common (-)

Title: PORTABLE DRYER: Moisture Sensor



Important: take advantage of the quick connect plug, take the sensor inside during the off-season!

Author: SUKUP MFG CO - MRK		
Date: 03/15	Sheet:	106.25
Revision:		







Fan / Heater Interlock Circuit

"X" is dictated by the Fan Position. Fan #1 is always the lowest fan. Fans are counted from the ground up, like floors on a building. Pictures of components like relays, contactors, and auxiliary contacts may vary from your actual product.



Retrofit Fan / Heater Interlock Circuit

"X" is dictated by the Fan Position. Fan #1 is always the lowest fan. Fans are counted from the ground up, like floors on a building. Pictures of components like relays, contactors, and auxiliary contacts may vary from your actual product.





















