



Calc-U-Dri Moisture/ Matic/Manager

Owner's Manual

PNEG-1153

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PNEG-1153

All information, illustrations, photos and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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1. Introduction

GSI Calc-U-Dri Moisture/Matic is a grain drying control specifically designed for continuous flow, out-of-bin grain dryers with an SCR control and a DC motor on the metering rolls.

The Calc-U-Dri Moisture/Matic will automatically increase or decrease the speed of the metering rolls to maintain a desired moisture content. The Moisture/Matic is available as a base unit or with an optional chart recorder or printer for convenient record keeping.

The metering roll speed control potentiometer in the dryer control panel is replaced by the main speed control in the Moisture/Matic. A DC voltmeter is provided to indicate the voltage applied to the metering roll motor, which will change from fast, medium or slow. The speed is selected by comparing the actual moisture of the grain being discharged from the dryer to the moisture set point.

As the grain moisture increases, the Moisture/Matic will slow the metering rolls down. The slower grain movement will increase the time the grain spends in the dryer, which will reduce the moisture. As the moisture nears the moisture set point, the unit will switch from slow to main speed. As long as the grain moisture is at or near the set point the main speed is retained. Should the moisture start to get dryer, the unit will switch to high speed. The 3 speeds are adjustable to match the dryer to the grain that is being dried.

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Save these safety guidelines for future reference.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in **SERIOUS INJURY** or **DEATH**.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

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

ST-0001-3

Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.



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



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**



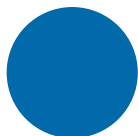
This symbol is used to address practices not related to personal injury.



This symbol indicates a general hazard.



This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection



Respiratory Protection



Foot Protection



Hearing Protection



Head Protection



Fall Protection



Hand Protection



- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.



ST-0002-1

2. Safety

Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts.
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.



ST-0003-1

Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment and bins are properly grounded.



ST-0075-1

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

[illegible]

ST-0007

3. Safety Decals



Be a safe operator.

1. **Read and understand the Owner's Manual.**
2. **Disconnect all electrical power before servicing or opening control box, adjusting or lubricating the equipment.**
3. **All electrical hook-ups should be in accordance to the National Electrical Code.**
4. **Ground all electrical equipment as well as bin itself.**
5. **Only knowledgeable and trained personnel should operate this equipment.**
6. **NEVER WORK WITH BELTS OR AUGERS WITH POWER "ON".**
Automatic controls may start without warning. Stay clear of motors, belts and augers.

Failure to follow these instructions may result in personal injury or property damage.

The decal shown [below](#) must be displayed as shown replacements are available upon request.

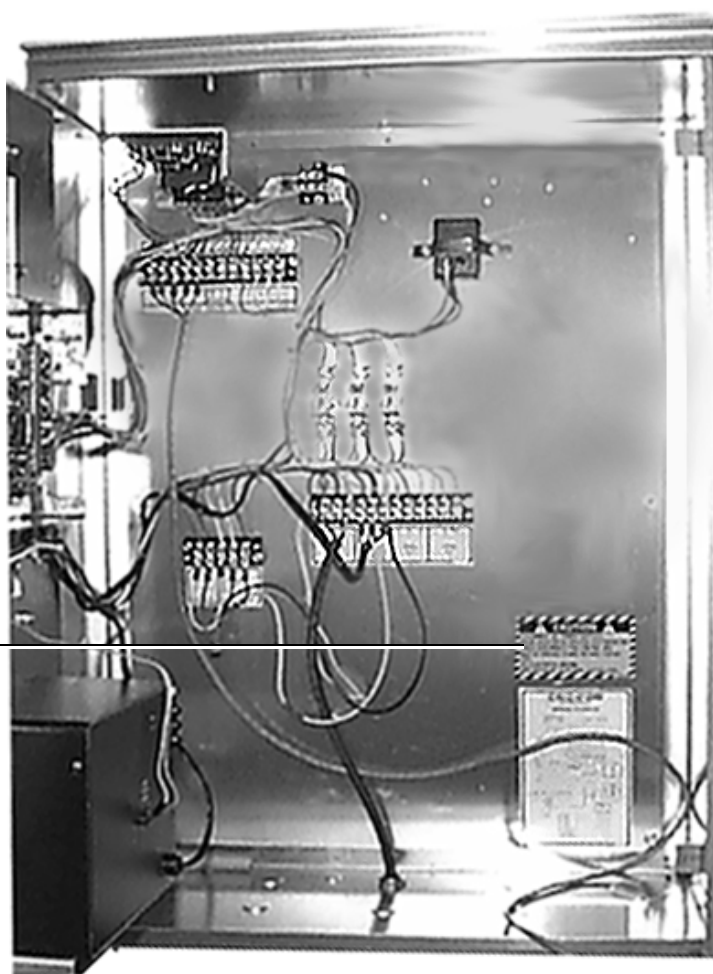
NOTE: 1. The decal on this page is NOT actual size.

2. Keep all decals wiped clean at all times.

3. All decals must be replaced if they are destroyed, missing, painted over or can no longer be read.



Part #: 801L010



Sensor Location and Cut Out Instructions

Sensor Location

Locations for sensor installation are dependent on the following factors all being present for proper operation. (See Figure 4A.)

1. Installation in a 6" or 8" diameter auger or a flat bottom pan.
2. The auger can be horizontal, vertical or inclined. It is recommended that the clearance between the flighting and the tube be 5/8" or less.
3. The auger must have a minimum of 225 bushels per hour flow rate of grain across the sensor.
4. The auger must have one full pitch of flight before and after the sensor.
5. Avoid placing the sensor in a location that will be affected by condensation.

NOTE: If help is needed for sensor location, contact your GSI dealer.

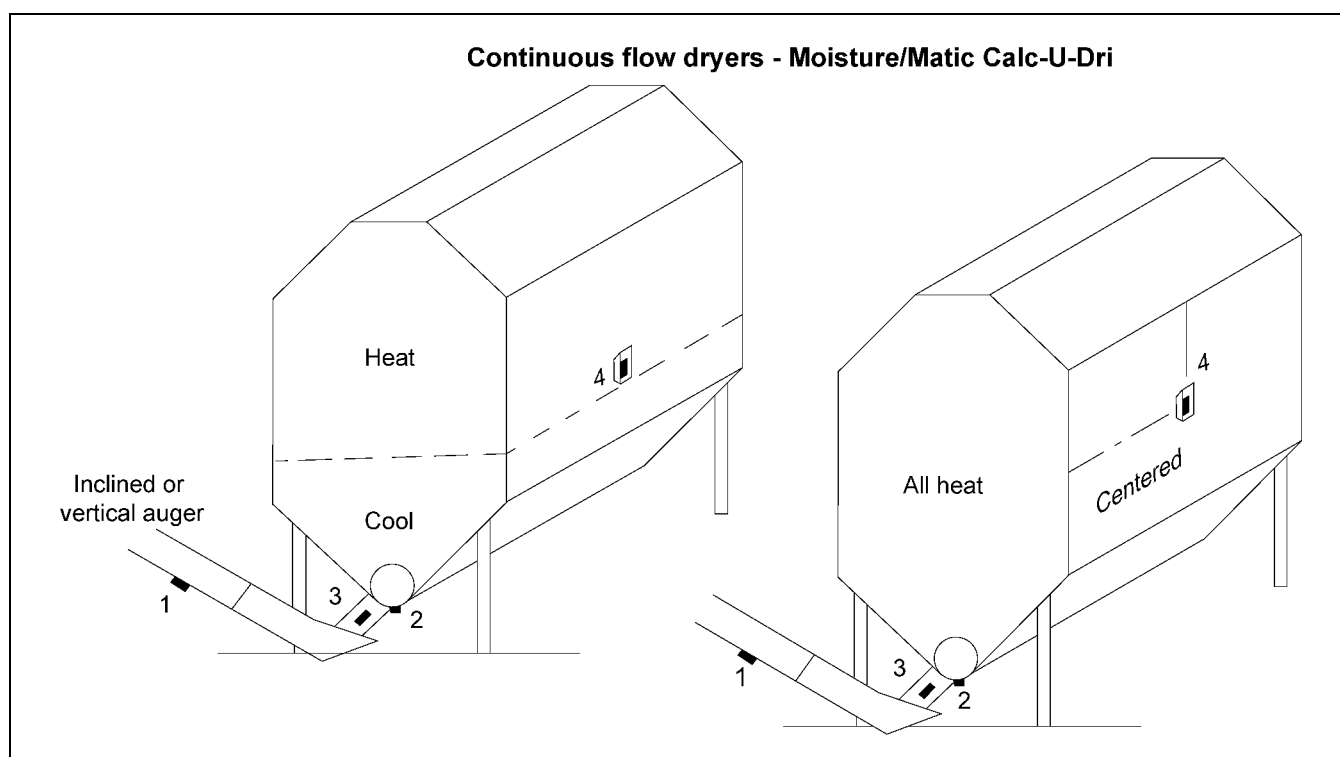


Figure 4A Control Sensor Location - Order of Preference

- a. Take-away auger.
- b. Discharge auger - One full pitch of flighting before and after flighting. Flighting to tube clearance less than 5/8". Condensation from dryer may affect sensor.
- c. Discharge spout - Use a funnel-type of restrictor.
- d. Column - Column sensor is usually in the lowest part of the heating section or in the highest part of the cooling section (centered if all heat). There must be no restriction in air flow near the sensor. Use column sensor bracket #602N175.

4. Installation

Sensor Cut Out Instructions

Sensor Cut Out Instructions for 6" and 8" Augers



Disconnect power to the auger motor before proceeding any further.

1. Look at the discharge tube and determine where the sensor can be located. (See Figure 4C.) There must be at least one full pitch of flighting on the discharge auger before and after the sensor to move the grain over the sensor blade.

NOTE: If the unit has a connecting band, determine if it can be removed and replaced with a 12" long connecting band. If it is a structural supporting connecting band, additional support may be needed during removal of the connecting band.

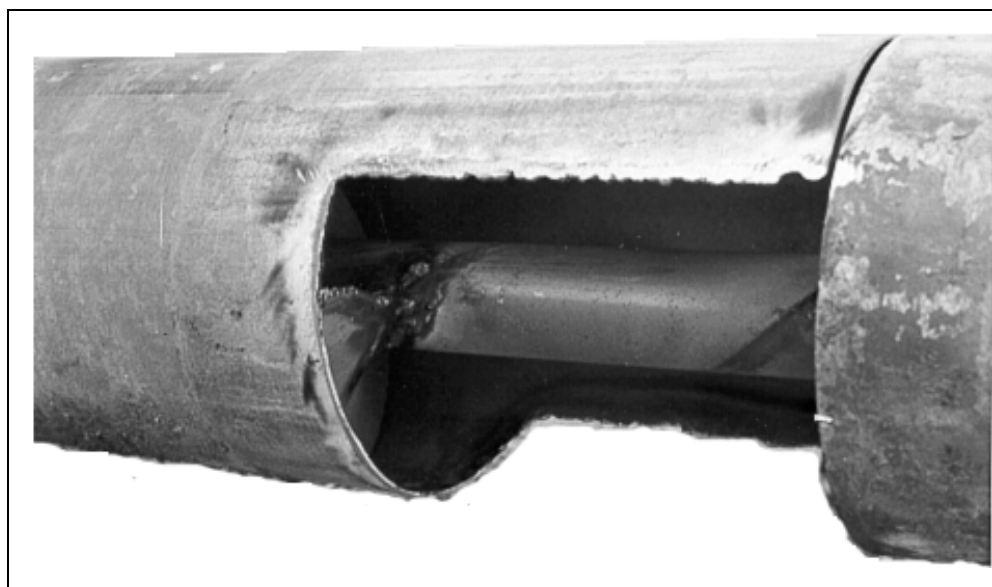


Figure 4B

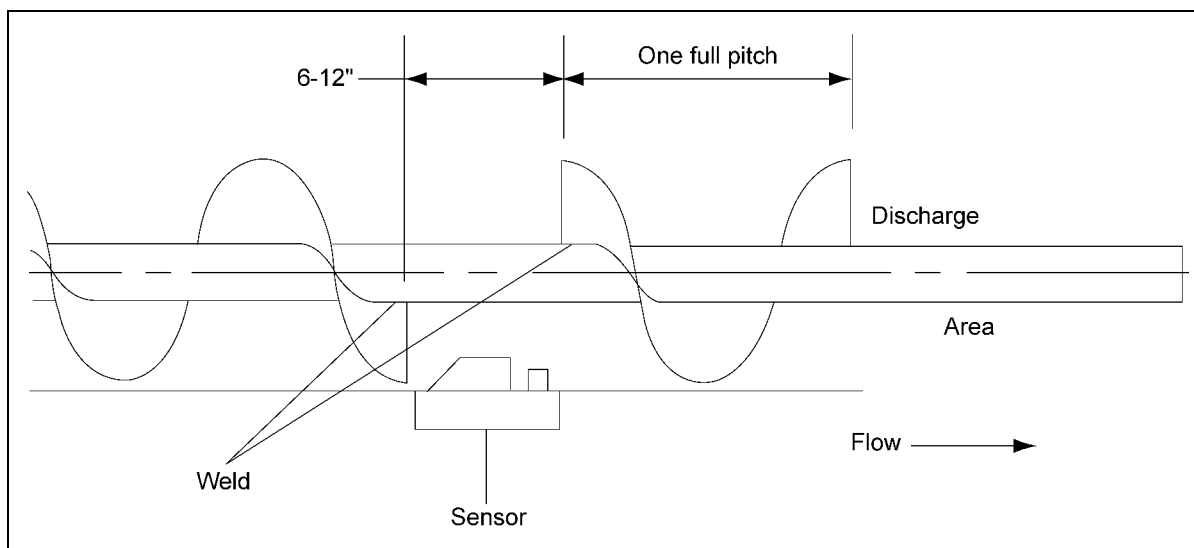


Figure 4C

2. Position the sensor connecting band on the discharge tube so that the rectangular hole is toward the discharge end. Mark the outline of the rectangular hole and the edges of the band on the discharge auger tube. Cut a hole in the discharge tube 8" long so the outline of the rectangular hole is removed (stay inside the total overall length marks of the band). Cut up one side of the discharge tube about one third ($\frac{1}{3}$) of the way around the tube. This extra room is for ease of removing flighting in the next step. (See [Figure 4B on Page 12.](#))
3. Replace the connecting band on the discharge tube in the same position as in [Step 2 above](#) and mark the flighting at each end of the rectangular hole. Weld the discharge auger flighting to the shaft $\frac{3}{8}$ " beyond each of the marks. After the flight is welded at these points, cut out 6- $\frac{1}{2}$ " of the flighting all the way to the center shaft.
4. Smooth all the rough edges from the cut area and position the sensor hole centered over the 6- $\frac{1}{2}$ " area, then tighten the connecting band.
5. Before installing the sensor, see sensor installation [on Page 18.](#)

Sensor Cut Out for Flat Bottom Discharge Units



Disconnect power to the auger motor before proceeding any further.

