TD-AFB121

Installation and user manual

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Warning Labels

Figure 1

Moving grain warning sticker.

Sticker to be placed on bin roof lid and top dryer bin door.

Figure 2

Danger moving parts can crush and cut.

Placed on cover of actuator and guards of loading stages.

Figure 3

Danger 240v disconnect power before opening.

Placed on cover of TD-AFB121AB.

Component Identification

HMI Box (TD-AFB121HB)

Figure 4

A) HMI (HMIGTO5310)
B) Start button (ZB4BA3)
C) Mushroom E-stop button (ZB4BS844)
D) ¼ Turn latch

Inside HMI Box

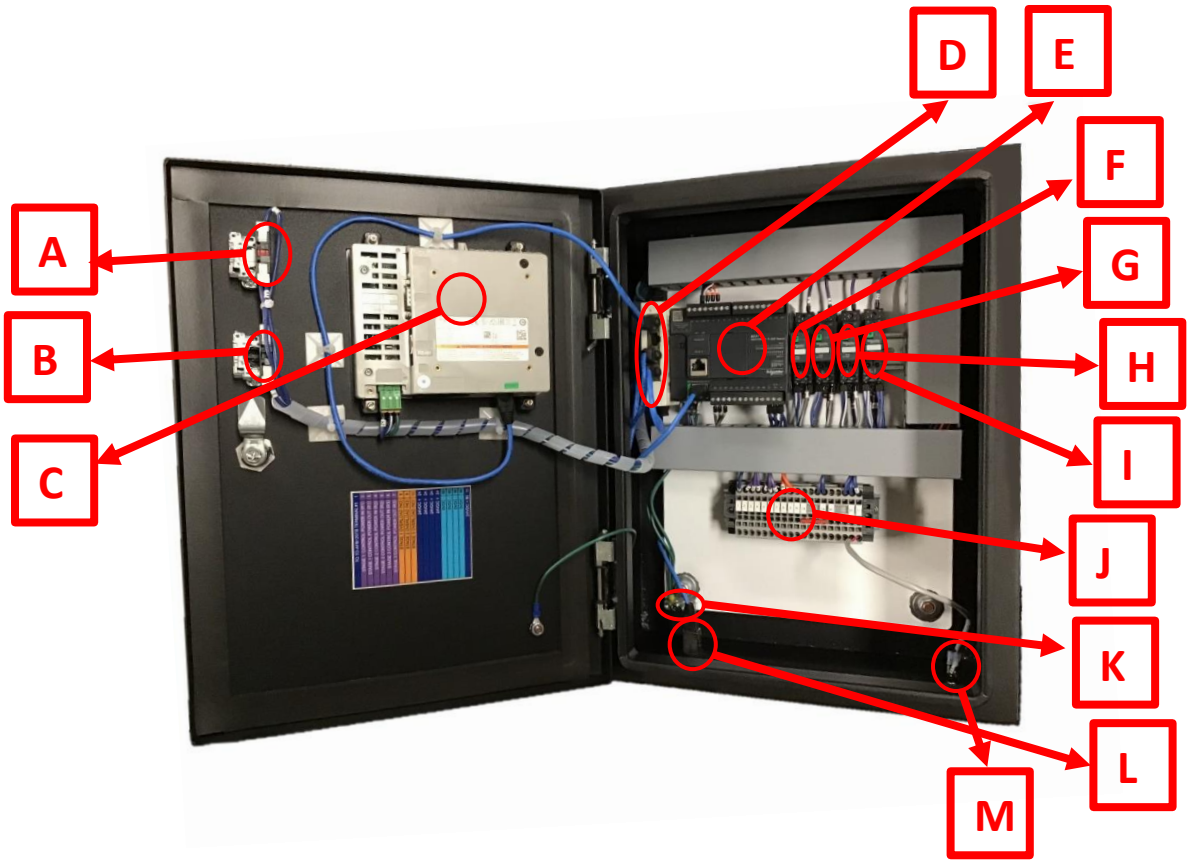


Figure 5

A) NO contact
B) NC contact
C) HMI (HMIGTO5310)
D) Ethernet switch (TCSESUO53FN0)
E) PLC (TM221CE24T)
F) (R1) Stage 1 relay (RPM11BD)
G) (R2) Stage 2 relay (RPM11BD)
H) (R3) Stage 3 relay (RPM11BD)
I) (R4) Control power relay (RPM11BD)
J) Terminal Block 1 (TB1)
K) Ground Bar
L) Ethernet plug (XB5PRJ45)
M) 24vdc power female socket (5.5mmX2.1mm)

Terminal Block 1 (TB1)