1. Determine where the sensor can be located. (See [Figure 4D.](#)) There must be at least one full pitch of flight before and after the sensor. (See [Figure 4E on Page 14.](#))

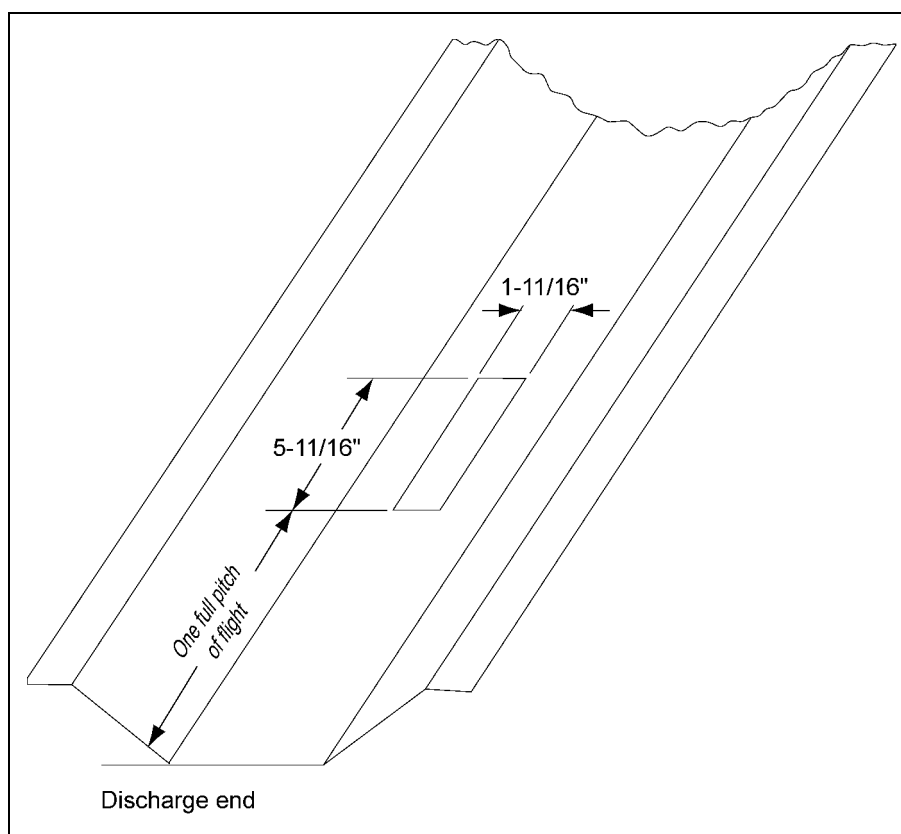


Figure 4D

4. Installation

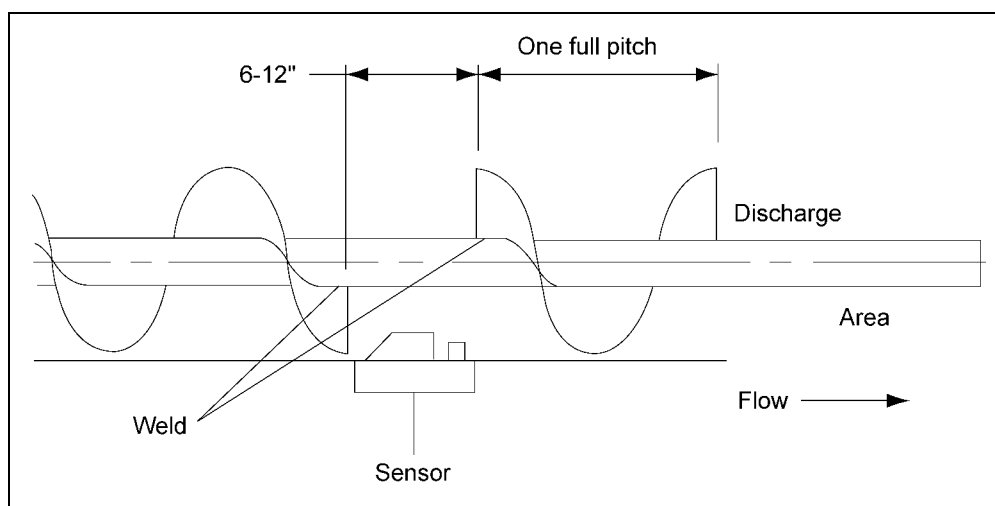


Figure 4E

NOTE: If there is more than $\frac{5}{8}$ " gap between the bottom pan and the outer edge of the flighting, do not use a sensor in that location. Use another location, such as a take-away auger. (See Figure 4F.)

2. Remove the flat bottom pan and mark the sensor cut out area at least one pitch length of the auger from the discharge area. This allows for good pickup of the grain when it leaves the sensing area. Cut the sensor rectangle $1\text{-}\frac{11}{16}$ " x $5\text{-}\frac{11}{16}$ " with a saber saw (do not torch cut) and check so the sensor block fits into it with the stepped edge. (See Figure 4D on Page 13.)
3. Hold the pan up to the unit and mark the flighting where the sensor hole is located. Remove the pan and mark the flighting about $\frac{3}{8}$ " away from marks just made, so the new marks are $6\text{-}\frac{1}{2}$ " apart.

NOTE: For 7" flight or less, cut the flight to the shaft. Weld the auger flight to the shaft at each end of the $6\text{-}\frac{1}{2}$ " cut out marks, then cut out the $6\text{-}\frac{1}{2}$ " of flighting from the auger, leaving only the drive tube. For 8" or larger diameter flighting, $\frac{1}{2}$ " of flighting can be left as a ribbon around the shaft in the cut out area. (See Figure 4E.)

4. Smooth all the rough edges from the cut out area.

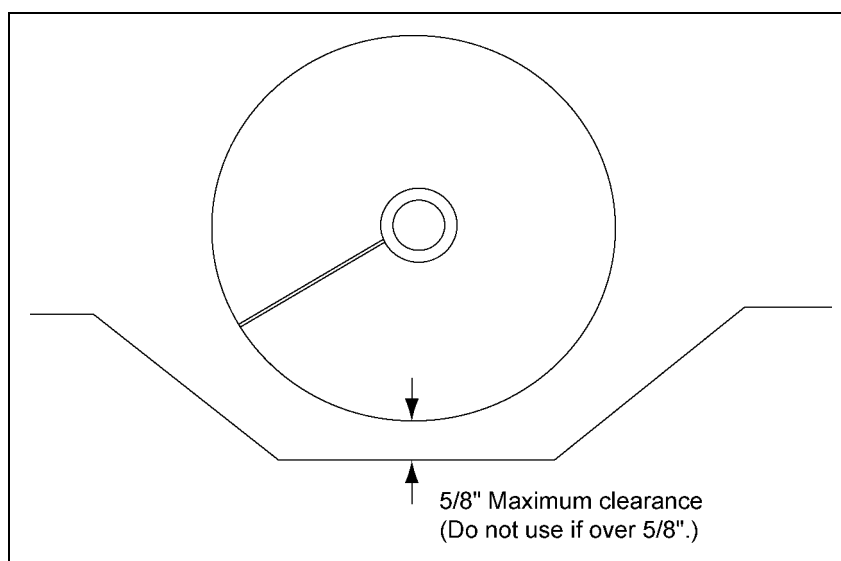


Figure 4F

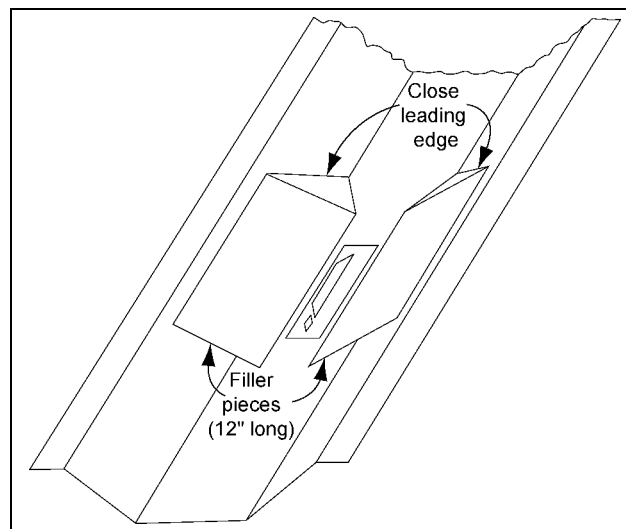


Figure 4G

5. On the flat bottom pan, make some filler pieces 12" long to keep the grain closer to the sensor flag. (See [Figure 4G](#), [Figure 4H](#) and [Figure 4I](#).) Be sure the leading edge is closed so grain cannot get under the pieces. Weld the pieces in place as shown in [Figure 4G](#).
6. Re-mount the pan and check all the clearances and alignments. Before installing the sensor, insert the clearance gauge into the cut out. (See [Figure 4J on Page 16](#).)

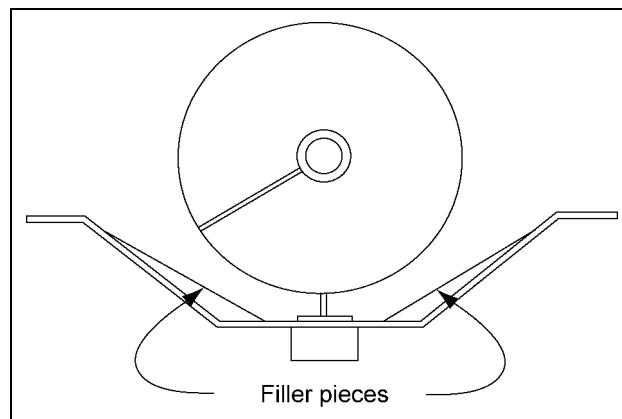


Figure 4H

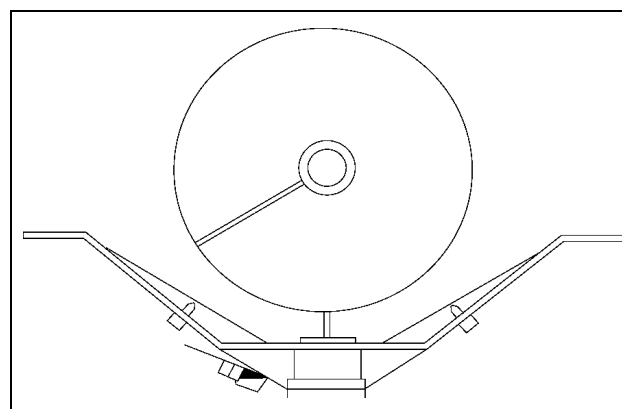


Figure 4I

4. Installation



Slowly rotate the auger by hand one complete revolution. The flighting must miss the gauge completely and not rub on the filler pieces. If there are areas of binding or hitting, correct the situation now.

Disconnect power.

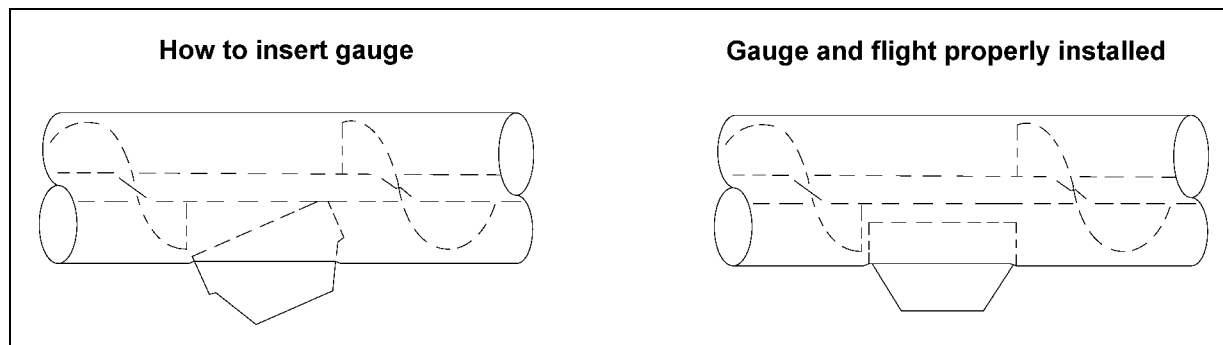


Figure 4J

7. Securing the sensor to the flat pan will require modified clamps. Cut the end off the clamp and mount it with a self-drilling screw to the tapered side so the screw tip goes under the filler pieces added earlier. Attach the screw end of the clamp on the other side with a self-drilling screw. Have the length such that the screw is beside the sensor as shown in [Figure 4I on Page 15](#).
8. When installing the sensor, follow the instructions on the sensor decal for the correct direction of grain movement.

Sensor Cut Out for Flat Bottom Down Spout

1. When using a down spout, there must be a constant density of grain flowing over the sensor for accurate readings. This flow must be independent of the total flow or velocity of the stream of grain. To do this, the installation of the restrictor spout or flats angled to create a funnel is recommended.

The sensor should be located in an accessible location, so it can be periodically inspected for trash build-up.

2. Cut a hole in the bottom of the spout (1-11/16" x 5-11/16") and drill two (2) 5/16" diameter holes 3-1/2" toward the discharge end and 5-1/2" apart as shown in [Figure 4K](#). Use a saber saw for the hole, not a torch. Remove burrs and check so the sensor block fits into the stepped edge.

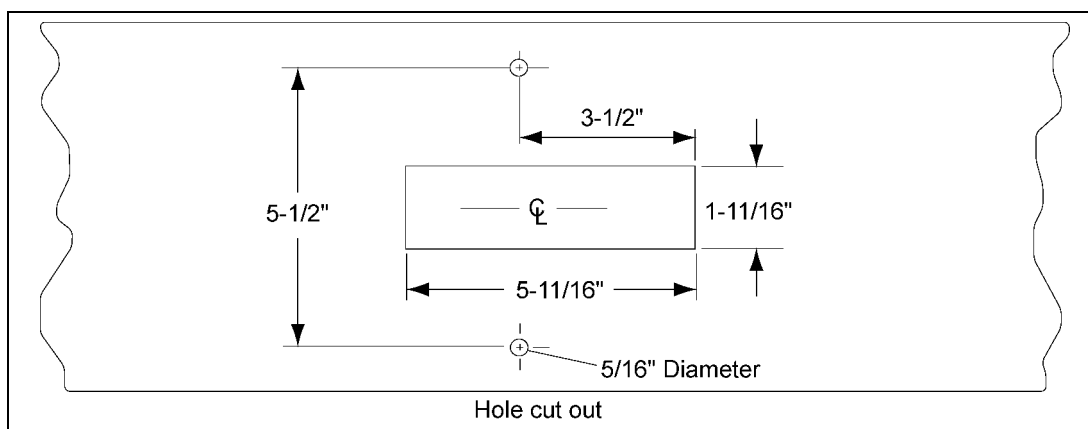


Figure 4K Top View

- Secure the restrictor spout to the flat bottom with 1/4" hardware. Secure the sensor by cutting the end off of the strap and mounting with a self-drilling screw to the edge of the flat spout. Attach the screw end of the clamp on the other side of the flat spout with a self-drilling screw. (See Figure 4L and Figure 4M.)