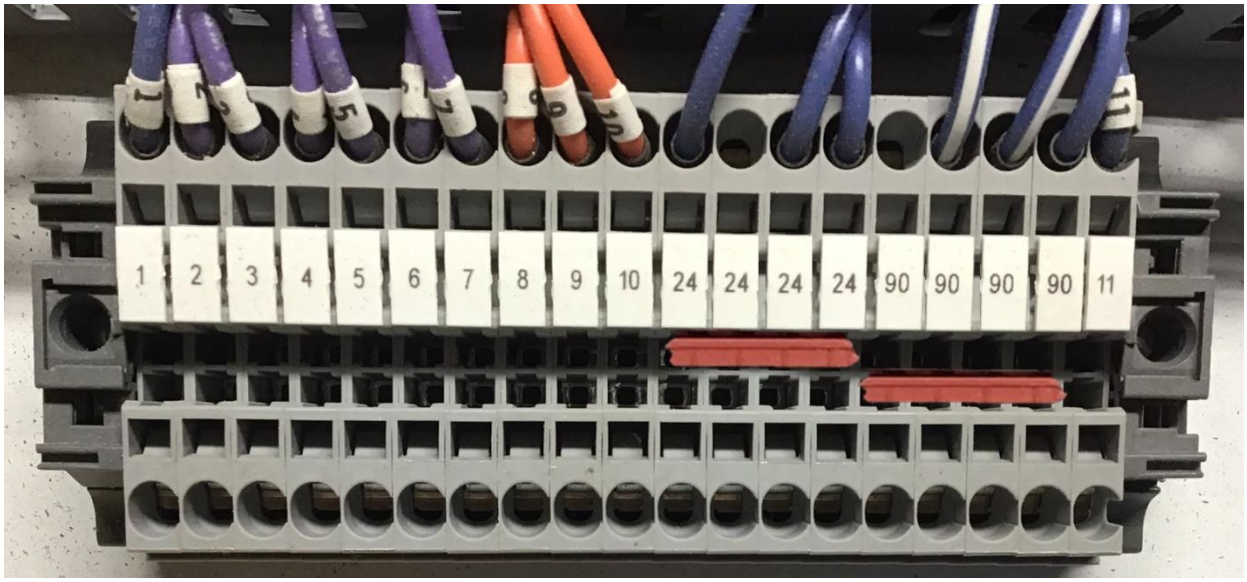


Figure 6

1) To TD-AFB121TB TB2 #1(Blue)
2) Stage 1 (Relay 1) (Purple)
3) Stage 1 (Relay 1) (Purple)
4) Stage 2 (Relay 2) (Purple)
5) Stage 2 (Relay 2) (Purple)
6) Stage 3 (Relay 3) (Purple)
7) Stage 3 (Relay 3) (Purple)
8) Stage 1 Overload (Orange)
9) Stage 2 Overload (Orange)
10) Stage 3 Overload (Orange)
24) +24vdc (Blue) To TD-AFB121TB TB2 #24 (Blue)
24) +24vdc (Blue)
24) +24vdc (Blue)
24) +24vdc (Blue)
90) -0vdc (Blue and white) To TD-AFB121TB TB2 #90 (Blue and white)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
11) 24vdc input (Blue)

Top Box (TD-AFB121TB)