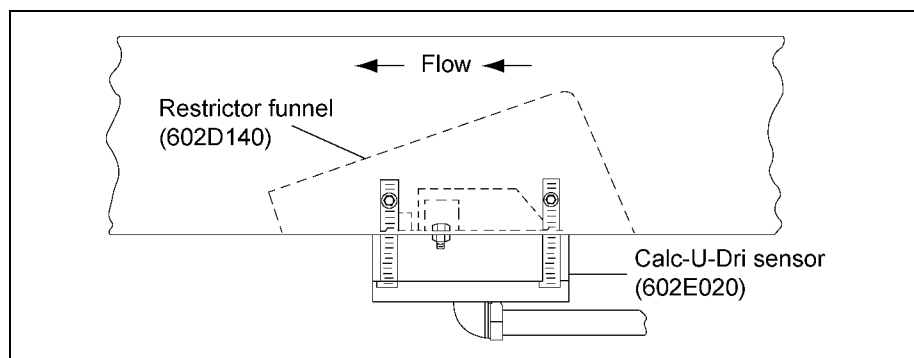


Figure 4L Side View

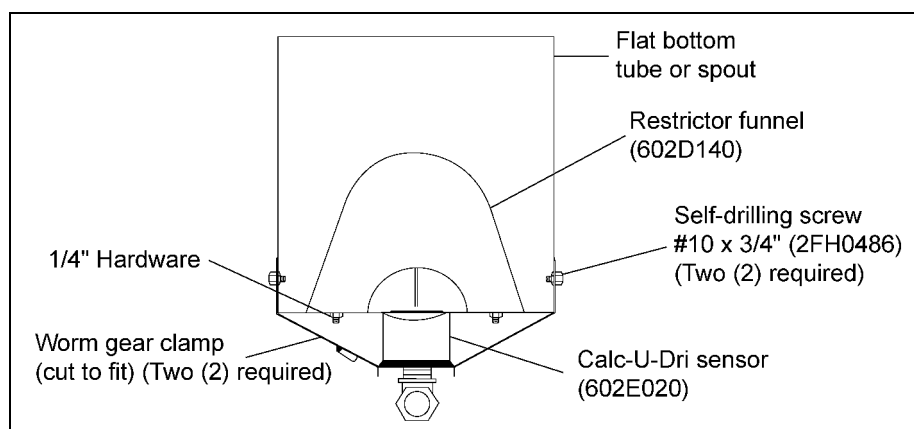


Figure 4M

- For conditions where straw or chaff can accumulate in the restrictor funnel, the grain can be channeled over the sensor with angled brackets in the down spout. (See Figure 4N.)

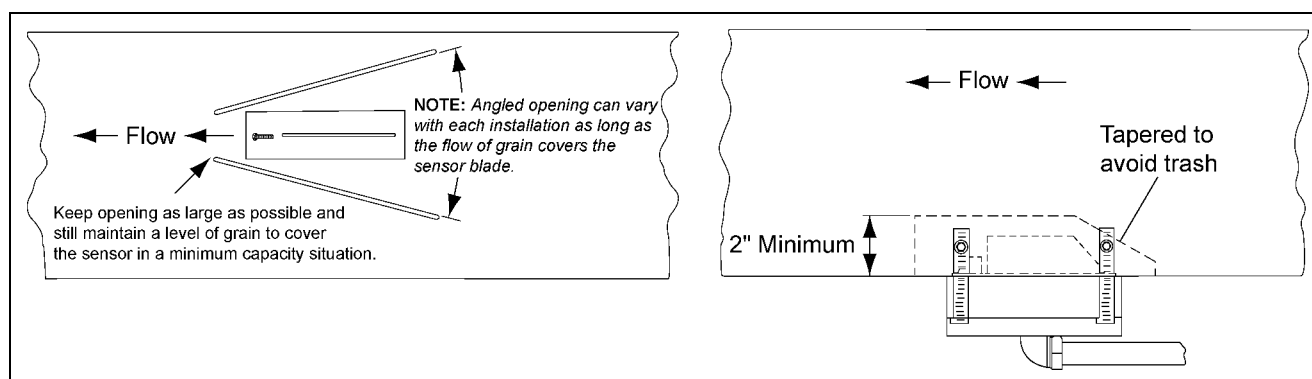


Figure 4N

Sensor Cut Out for Round Down Spouts

- When using a sensor in a down spout, there must be a **CONSTANT** density of grain flowing over the sensor for accurate readings. This flow must be independent of the flow or velocity of the grain stream. It is recommended that a restrictor be used to slow the grain speed over the sensor such as used in step. A modified open top version may have to be used.

Moisture/Matic Electrical Box and Sensor Installation Instructions

1. The Calc-U-Dri Moisture/Matic can be near the unit's main control box, discharge auger or other locations that are easily accessible and of convenient height for you to observe and use. Mount the electrical box using four (4) 5/16" x 1-1/2" bolts, lock washers and nuts.
2. Included with the Calc-U-Dri Moisture/Matic are 27' of 1/2" liquid-tite conduit. This is to be used to protect the sensor wire between the Calc-U-Dri Moisture/Matic box and the sensor.
3. A 4 x 4 junction box, sensor wire and liquid-tite is available to extend the sensor wire up to 250', if required. Determine the shortest distance from the sensor to the junction box. Use the 27' of 1/2" liquid-tite conduit and feed the sensor wire through it using the connector provided. There should be 6" of sensor wire inside the junction box. Any excess wire or conduit may be cut off. Be sure not to cut off too much since both the conduit and the sensor wire need to be connected at the other end to the Moisture/Matic box.
4. Connect the Calc-U-Dri sensor wires in the 4 x 4 junction box to the top of the terminal strip. The leads from the Moisture/Matic box go to the bottom of the terminal block. Be careful to match the color coded wires to each other - red to red, etc. (See Figure 4O.) Then, attach the junction box lid.

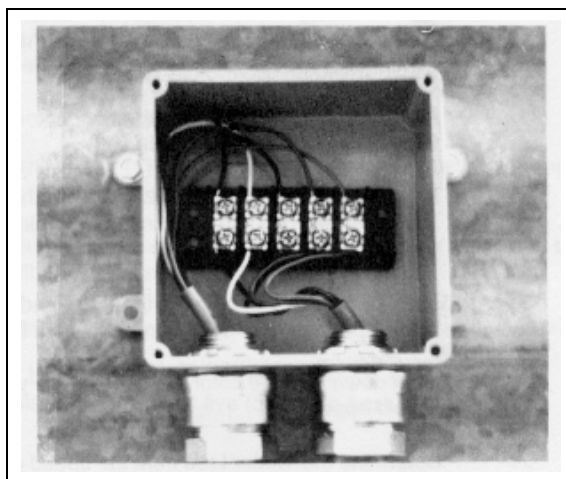


Figure 4O

5. Secure the Calc-U-Dri sensor wire to the inside of the Calc-U-Dri Moisture/Matic box with the plastic "J" clips. Connect the sensor wires to the terminal strip marked "sensor". Excess sensor wire can be cut off. Be sure the sensor wire (stripped bare of insulation) is clamped in the terminal and not on the insulation.

If more than one sensor is used, hook the sensor wires so that all like-color wires are under one terminal post. (All black wires on terminal number one, etc.) The correct dip switch setting for the circuit board is described on the chart [on Page 44](#). Set dip switches 9 and 10 to the correct position according to the number of sensors used.

NOTE: The top terminal strip on the back panel of the Moisture/Matic is low voltage DC. Never hook AC power to this terminal strip.

6. Mount the sensor in the discharge tube by positioning the stainless steel flag toward the grain and the copper flag toward the discharge end. The flow of grain must follow the arrows on the sensor decal. Be sure the sensor block seats fully into the rectangular hole in the discharge auger tube. Fasten to the tube with strap bands. Fasten the grounding strap from the sensor to the discharge auger tube by drilling a self-tapping screw through the connector on the ground strap and back into the discharge tube in the area where the flighting has been removed. Leave at least 2" between the sensor block and the grounding screw.

Electrical Hook-Up *(See Figure 4P.)*

1. Disconnect the AC power from the dryer and lock out the AC power to ensure that it will not start.
2. DC Voltmeter Hook-Up: Use the 15' piece of five (5) conductor cable provided for the hook-up wire. Use liquid-tite and proper fittings (not provided) to run between the Calc-U-Dri and the SCR controller. On the SCR control board locate the leads going to the DC motor.
 - a. Attach the black wire, one of the conductors in the cable, to the positive motor lead (A1) and the green wire to the negative motor lead (A2).
 - b. In the Moisture/Matic control box, locate the five (5) post terminal. This has "DC Voltmeter" written on it. The green wire should be placed on terminal 1 and the black on terminal 2.
3. Speed Control Hook-Up: Locate the three (3) leads on the SCR control board (in the dryer control box) that are attached to the speed control potentiometer. *(See Figure 4P.)*
 - a. Mark down the wire color and terminal as you remove the three (3) leads. This can be used for a test if problems should appear.
 - b. Determine the center lead from the speed control potentiometer. (This may not be the center lead on the SCR board.) Remove this wire from the SCR board and replace it with the red wire in the five (5) conductor cable from the Moisture/Matic.

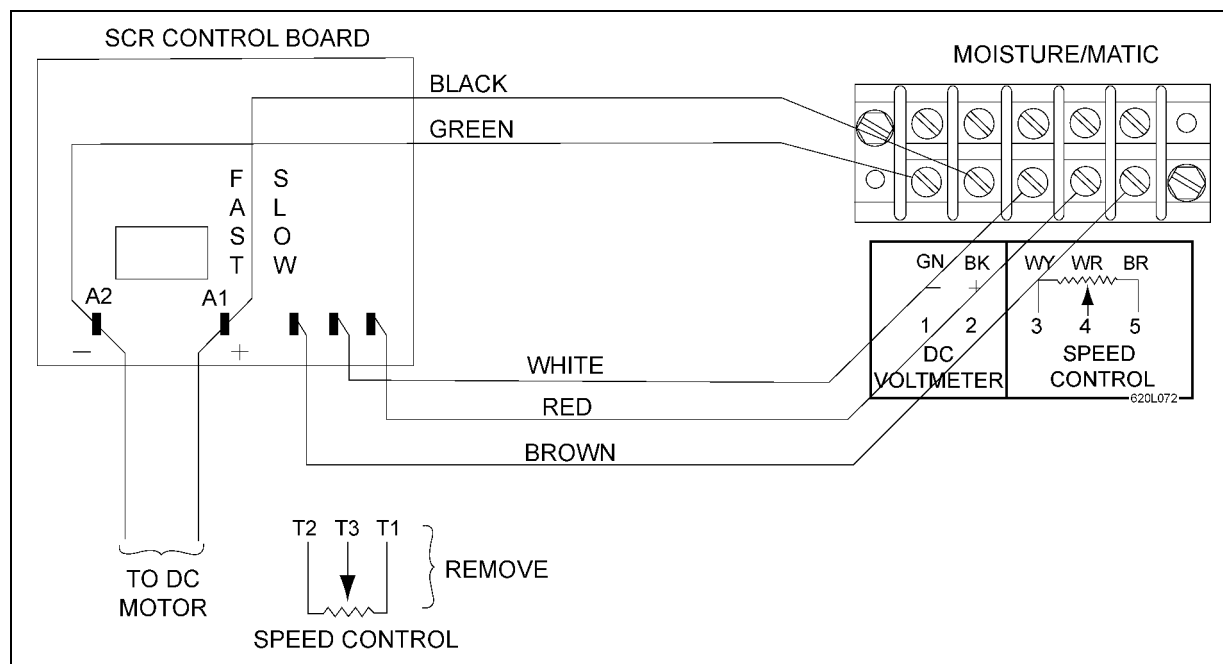


Figure 4P

- c. Attach the other end of this red wire to terminal 4 as marked by the decal on the back panel in the Moisture/Matic.
- d. Determine which wire is attached to the "slow" end of the speed control potentiometer. Remove this wire from the SCR board and replace it with the white wire from the Moisture/Matic.
- e. Attach the other end of this white wire to terminal 3 on the back panel of the Moisture/Matic.
- f. Remove the remaining wire from the SCR board and replace it with the brown wire from the Moisture/Matic. Attach the other end of this wire to terminal 5 on the back panel of the Moisture/Matic.

NOTE: See appendix B on Page 39 for more examples on wiring.

4. Installation

4. 115 Volts A/C Hook-Up:

- a. The Calc-U-Dri Moisture/Matic requires 115 volts AC. This can be on an independent circuit or taken from a control box which would automatically turn the Calc-U-Dri on when the dryer is ON.
- b. The input 115 volts AC should be wired to the lower terminal strip as indicated by the decal in the Moisture/Matic box (L1, N and GND).

5. Additional Signal Outputs

- a. Signal 1 out and signal 2 out are located on the lower terminal strip. Each “signal out” consists of ‘C’ (Common), ‘N.O.’ (Normally Open) and ‘N.C.’ (Normally Closed) contacts. These signals will operate when in the ‘Automatic’ mode and when the moisture of the grain exceeds 1.3% over the moisture set point setting. These contacts can be used on any accessory equipment or warning device that requires less than 5 amps at 115V AC.
6. The MCR relay output sends 110 VAC signal when the control power switch is set to “control”. This allows for switching between the CUD and the “Dryer Control”. When the control switch is in “Monitor” the MCR signal will not be present. This will allow monitoring when using temperature based control or batch control.
 7. The unload monitor will allow the printer to print only when the dryer is unloading. Terminal 6 on the unload monitor needs too have 110 VAC to enable the printer to print. If a dry contact, such as in AUX is used, power may be used from terminal 5. If this feature is not required, jumper may be placed between unload monitor terminal 5 and terminal 6.
 8. Check to make sure that all dryer safety switches are functioning correctly after the wiring is complete.



Never apply AC voltage to the upper sensor terminal strips.

All wiring must be done in accordance with the National Electrical Code.

All wiring should be done by a qualified electrician and should be to all code standards to avoid possible bodily injury or death.