Figure 7

A) Mushroom E-Stop (ZB4BS844)
B) ¼ Turn latch

Inside Top Box

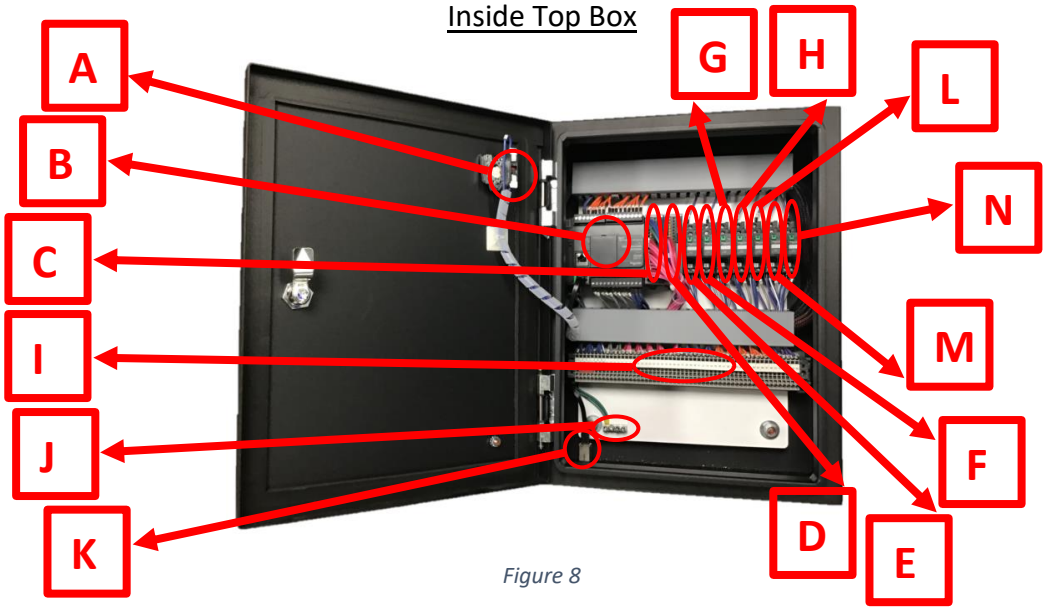


Figure 8

A) NC contact
B) PLC (TM221CE24T)
C) Temperature input card (Temperature probes 1,2,3,4) (TM3TI4)
D) Temperature input card (Plenum temperature probe) (TM3TI4)
E) (R5) Power for bin level rotary's (RPM11BD)
F) (R6) Dryer 1 fan control (RPM11BD)
G) (R7) Dryer 1 burner control (RPM11BD)
H) (R8) Dryer 1 burner high/low control (RPM11BD)
I) Terminal block 2 (TB2)
J) Ground bar
K) Ethernet plug (XB5PRJ45)
L) (R11) Dryer 2 fan control (RPM11BD)
M) (R12) Dryer 2 burner control (RPM11BD)
N) (R13) Dryer 2 burner high/low control (RPM11BD)

Terminal Block 2 (TB2)

Figure 9

1) From TD-AFB121HB TB1 #1(Blue)
24) +24vdc (Blue)
24) +24vdc (Blue)
24) +24vdc (Blue)
24) +24vdc (Blue)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
91) To TB3 #13 (Grey)
92) To TB3 #14 (Grey)
93) To TB3 #16 (Grey)
94) To TB3 #19 (Grey)
21) Temperature probe 1+ (Red)
21) Temperature probe 1- (Pink)
21) Temperature probe 1- (Pink)
22) Temperature probe 2+ (Red)
22) Temperature probe 2- (Pink)
22) Temperature probe 2- (Pink)
23) Temperature probe 3+ (Red)
23) Temperature probe 3- (Pink)
23) Temperature probe 3- (Pink)
25) Temperature probe 4+ (Red)
25) Temperature probe 4- (Pink)
25) Temperature probe 4- (Pink)
26) Plenum temperature probe + (Red
26) Plenum temperature probe - (Pink)
26) Plenum temperature probe - (Pink)
27) Rotary power in (R5) (Purple)
28) Rotary power out (R5) (Purple)
29) Dryer 1 fan power in (R6) (Purple)
30) Dryer 1 fan power out (R6) (Purple)
31) Dryer 1 burner power in (R7) (Purple)
32) Dryer 1 burner power out (R7) (Purple)
33) Dryer 1 hi/low power in (R8) (Purple)
34) Dryer 1 hi/low power out (R8) (Purple)
35) +24vdc input from TB3 terminal #35 from TD-AFB121AB (Orange)
36) +24vdc input from bin top rotary (Orange)
37) +24vdc input from storage full rotary (Orange)
38) +24vdc input from TB3 terminal #38 from TD-AFB121AB (Orange)
39) +24vdc input from TB3 terminal #39 from TD-AFB121AB (Orange)
40) +24vdc input (Spare) (Orange)
41) +24vdc input dryer fan 1 coil (Orange)
42) +24vdc input dryer fan 2 coil (Orange)
43) +24vdc input (Spare) (Orange)
44) +24vdc input (Spare) (Orange)
45) +24vdc input (Spare) (Orange)
46) +24vdc input (Spare) (Orange)
47) +24vdc input (Spare) (Orange)
48) +24vdc input (Spare) (Orange)
52) Dryer 2 fan power in (R11)
53) Dryer 2 fan power out (R11)
54) Dryer 2 burner power in (R12)
55) Dryer 2 burner power out (R12)
59) Dryer 2 high/low power in (R13)
60) Dryer 2 high/low power out (R13)

Actuator box

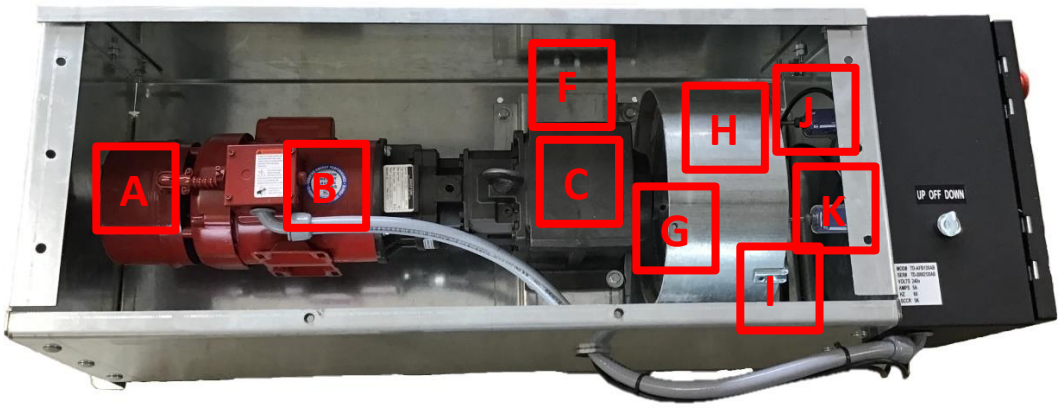


Figure 10

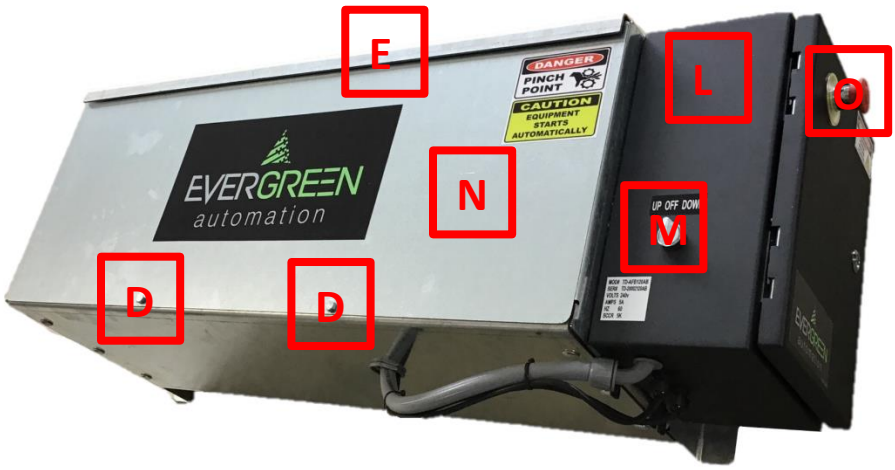


Figure 11

A) Motor brake
B) Forward / reversing motor
C) Gearbox
D) Cover mounting
E) Drip edge
F) Gearbox mounting bracket
G) Cable mounting hole
H) Cable drum
I) Beam clamp to activate limit switches
J) Open limit switch
K) Closed limit switch
L) Actuator control box
M) Chute leveling selector switch
N) Cover
O) Emergency stop

Actuator Control Box (TD-AFB121AB)

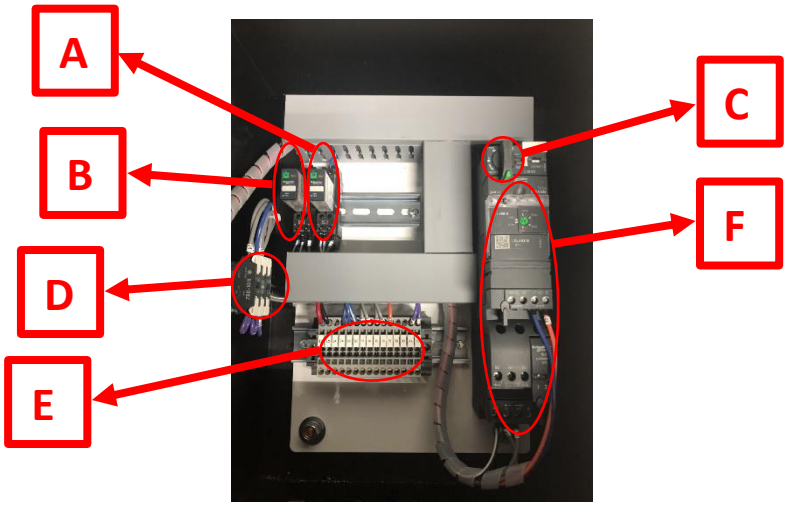


Figure 12

A) (R10) chute control relay (RPM11BD)
B) (R9) Aeration fan relay (RPM11BD)
C) Overload switch
D) Chute control selector switch
E) Terminal block #3 (TB3)
F) Chute contactor

Terminal Block 3 (TB3)