Grain bins and/or dryers with electrical equipment in operation must be grounded.

Do not modify or bypass any safety shut-offs.

1. Place the Automatic/Monitor switch in the “Monitor” position and turn the Moisture/Matic “ON”. The power indicator light should come ON; if not, check the AC power input and/or troubleshooting [on Page 37](#). Place the control power switch to “Control”. The printer switch may be in print or OFF.
2. Start-up the dryer according to the manufacturer’s recommendations using the main speed control on the Moisture/Matic to control the metering roll speed.

NOTE: *Turning the knob clockwise should increase the DC motor speed (higher DC voltage on motor) and counterclockwise should decrease the DC motor speed (lower DC voltage). If this does not happen, reverse the wires on terminal posts 3 and 5 in the back panel. See electrical hook-up, [Step 3 on Page 19](#).*

If this does not correct the situation, see the troubleshooting [on Page 37](#).

See Calc-U-Dri Moisture/Matic sampling chart [on Page 22](#), for proper sampling procedures.

3. The Moisture/Matic may need to be calibrated to compensate for different grains and sensor configurations. * Make sure that the calibration is set at zero before comparing the displayed moisture values with the samples tested with a reliable moisture tester. (See Calc-U-Dri Moisture/Matic sampling chart [on Page 22](#).)
 - a. If the displayed moisture value is less than the moisture value from a moisture tester, push the “Display Calibration” and turn the calibration adjustment knob until the display reads the difference (+ value).
 - b. If the displayed moisture value is more than the moisture tester value, push the “Display Calibration” and turn the calibration adjustment knob until the display reads the difference with a minus sign (- value).

* Push the “DISPLAY CALIBRATION” switch down and the display will show the amount added to or subtracted from the displayed moisture (-9.9 to +9.9).
4. Grain samples should be taken on a daily basis to ensure that the electronic equipment is functioning correctly. Use a quality moisture tester that will provide repeatable accuracy.



To take a sample, a few simple guidelines should be followed.

- a. USE A SAFE SAMPLING PROCEDURE. DO NOT SAMPLE FROM A HOPPER WITH AN UNGUARDED AUGER. KEEP HANDS, FEET AND CLOTHING AWAY FROM ROTATING PARTS.
- b. Take a sample when the digital panel meter is not changing rapidly.
- c. Watch the meter while sampling and use the average reading: i.e., record the readings of several samples, add the samples together and divide the total by the number of readings.
- d. Why take several samples? The electronics average the grain moisture and therefore it is possible to have a sample that is either wetter or dryer than the meter is reading. (If the meter is changing rapidly while sampling.)
- e. Take samples at the discharge, not from the storage bin, when monitoring a drying operation. If you do not have a sampler at the discharge, contact your dealer and have one installed. See the following Calc-U-Dri Moisture/Matic sampling chart [on Page 22](#).

5. Start-Up and Operation

The chart [below](#) shows grain moisture readings (from a real situation) as they should be taken to obtain a realistic moisture value.

Calc-U-Dri Moisture/Matic Sampling

	Calc-U-Dri		Dole		Elevator
Time	Temperature	Moisture	Temperature	Moisture	Moisture
9:33 AM	112	14.4%	109	14.7%	
9:36 AM	112	14.4%	111	14.4%	
9:38 AM	108	16.0%	107	17.5%	
9:40 AM	110	14.6%	109	14.7%	
9:43 AM	108	15.9%	104	17.3%	
9:50 AM	111	14.5%	107	15.0%	
Total		89.8%		93.6%	
Average		15.0%		15.6%	15.3

Question : Where would you set the moisture offset, +0.3 or +0.6?

Answer : Most would want to set it to +0.3 which would make it match the point of sale's moisture reading.

5. The moisture set point is adjusted by turning the set point adjustment knob while holding the "Display Set Point" paddle switch down. Turning the knob **clockwise will increase** the moisture set point and **counterclockwise will decrease** the moisture set point (0 to 25).

NOTE: *The set point will change whenever the knob is moved.*

6. Adjust the main speed adjustment knob to the desired discharge rate. This is the typical metering roll speed required to obtain the desired discharge moisture.
7. Switch the mode switch to "Automatic" and the Moisture/Matic will start to control the speed of the dryer metering rolls. The dryer will operate at "Low" speed when the moisture content displayed on the meter is wetter than 0.3% or more than the moisture set point. It will operate at "Main" speed when the moisture displayed is within +0.3% or -0.3% of the moisture set point and will run at "High" speed when the moisture is 0.3% or more below the moisture set point.
8. The amount of speed change from "Main" speed to either "Low" or "High" speed can be varied by using the "Speed Adjustments" located by the indicators.

A speed change of approximately 15% should give good performance under most conditions. However, some adjustments may be required to accommodate different drying situations. For example, if the moisture content of the wet, undried grain is not very consistent, then a wider speed change may be necessary.

To adjust the low speed or high speed follow these steps:

- a. Read the DC voltage in main speed and remember.
- b. Move the moisture set point to force the unit into the high or low speed, whichever you wish to adjust. (Note red indicators.)
- c. Locate the correct speed adjustment potentiometer and with a screwdriver adjust to the desired DC voltage.

Example: Want a 15% speed change from “Main” to “Low” speed. Main speed reads 50 volts. Force the unit to “Low” speed and the voltage reads 30. Adjust the “Low” speed potentiometer to a new value of 42 volts. Return the moisture set point to the original value.

NOTE: *If the main speed is changed, some readjustment of the low and high speeds may be required to maintain the same speed change.*

NOTE: *Before leaving the dryer unattended, make sure that the output of the dryer in the “High” speed range does not exceed the capacity of the dry grain take-away equipment and that the output in the “Low” speed range provides enough grain to cover the sensor blade.*

6. Printer Installation (Optional)

1. Disconnect all power (AC).
2. Remove the hole cover by removing the six (6) #8-32 screws holding it in.
3. Install the printer wiring decal 602L065 on the back of the inside door.
4. Remove the GSI 18 control board and open the dip switches 7 and 8 for the application. See the dip switch chart [on Page 44](#). Install the control board.
5. Install the black card guides (1EL0850) into the card holder. This is to hold the new card in place.
6. Connect the wires coming from the green card connector to the black card connector (1EL0854). There is a total of eleven (11) wires. Refer to decal 602L065 mounted on the Calc-U-Dri door and [Figure 6A on Page 25](#). Note colors and pin letters. This must be done correctly.
7. Mount the black card connector using two (2) 4 x 40 5/8" bolts, 4 x 40 nuts and star washer. The numbered side of this connector will be visible when mounted correctly.
8. Connect the printer control cable to the black card connector. This cable will have a 25 pin connector on one end. Refer to [Figure 6A on Page 25](#).
9. Install the 5 volt power supply using two (2) 8 x 32 x 1/2" bolts. The locations is the upper right of the back panel. The red and green wires will be coming out of the left edge of the supply. Attach the violet and white wires to the 2 post terminal 2" to the left of the supply. Violet on the "V" terminal and white on the "W" terminal.
10. Attach the printer to the front panel with the five (5) #8-32 screws and nuts.

PRINTER WIRING DIAGRAM

BK -- BLACK
BL -- BLUE
BR -- BROWN
GN -- GREEN
GY -- GREY
O -- ORANGE
R -- RED
V -- VIOLE
Y -- YELLOW
W -- WHITE
WO -- WHITE/ORANGE
WR -- WHITE/RED
WY -- WHITE/YELLOW
WBL -- WHITE/BLUE
WGY -- WHITE/GREY
BK/WH -- BLACK/WHITE

IF NOT ALREADY
HOOKED-UP THESE
WIRES ORIGINATE
FROM GREEN EDGE
CONNECTOR STRIP
WIRES 5/8" BEFORE
HOOKING-UP.

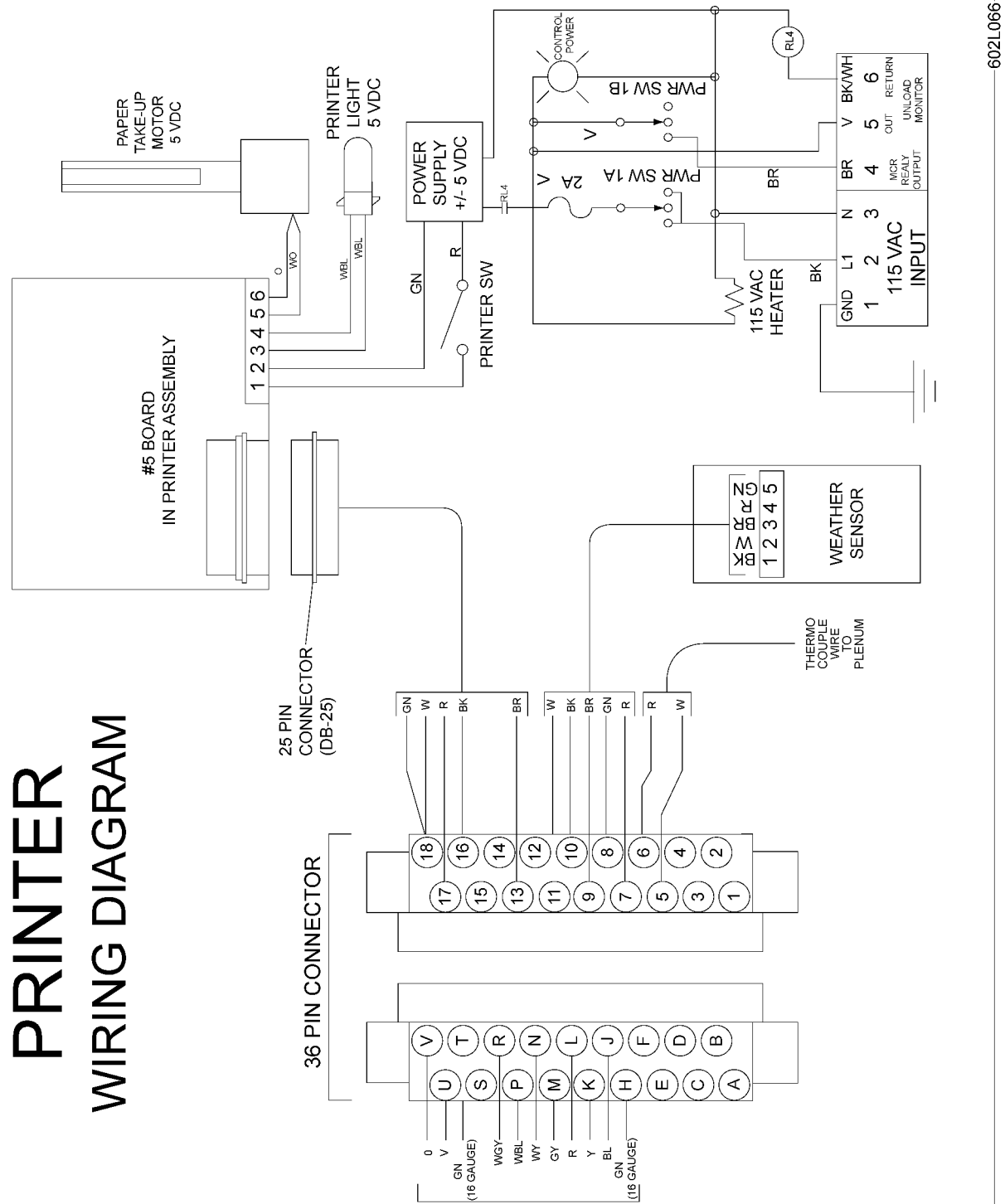


Figure 6A

6. Printer Installation (Optional)

11. Plug in the printer control cable to the printer assembly.
12. Wire the printer power supply wire to the printer assembly. Connect the red wire to #1, green wire to #2. See decals [on Page 10](#) by connector.
13. To mount the plenum thermocouple, cut a hole in the plenum 1-1/4" diameter within 50' of the control box. Secure the liquid-tite and thermocouple using conduit clamps. Wire the sensor into the back connector pin #5 to white, pin #6 to red. ([See Figure 6A on Page 25.](#))
14. To mount the weather sensor, feed the cable through the 1-3/32" diameter hole in the bottom of the control box and secure with the electrical screw bushing. Have the sensor on the outside of the control box. Wire the cable to the black 36 pin connector, pins 7 through 11. ([See Figure 6A on Page 25.](#))
15. Put cable ties approximately every 4" to hold all the loose wires and cables in place. Do not tie any of these wires to the AC leads. Cut off the cable tie ends.
16. Remove the printer interface card GSI 4 from its shipping box and install it in the new card slot with the black connector to the bottom. DO NOT lay this control card on any steel or conductive material.
17. Remove the shipping tape from the printer paper and spool.

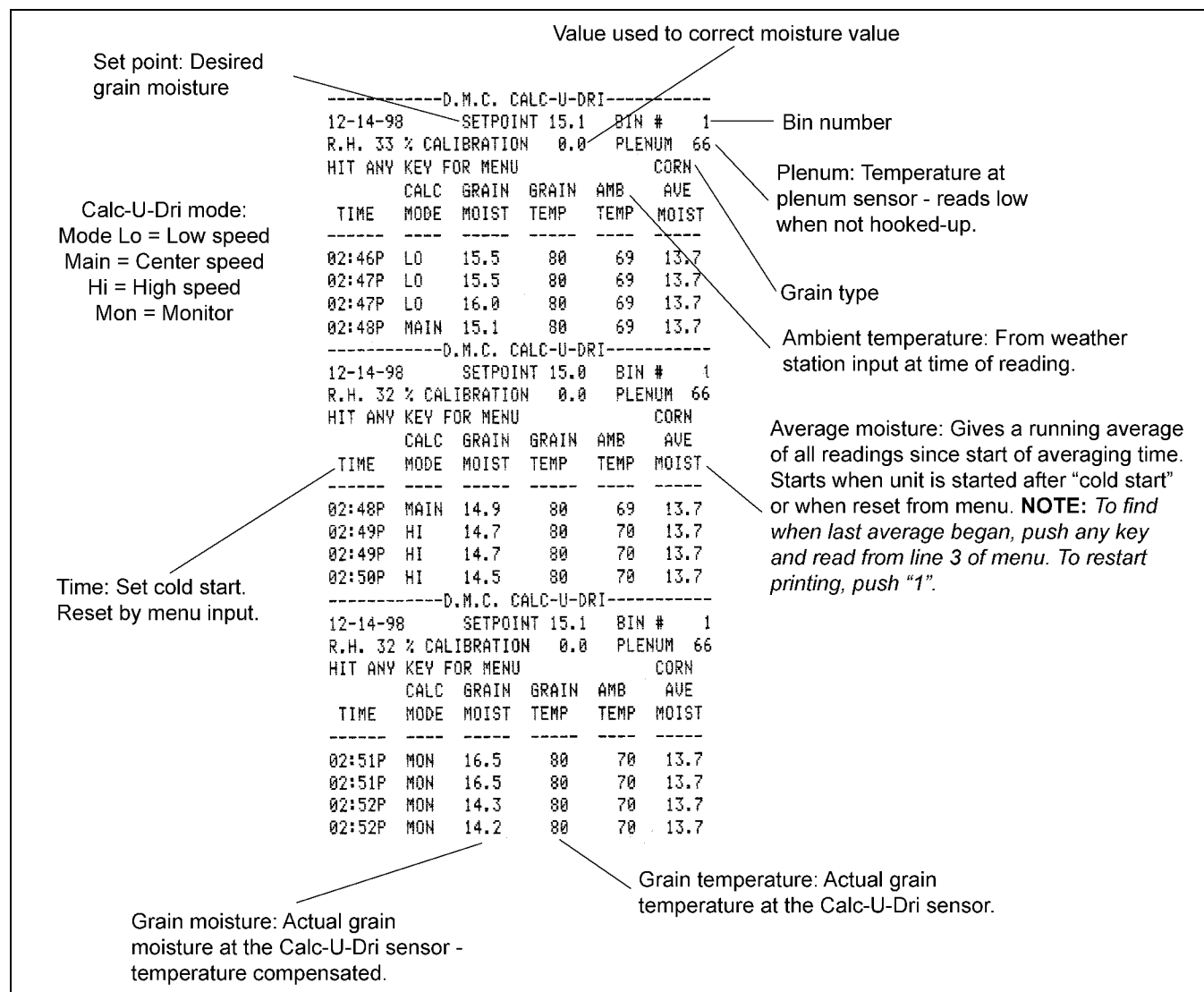


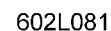
Figure 6B Sample Printer Readout

Service for Modular Printer Assembly

If removal of the circuit board is necessary, follow these steps.