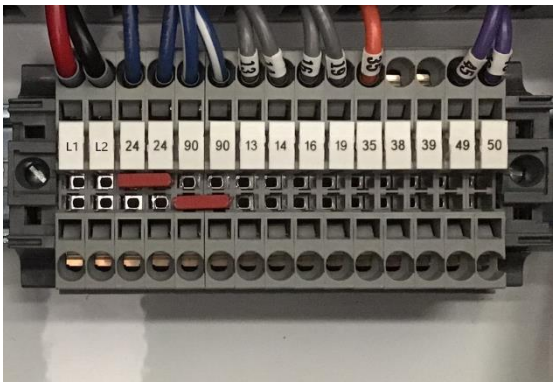


Figure 13

L1) Line 1 240v (Red)
L2) Line 2 240v (Black)
24) +24vdc (Blue)
24) +24vdc (Blue)
90) -0vdc (Blue and white)
90) -0vdc (Blue and white)
13) To TB2 #13 (Grey)
14) To TB2 #14 (Grey)
16) To TB2 #16 (Grey)
19) To TB2 #19 (Grey)
35) +24vdc output to TB2 terminal #35 (Orange)
38) +24vdc output to TB2 terminal #38 (Orange)
39) +24vdc output to TB2 terminal #39 (Orange)
49) Aeration Fan Relay Input (Relay 9) (Purple)
50) Aeration Fan Relay Output (Relay 9) (Purple)

Grain Temperature Probe

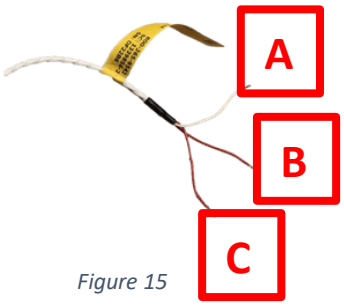


Figure 15

Figure 16

A) RTD + Lead
B) RTD - Lead
C) RTD – Lead

D) Connection point
E) Temperature probe

Plenum Temperature Probe

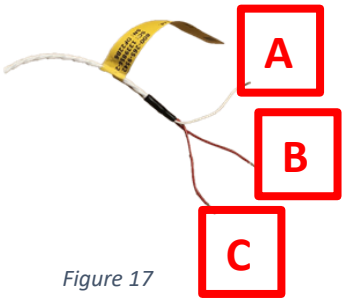


Figure 17

Figure 18

Figure 19

A) RTD + Lead
B) RTD - Lead
C) RTD - Lead

D) Connection point
E) Temperature probe

Rotaries not included (Bin Master BMRX)

Figure 14

Installation

Grain Temperature Probe Installation

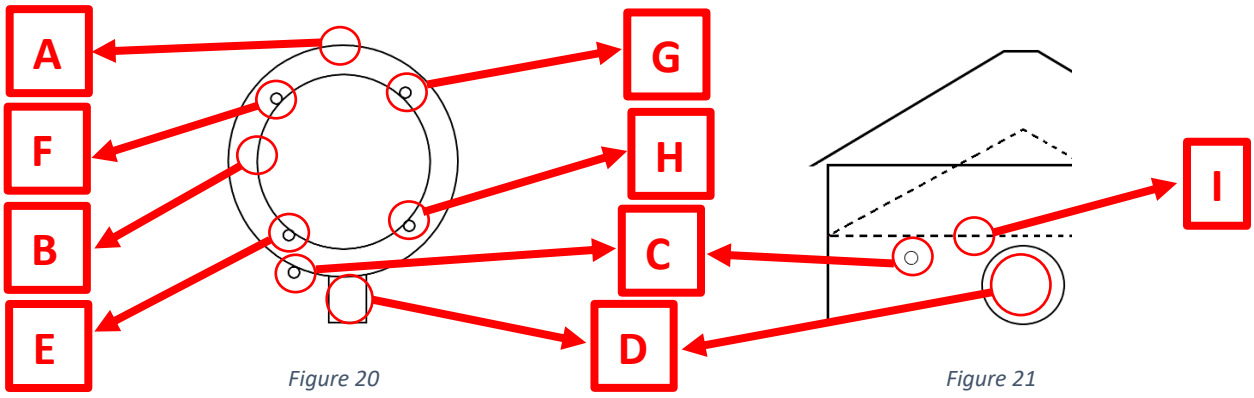


Figure 20

Figure 21

A) Bin wall
B) Outside leveling band
C) Plenum temperature probe
D) Burner
E) Temperature probe 1
F) Temperature probe 2
G) Temperature probe 3
H) Temperature probe 4
I) Drying floor

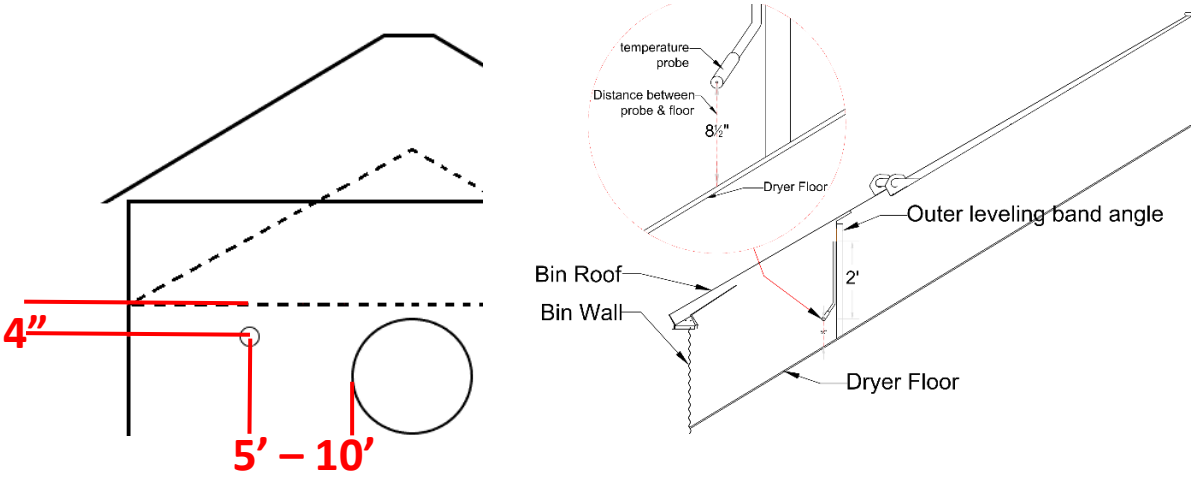


Figure 22

- Equally space temperature probes E, F, G, H.
- Mount probe 8.5in off drying chamber floor.
- Use provided ½” 2 hole straps to attach the temperature probe conduit to bottom leveling band.
- Install so temperature probes are parallel with bands.
- Mount plenum temperature probe 4” under drying floor and 5’-10’ away from burner inlet. Ex (Figure 23)