1. Disconnect AC power to the control box.
2. Carefully pull the circuit board straight out of the guides. This sometimes requires a little extra force. Do not use pliers or another tool to pull or pry this circuit board.
3. If the circuit board is to be replaced, return it in the packaging in which you received the replacement circuit board.
4. Install the circuit board with the component side away from the door. Slide into guides and push firmly until it is seated in the circuit board jack.
5. Apply power to the unit and switch ON. If digital panel is blank, it is possible the circuit board is not seated properly. Disconnect power and repeat [Step 4 above](#).
6. The printer control board contains two (2) alkaline AA batteries. They require replacement every year.

If the printer requires service, unplug the 25 pin jack and remove all the wires from the orange terminal. Remove the four (4) bolts that secure the printer mounting plate. This will be serviced as a complete module. Re-install the new unit and wire up the orange terminal as per the decal. Plug in the DB25 five (5) conductor cable.

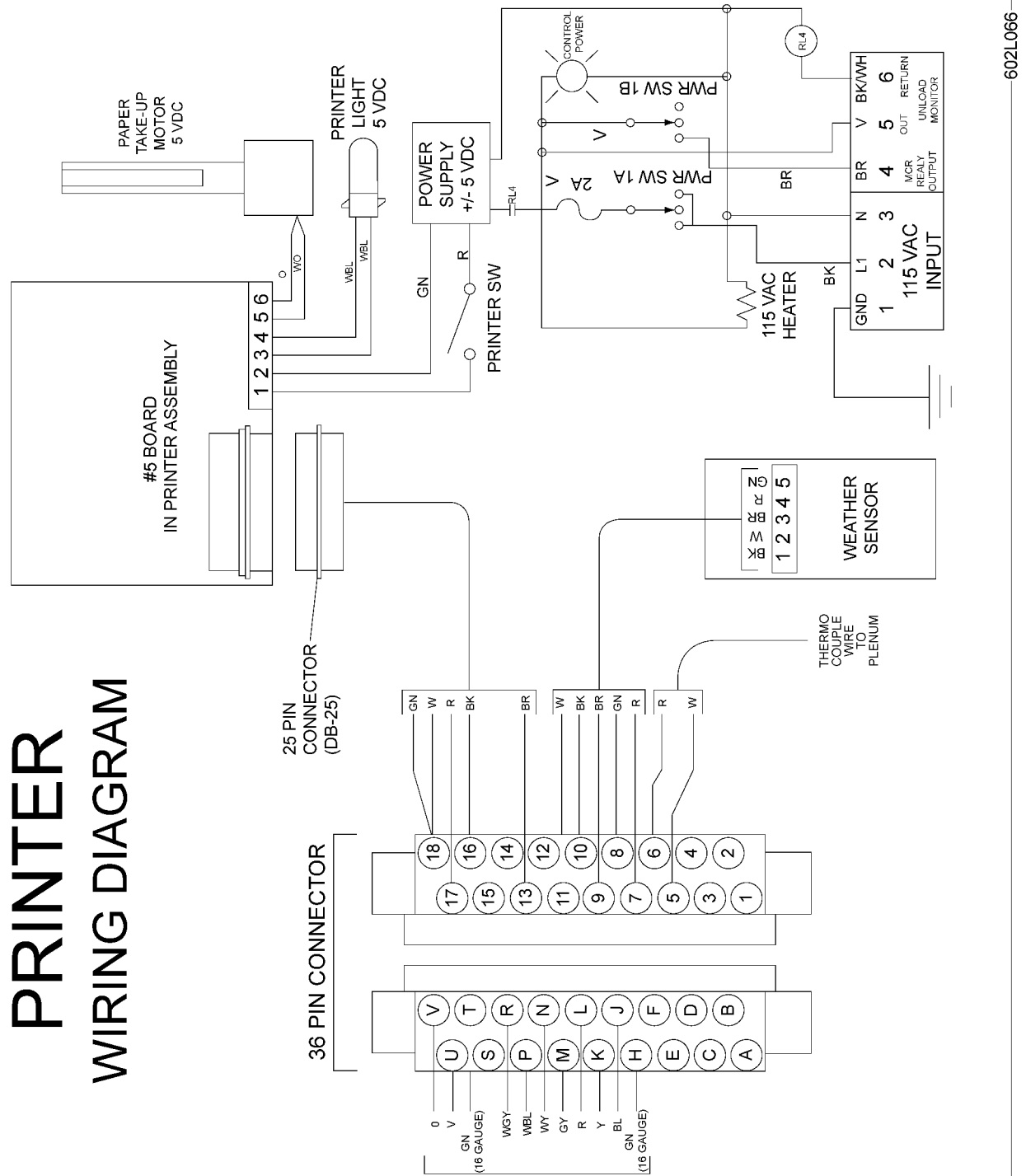


Wiring Diagram for Moisture/Matic Printer

PRINTER WIRING DIAGRAM

BK -- BLACK
BL -- BLUE
BR -- BROWN
GN -- GREEN
GY -- GREY
O -- ORANGE
R -- RED
V -- VIOLE
Y -- YELLOW
W -- WHITE
W/O -- WHITE/ORANGE
W/R -- WHITE/RED
W/Y -- WHITE/YELLOW
W/BL -- WHITE/BLUE
W/GY -- WHITE/GREY
BK/WH -- BLACK/WHITE

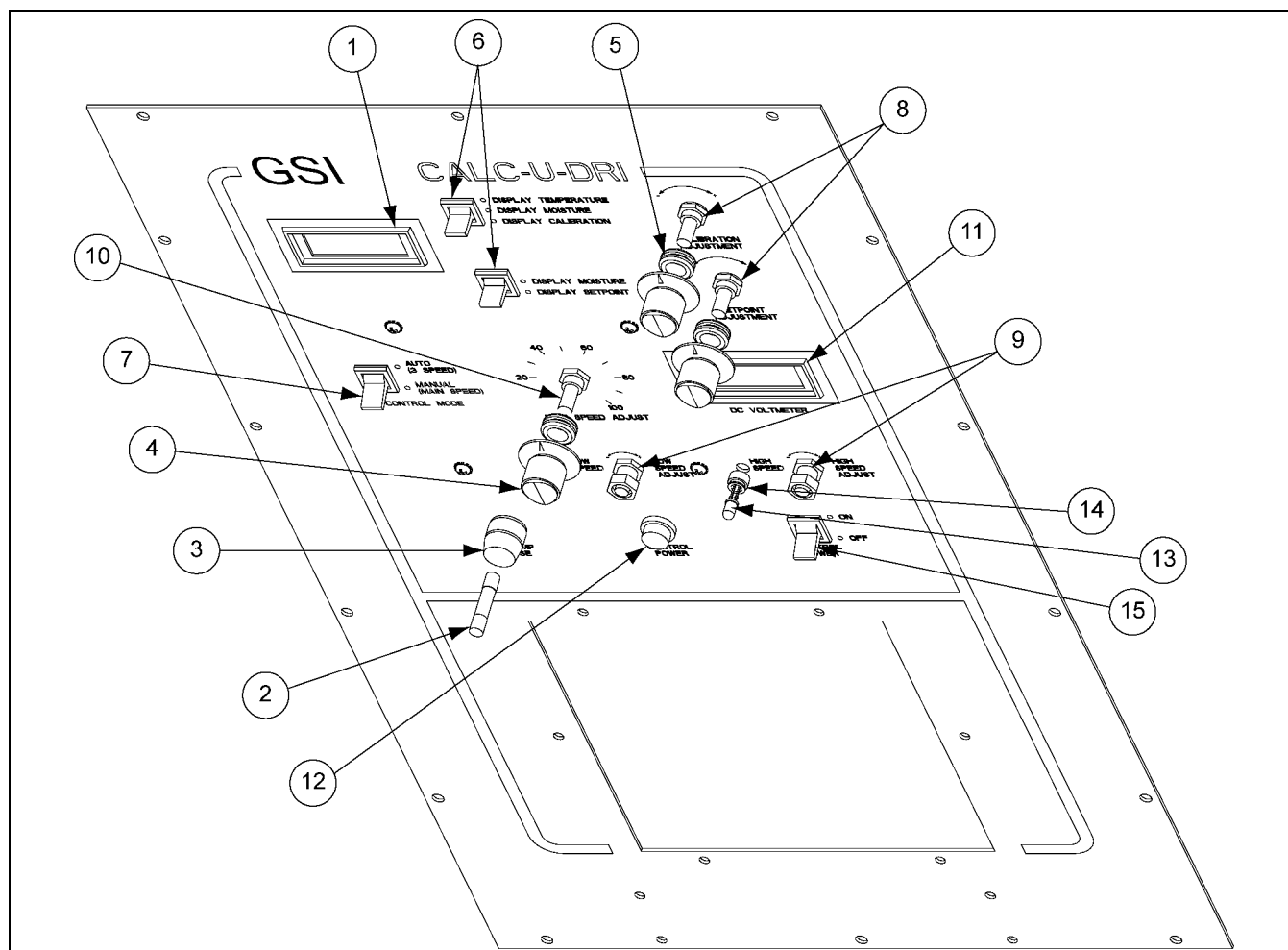
IF NOT ALREADY
HOOKED-UP THESE
WIRE ORIGINATE
FROM GREEN EDGE
CONNECTOR STRIP
WIRES 5/8" BEFORE
HOOKING-UP.



NOTES

1. **Moisture/Matic/Manager Module Sub-Assembly** - ([See Pages 32.](#))
2. **Moisture/Matic/Manager Control Box (Plain)** - ([See Pages 33.](#))
3. **Moisture/Matic/Manager Control Box (Printer)** - ([See Pages 34.](#))
4. **Printer Module Sub-Assembly** - ([See Pages 35.](#))
5. **Calc-U-Dri Moisture/Matic/Manager Parts** - ([See Pages 36.](#))

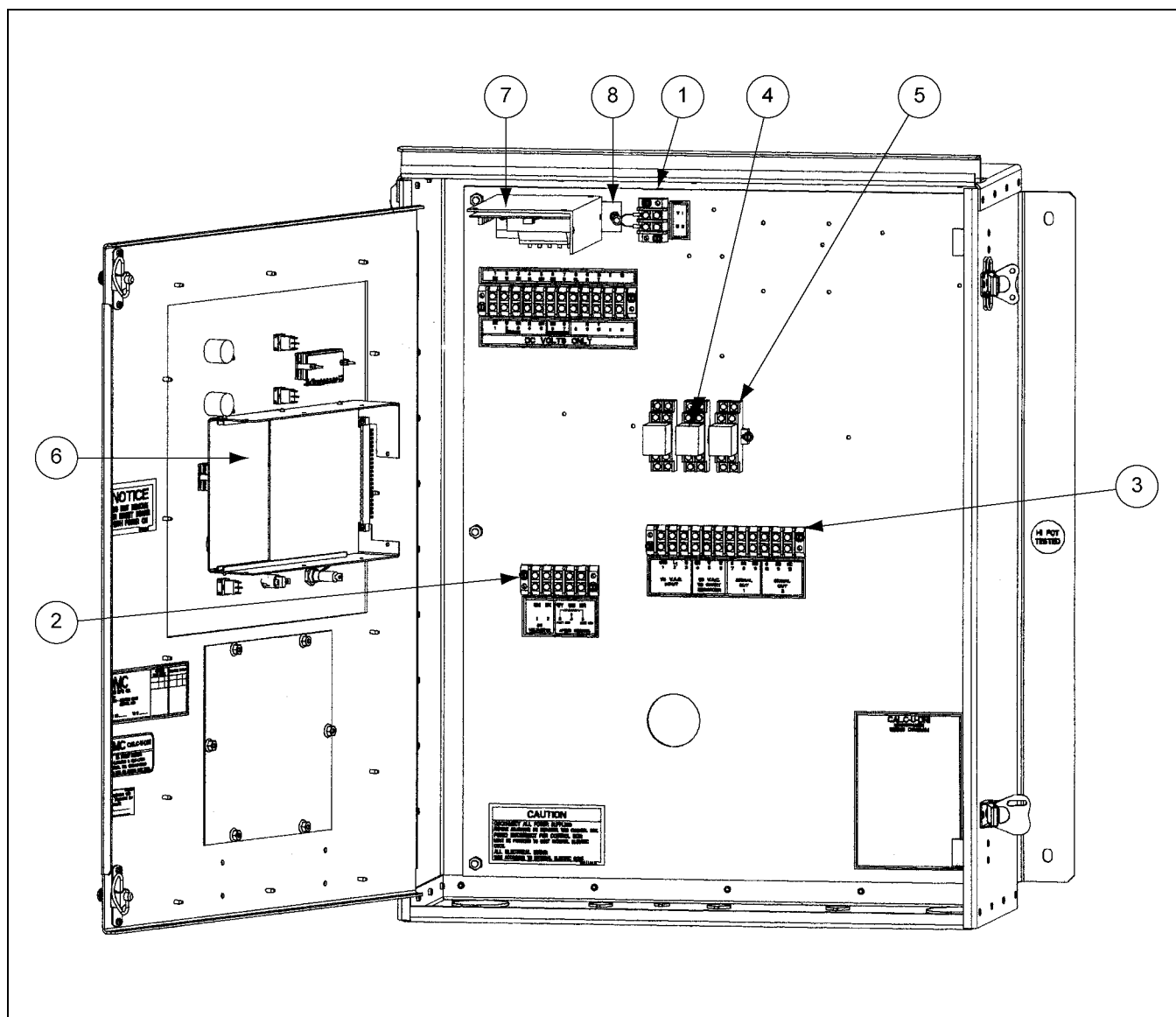
Moisture/Matic/Manager Module Sub-Assembly



Moisture/Matic/Manager Module Sub-Assembly Parts List

Ref #	Part #	Description	Qty
1	5041198	Digital Panel Meter Kit	1
2	1EL0719	Fuse - AGC, 2 Amp, 250 Volt	1
3	1EL0826	Fuse Holder	1
4	1EL0921	Knob, Control Black	3
5	1EL2042	Rubber Grommet	3
6	2EL0658	Switch, LVR, SPDT ON-OFF-ON	2
7	2EL0669	Switch, LVR, DPDT ON-OFF-ON	2
8	2EL0672	Potentiometer, 10K Ohm	2
9	2EL0674	Resistor, 10K Ohm	2
10	2EL0675	Resistor, 10K Ohm, One Turn Position	1
11	2EL0690	Meter, Digital Panel	1
12	TFH-2021	Lamp, Red Light (No Leads)	1
13	2EL1163	Lamp, Light Red	2
14	2EL1164	Lamp, Light - LED Clip and Ring	2
15	2EL0669	Switch, LVR, DPDT ON-OFF-ON	1

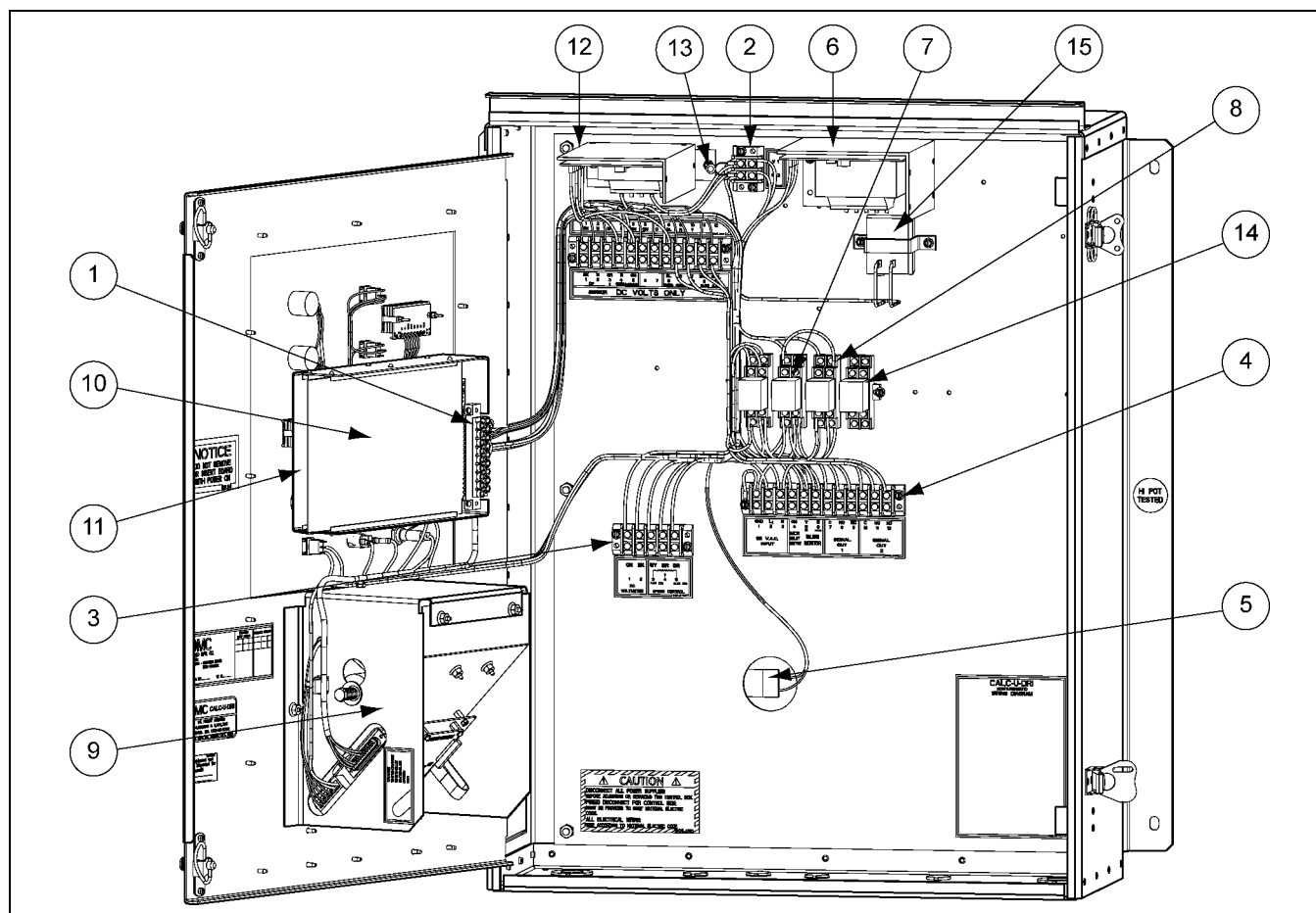
Moisture/Matic/Manager Control Box (Plain)



Moisture/Matic/Manager Control Box (Plain) Parts List

Ref #	Part #	Description	Qty
1	1EL0879	Connector, Terminal Block 2P 30A 250V CSA Marathon at 671 RZ 02 3765	1
2	1EL0898	Connector, Terminal Block 5P 30A 300V CSA Marathon at 671 RZ 05 3765	1
3	1EL0900	Connector, Terminal Block 12P 30A 300V CSA Marathon at 671 RZ 12 3765	2
4	2EL0274	Relay, DPDT 12 VDC (CSA) OMRON #LY2-DC12 or Equiv. CSA	3
5	2EL0275	Relay, Socket, DPDT (CSA) IDEC#SH2B02 10A 300 VAC	3
6	602E460	Circuit Board - GSI 18	1
7	602E340	Power Supply - Main	1
8	602E430	Surge Absorber - Assembly with Terminals	1

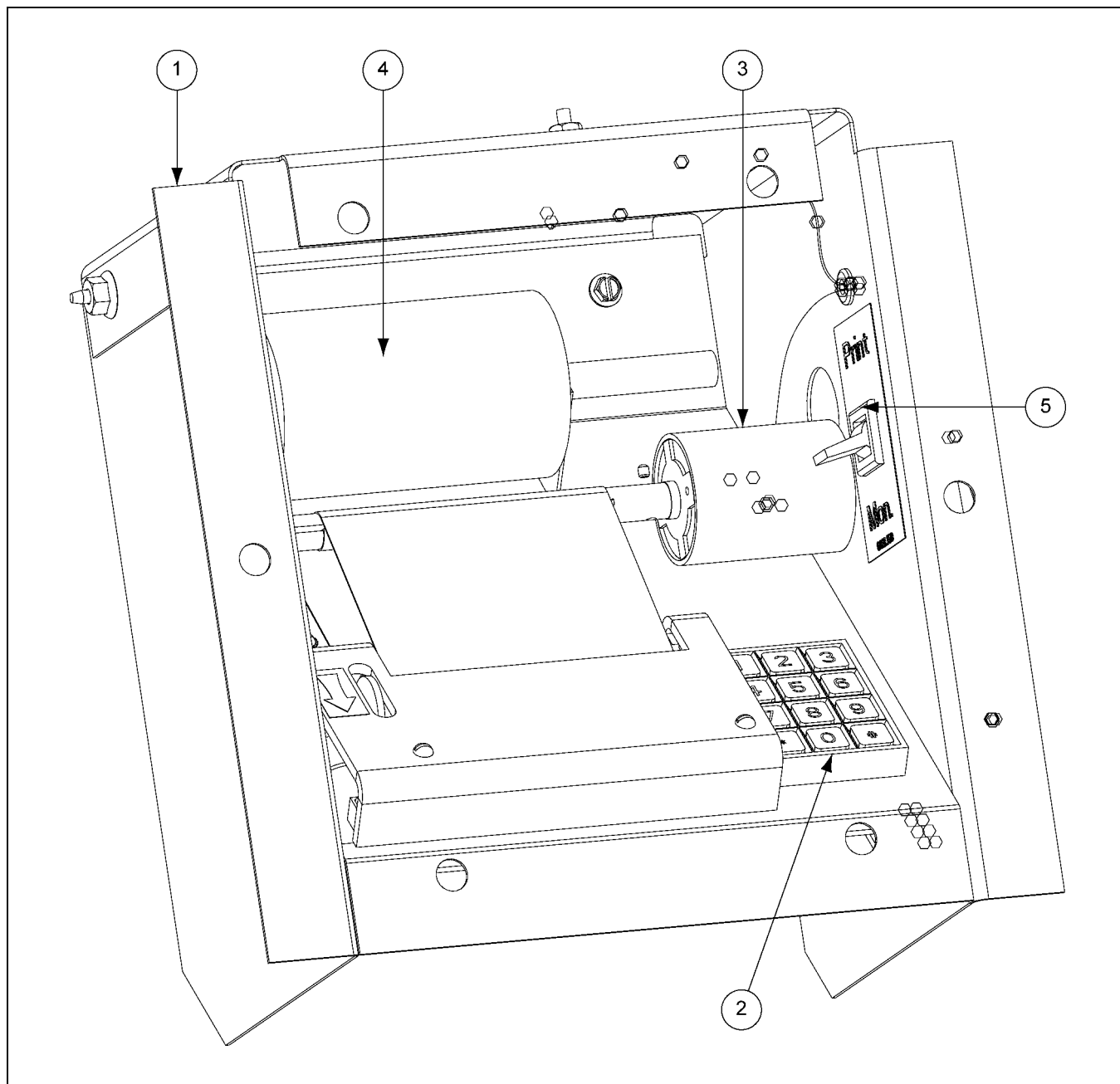
Moisture/Matic/Manager Control Box (Printer)



Moisture/Matic/Manager Control Box (Printer) Parts List

Ref #	Part #	Description	Qty
1	1EL0854	Connector, PCB	1
2	1EL0879	Connector, Terminal Block 2P 30A 250V CSA Marathon at 671 RZ 02 3765	1
3	1EL0898	Connector, Terminal Block 5P 30A 300V CSA Marathon at 671 RZ 05 3765	1
4	1EL0900	Connector, Terminal Block 12P 30A 300V CSA Marathon at 671 RZ 12 3765	2
5	1EL1525	Strip, Heater - 1" x 3"	1
6	602E343	Power Supply - Printer	1
7	2EL0274	Relay, DPDT 12 VDC (CSA) Omron#LY2-DC12 or Equiv. CSA	3
8	2EL0275	Relay, Socket, DPDT (CSA) IDEC#SH2B02 10A 300 VAC	3
9	602E184	Printer Module - Printers	1
10	602E230	PCB-GSI Matic/Commander Printer PB	1
11	602E460	Circuit Board - GSI 18	1
12	602E340	Power Supply - Main	1
13	602E430	Surge Absorber - Assembly with Terminals	1
14	TD-100300	Coil, Relay 2 PDT 120 VAC IDEC RH2B-U	1
15	2EL0225	Power Supply, Wall Mount	1

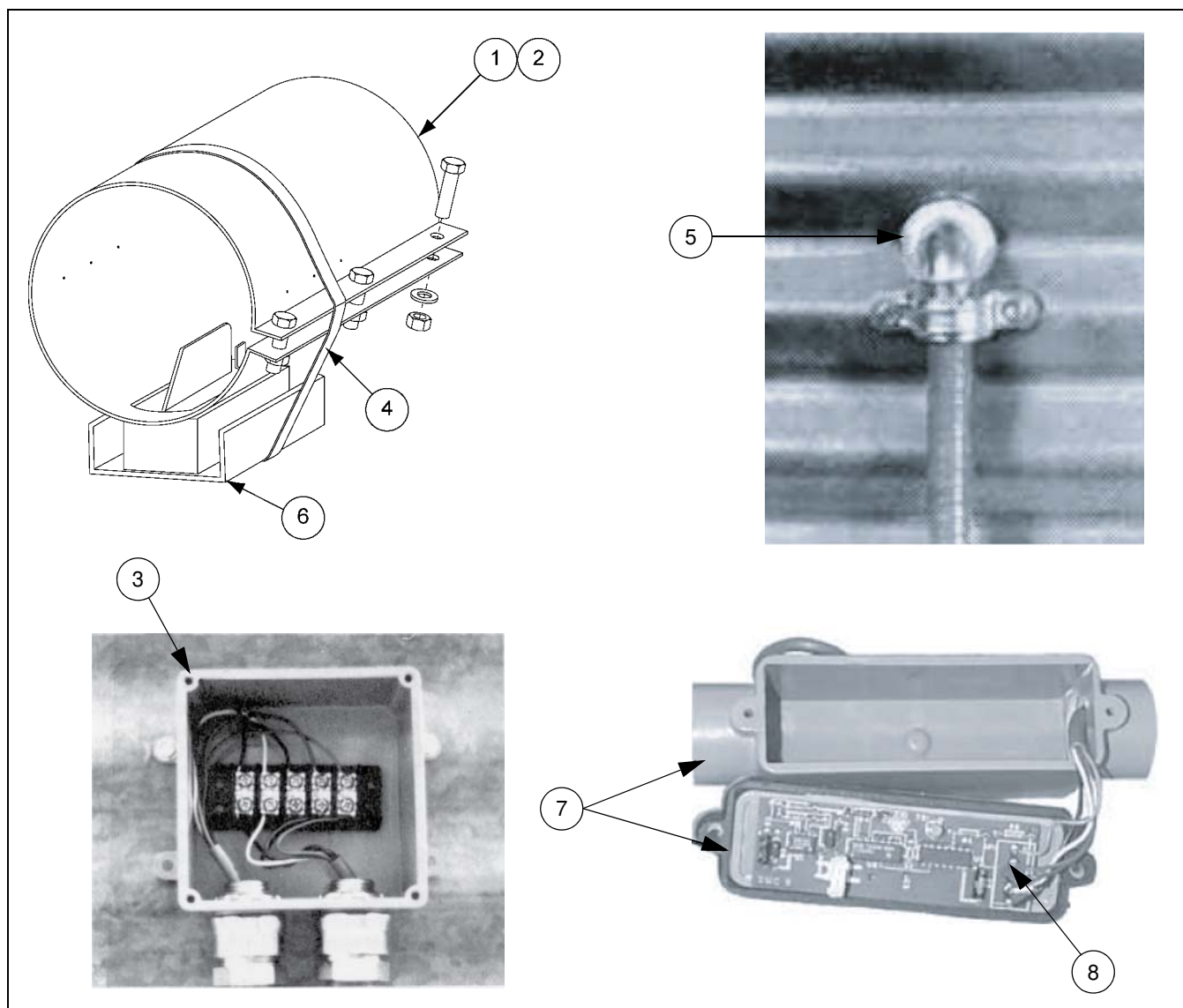
Printer Module Sub-Assembly



Printer Module Sub-Assembly Parts List

Ref #	Part #	Description	Qty
1	602E184	Printer Module - Printers	1
2	2EL0299	Keyboard - 12 Button GRAYHILL#83AB1-102	1
3	602E155	Printer - Paper Take-Up	1
4	MS0306	Printer, Paper (Thermal) Replacement Paper for GSI Moisture	1
5	2EL0659	Switch, LVR, SPDT, ON-NONE-ON	1