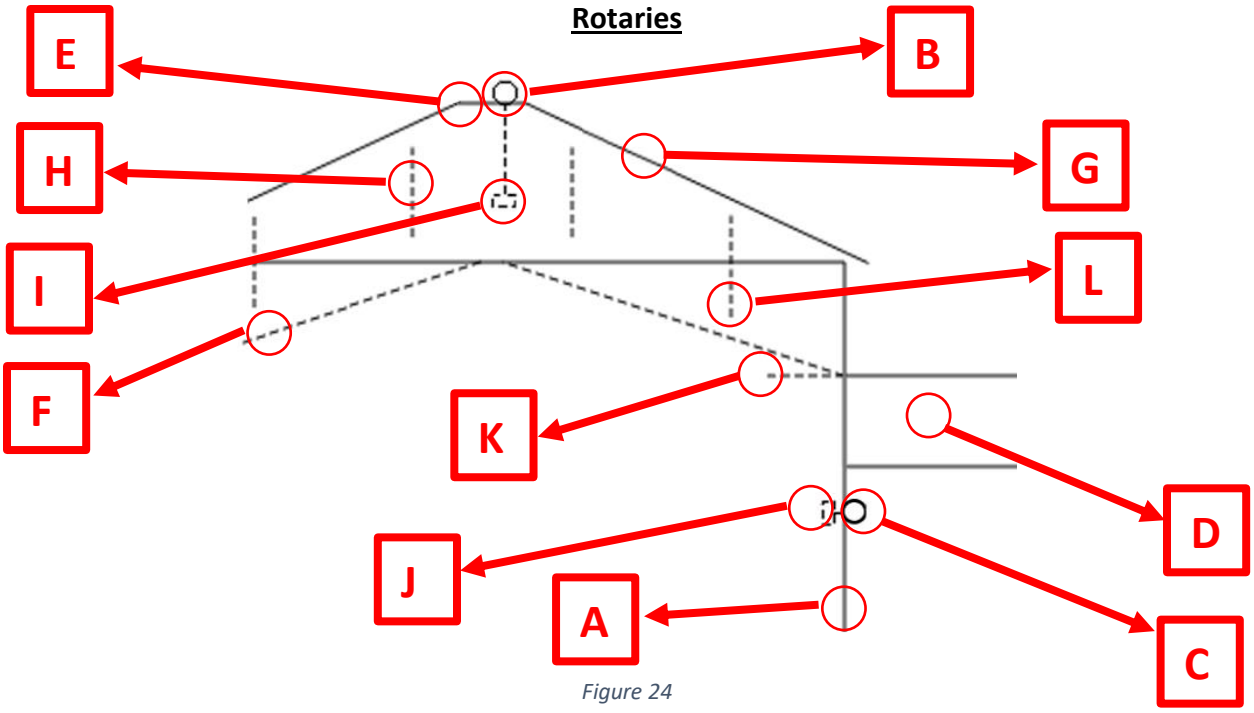


Figure 24

A) Bin wall
B) Drying chamber full rotary (Rotary #1)
C) Storage full rotary (Rotary #2)
D) Burner
E) Dryer bin lid
F) Drying chamber floor
G) Bin roof
H) Top leveling band
I) Rotary #1 paddle
J) Rotary #2 paddle
K) Chutes
L) Bottom leveling band

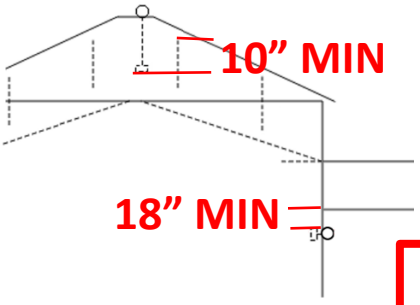


Figure 25

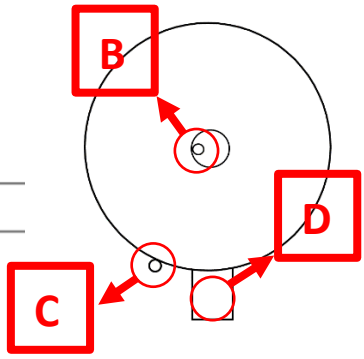


Figure 26

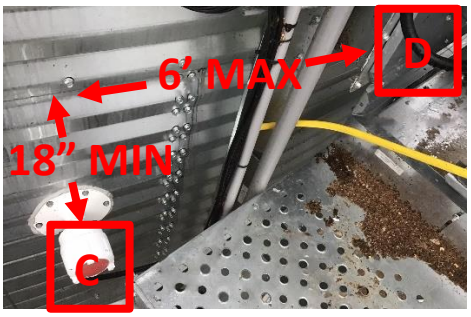


Figure 27

- Dryer storage full rotary paddle mounted 18in under and no more than 6ft from burner inlet. Ex (Figure 27)
- Drying chamber full rotary paddle mounted a minimum of 10in below the top of the top leveling band. Ex (Figure 25)

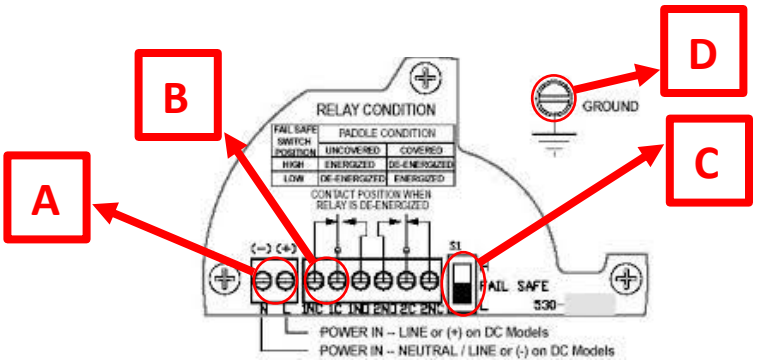


Figure 28

A) 120v power in
B) Relay
C) Fail safe switch
D) Ground

Bin Top Rotary

- Run wire from “+” to “TB2 #28”
- Tie “-“ to neutral
- Run wire from “1C” to “TB2 #24”
- Run wire from “1NO” to “TB2 #36”

Bin Storage Rotary

- Run wire from “+” to “TB2 #28”
- Tie “-“ to neutral
- Run wire from “1C” to “TB2 #24”
- Run wire from “1NO” to “TB2 #36”

Cable Install

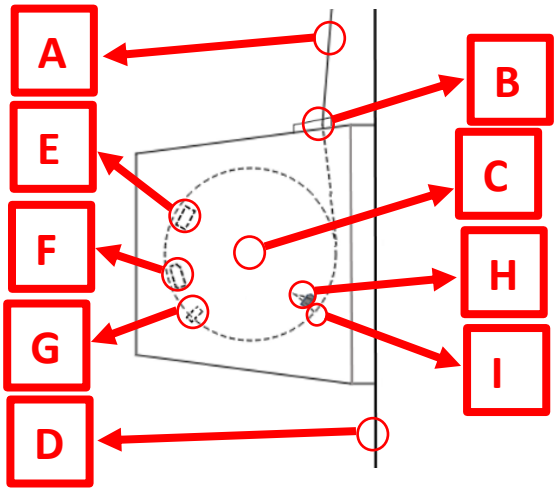


Figure 29

A) Cable
B) Fairlead
C) Actuator drum
D) Bin wall
E) Open limit switch
F) Closed limit switch
G) Beam clamp
H) Crosby clamp
I) Hole through actuator drum