Calc-U-Dri Moisture/Matic/Manager Parts



Calc-U-Dri Moisture/Matic/Manager Parts List

Ref #	Part #	Description	Qty
1	602C040	6" Connecting Band with Sensor Cut Out	1
2	603C021	8" Connecting Band	1
3	602N117	Bag - Cable Extension	1
4	MS0309	Clamp, Worm Gear 39-1/2"	2
5	602E181	Wire - Thermal Couple, 50'	1
6	602E020	Sensor - Standard Assembly (Wide)	1
7	602E148	Weather Sensor Assembly	1
8	602E151-2	Weather Sensor PCB Assembly	1
8	1EL3045	Conduit, Liquid-Tite, 1/2"	1

Problem	Possible Cause	Solution
1. Digital readout dead.	1. Main AC power OFF. 2. Main fuse(s) or control fuse blown. 3. Circuit board not plugged in. 4. Bad circuit board. 5. Power supply not working.	1. Turn ON. 2. Replace fuse(s). 3. Plug in. 4. Replace circuit board. 5. Put in new power supply.
2. Digital readout is not lit. All control functions are working.	1. Digital panel meter bad. 2. Open or loose wire feeding the digital panel meter. 3. Circuit board trouble.	1. Replace the DPM. 2. Repair. 3. Replace circuit board.
3. Moisture readings are very high - grain checks dry.	1. Moisture on sensor blade. 2. Foreign object jammed on sensor. 3. Water in circuit board jack. 4. Calibration accidentally set too high. 5. Sensor not grounded to the tube. 6. Bad circuit board. 7. Bad sensor. 8. Circuit board dip switches set wrong.	1. Dry OFF the sensor. 2. Remove object. 3. Dry OFF. 4. Reset. 5. Secure ground strap. 6. Replace circuit board. 7. Replace sensor. 8. Set switches using dip switch chart on Page 44.
4. Erratic operation after replacing the control card.	1. Dip switches on new card are not set correctly.	1. Refer to illustration on Page 44.
5. Moisture readings do not change, temperature readings are high negative.	1. Sensor leads are broken or not hooked into the terminal. 2. Sensor trouble.	1. Tighten terminal screws or replace the sensor. 2. Replace sensor.
6. Moisture readings are intermittently high then low.	1. Check for the sensor ground strap not hooked-up. 2. Sensor cable leads broken. 3. Loose terminal leads where sensor is hooked.	1. Hook-up strap. 2. Replace sensor. 3. Tighten screws.
7. Moisture readings are consistently high or low.	1. Correct by calibration adjustment, refer to Page 21.	1. Adjust.
8. Blowing control fuses.	1. Check for loose or shorted wires. 2. Surge absorber shorted. 3. Any component that is bad can cause this - check by isolating one component at a time.	1. Isolate and correct. 2. Replace if it looks bad. 3. Replace bad component.

9. Troubleshooting

Problem	Possible Cause	Solution
9. Printer spaces several lines but nothing is printed.	1. Paper installed with the wrong side up or the wrong type paper. 2. Print head is unplugged or bad.	1. Turn over paper or install the correct paper MS0306. 2. Plug in or replace printer.
10. Printer spaces one line, nothing more.	1. Computer control card not making connection or bad card. 2. Five (5) conductor cable loose or installed in error. 3. Low printer power supply. 4. Printer module failed.	1. Insert the computer card or replace card (GSI 4). 2. Refer to decal for correct wiring at the computer jack. Insert the 25 pin jack at the printer. 3. Five (5) volt supply must be set at 5.0 to 5.2 volts. 4. Replace module or have repaired.
11. Printer does not space, no night light and the paper take-up motor not working.	1. No DC power or no AC power or not hooked-up.	1. If 5V DC is missing replace the power supply. 2. Repair loose or broken power leads (red and green) or (white and violet).
12. Printer does not space, but has night light.	1. Printer motor not plugged in.	1. Plug in the flat, gray cable on the printer and check if broken.
13. Prints characters that are unintelligible.	1. Computer not working.	1. Replace computer card (GSI 4).
14. Moisture and temperature are printed at half the value displayed on the DPM.	1. Dip switches are not set correctly.	1. Reference the dip switch chart and correct dip switches 7 and 8 on Page 44.
15. Top part of the characters are missing.	1. Plastic guard too close.	1. Raise the plastic shield.
16. Part of each character is missing.	1. Head cable loose or print head bad. 2. Dirt build-up on the platen.	1. Reseat the flat bottom cable or replace the printer. 2. Clean the black bar under the paper that the head goes over.
17. Paper take-up not rolling up the paper.	1. Loss of power or bad motor or aluminum shaft binding against the motor.	1. The orange and orange/white wire loose or broken. Re-tighten or replace the assembly or adjust the aluminum shaft by loosening the allen screw.

NOTE: 1. Never unplug or plug in the circuit board with power "ON".

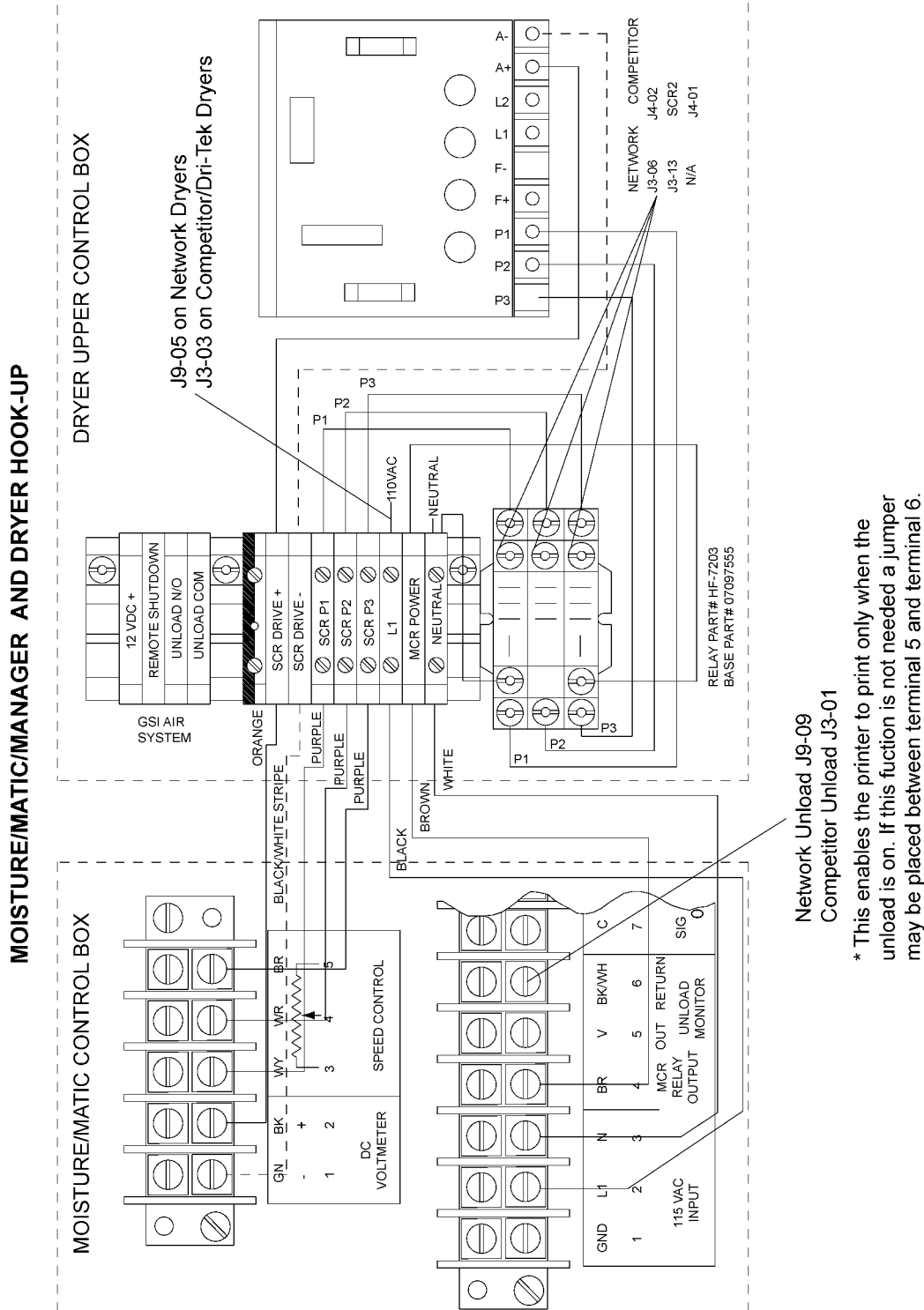
2. Do not make field adjustments on the circuit board. This is a factory adjustment only.

3. Contact your dealer or GSI if you have any questions on the service of the Calc-U-Dri Moisture/Matic.

TAKE TIME FOR PROPER INSTALLATION IT SAVES SERVICE CALLS.

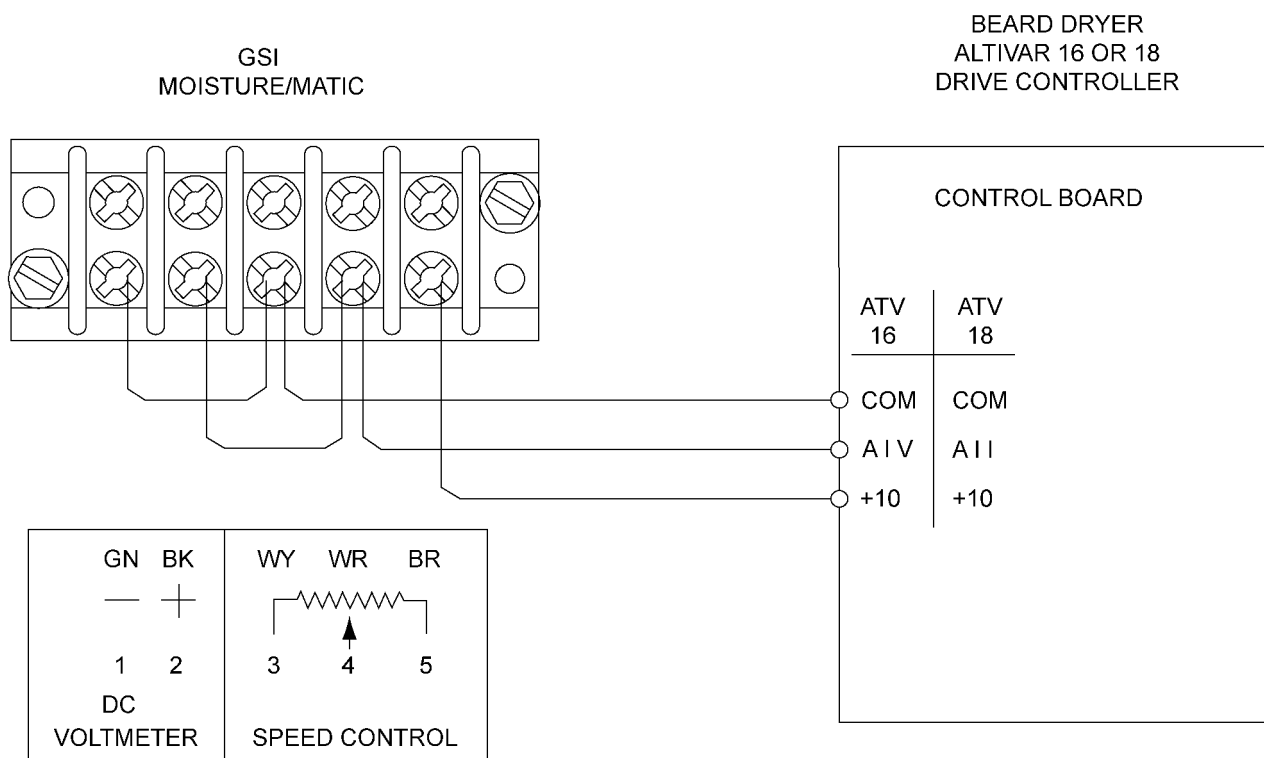
Appendix B

Hooking-Up a Moisture/Matic Control Box to a GSI or newer FFI GSI Portable Dryer



10. Wiring Examples

Hooking-Up a Moisture/Matic Control Box to a Beard Dryer with an Altivar Drive

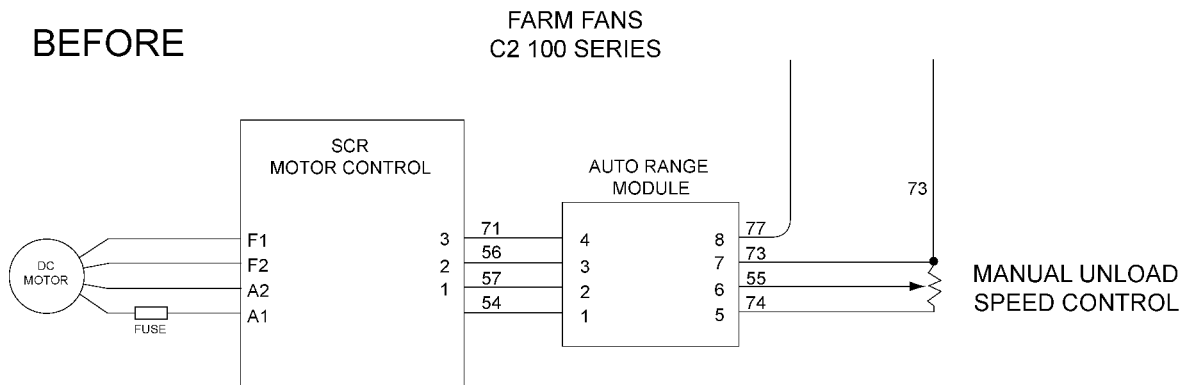


1. Remove and tape off the wires from the manual speed control and the speed meter.
This should be done on the back side of the speed control and meter in the beard dryer.
2. Add wire from "COM" to terminal 3.
3. Add wire from "AIV" ("all") to terminal 4.
4. Add wire from "+ 10V" to terminal 5.
5. Connect jumper wire from terminal 1 to terminal 3.
6. Connect jumper wire from terminal 2 to terminal 4.

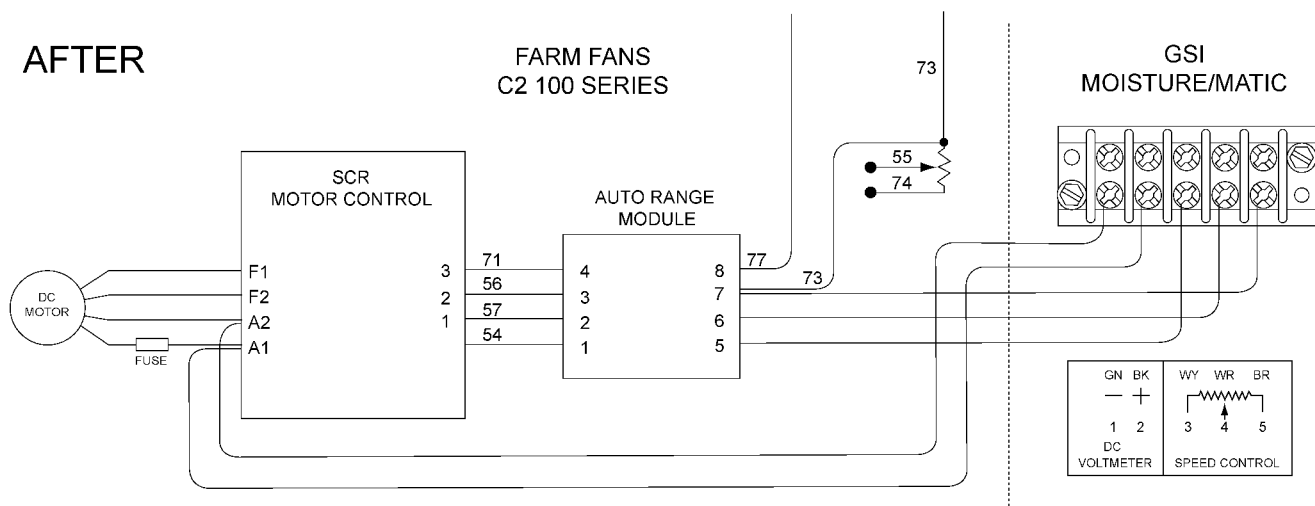
Operation: The manual/automatic switch on the dryer must be in the manual position. The metering roll speed is controlled from the Calc-U-Dri control box. The speed is displayed (from 0 to 10) in the Calc-U-Dri control box.

Hooking-Up a Moisture/Matic Control Box to a Farm Fans Series 2100 Dryer

BEFORE



AFTER



Remove and tape off the following two (2) wires from the auto range module:

1. Wire #55 from terminal "6".
2. Wire #74 from terminal "5".

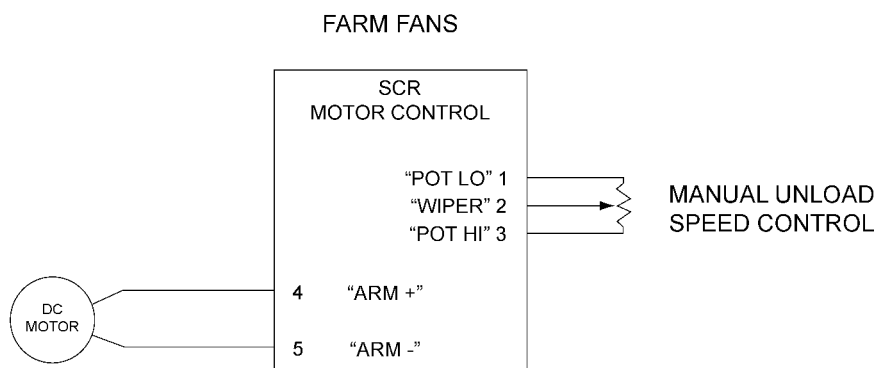
Make the following wire connections:

1. GSI terminal "1" to farm fans terminal "A2" on SCR.
2. GSI terminal "2" to farm fans terminal "A1" on SCR.
3. GSI terminal "3" to farm fans terminal "5" on auto range module.
4. GSI terminal "4" to farm fans terminal "6" on auto range module.
5. GSI terminal "5" to farm fans terminal "7" on auto range module.

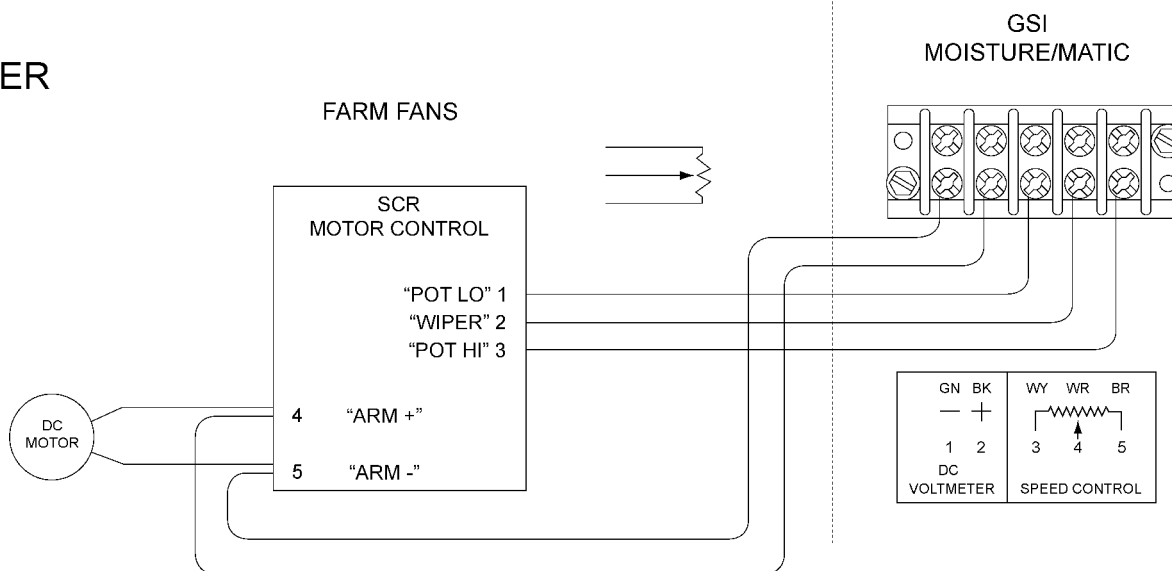
Run farm fans dryer in manual mode.

Hooking-Up a Moisture/Matic Control Box to a Farm Fans Series CFS-SA 410 Dryer

BEFORE



AFTER



Remove the three (3) wires on terminals "1", "2" and "3" on the SCR.

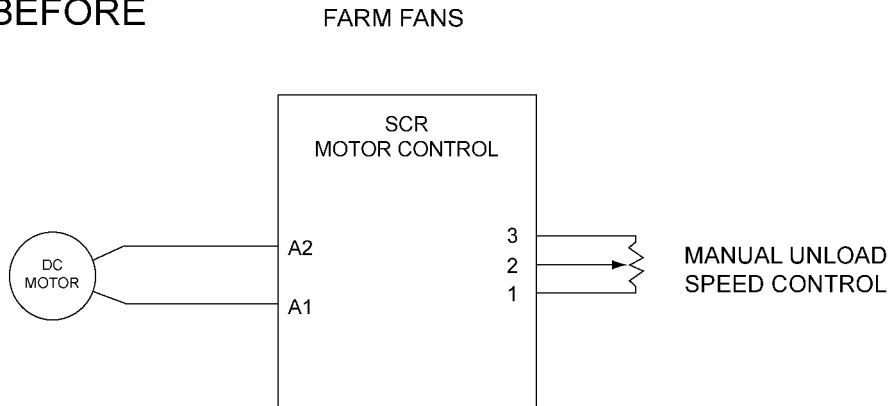
Make the following wire connections:

1. GSI terminal "1" to farm fans terminal "5" on SCR.
2. GSI terminal "2" to farm fans terminal "4" on SCR.
3. GSI terminal "3" to farm fans terminal "1" on SCR.
4. GSI terminal "4" to farm fans terminal "2" on SCR.
5. GSI terminal "5" to farm fans terminal "3" on SCR.

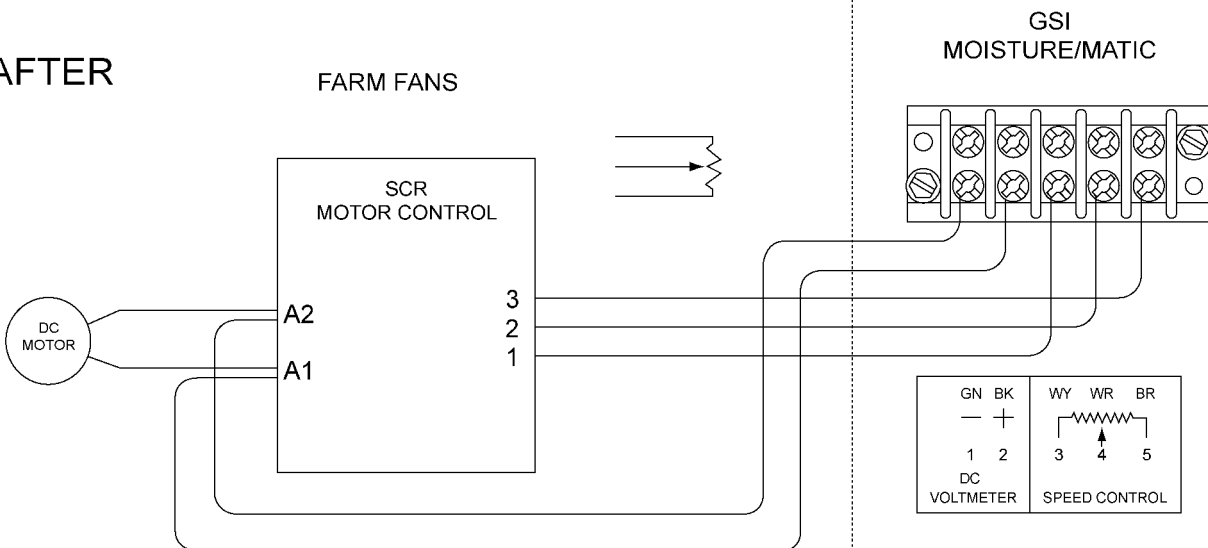
Run farm fans dryer in OFF mode.

Hooking-Up a Moisture/Matic Control Box to a Farm Fans Series CF/AB 270 and 320 Dryer

BEFORE



AFTER



Remove the three (3) wires on terminals "1", "2" and "3" on the SCR.

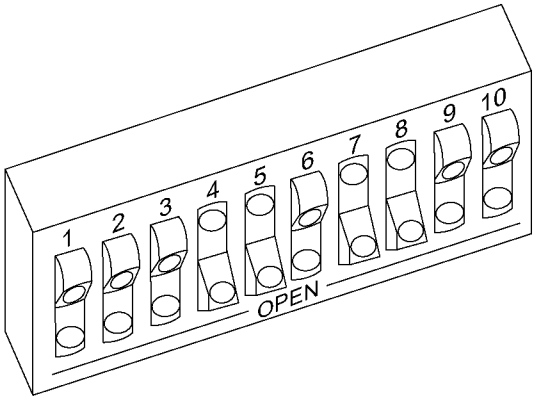
Make the following wire connections:

1. GSI terminal "1" to farm fans terminal "A2" on SCR.
2. GSI terminal "2" to farm fans terminal "A1" on SCR.
3. GSI terminal "3" to farm fans terminal "1" on SCR.
4. GSI terminal "4" to farm fans terminal "2" on SCR.
5. GSI terminal "5" to farm fans terminal "3" on SCR.

Run farm fans dryer in CF mode.

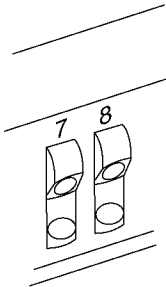
Moisture Matic Box
Dip Switch Settings for 602E460 GSI 18 Board

With one 602E020 sensor
with or without chart recorder



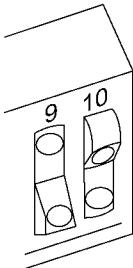
- 1 - Open
- 2 - Open
- 3 - Open
- 4 - Close
- 5 - Close
- 6 - Open
- 7 - Close
- 8 - Close
- 9 - Open
- 10 - Open

With printer



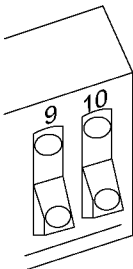
- 7 - Open
- 8 - Open

With two (2) sensors



- 9 - Close
- 10 - Open

With three (3) sensors



- 9 - Close
- 10 - Close

GSI Group, LLC Limited Warranty

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

Warranty Extensions:

The Limited Warranty period is extended for the following products:

	Product	Warranty Period	
AP Fans and Flooring	Performer Series Direct Drive Fan Motor	3 Years	* Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 25% 5 to 7 years - end-user pays 50% 7 to 10 years - end-user pays 75%
	All Fiberglass Housings	Lifetime	
	All Fiberglass Propellers	Lifetime	
AP and Cumberland	Flex-Flo/Pan Feeding System Motors	2 Years	
Cumberland Feeding/Watering Systems	Feeder System Pan Assemblies	5 Years **	** Warranty prorated from list price: 0 to 3 years - no cost to end-user 3 to 5 years - end-user pays 50%
	Feed Tubes (1-3/4" and 2.00")	10 Years *	
	Centerless Augers	10 Years *	
	Watering Nipples	10 Years *	
Grain Systems	Grain Bin Structural Design	5 Years	
Grain Systems Farm Fans Zimmerman	Portable and Tower Dryers	2 Years	† Motors, burner components and moving parts not included. Portable dryer screens included. Tower dryer screens not included.
	Portable and Tower Dryer Frames and Internal Infrastructure †	5 Years	

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12th) month from the date of purchase and continuing until the sixtieth (60th) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

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

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

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

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

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

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.



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