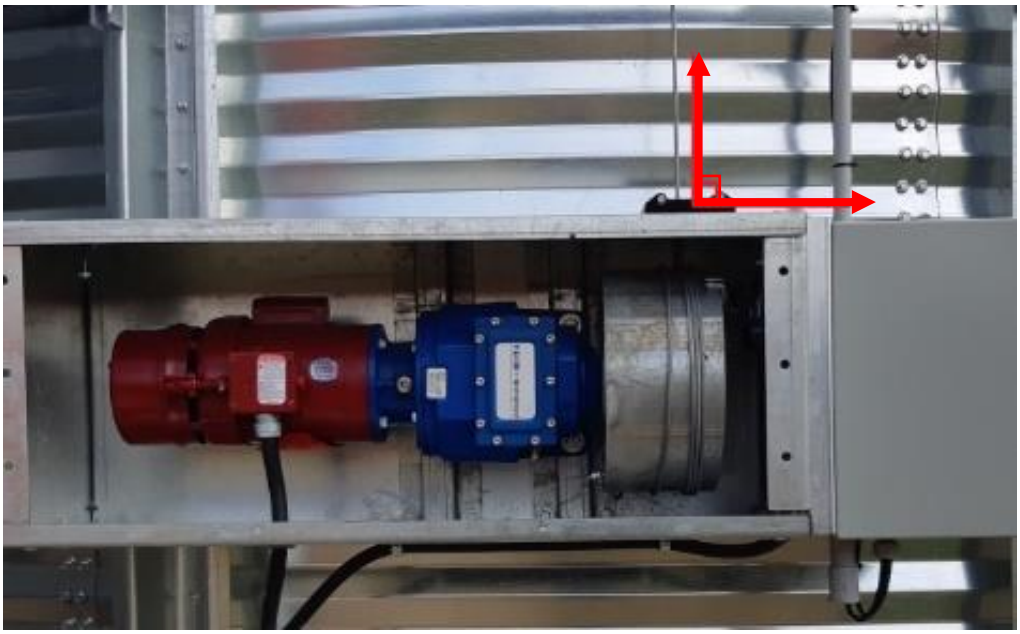


Figure 30

- Mount actuator so fairlead is as close to directly under cable as possible.
- Run cable through fairlead.

Figure 31

- Feed cable along the back of actuator drum and through hole in drum.
- Fold cable over after being fed through hole and install Crosby clamp on doubled over cable. Ex (Figure 31)

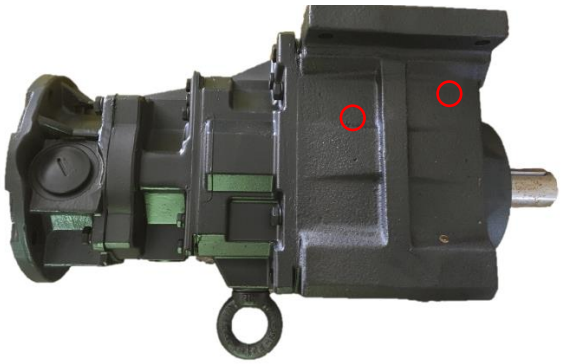


Figure 32

Figure 33

- Use a 5 mm allen key to remove the 2 plugs indicated above (Figure 32)
- Install the 2 provided breather plugs (Figure 33) in the openings that the plugs were removed from

Top Box (TD-AFB121TB)

Figure 34

A) Knockout for 8 wire to TD-AFB121AB
B) Knockout for rotary's
C) Knockout for 3 wire to TD-AFB121HB
D) Knockout for burner cables
E) Ethernet plug in from TD-AFB121HB
F) Knockout for temperature cables

- Mount box #1 on the bin wall so it is easily accessible from the top platform.
- Tie temperature probe wires into TB2.
- Run 9 wire cable between the TD-AFB121AB and TD-AFB121TB.
- Tie 9 wire into TB2.
- Run 3 wire between TD-AFB121HB and TD-AFB121TB.
- Run ethernet cable between TD-AFB121HB and TD-AFB121TB.
- Plug ethernet cable into RJ45 plug on bottom of box.

HMI Box (TD-AFB121HB)

Figure 35

- Mount Box 2 in a dry location.
- Connect 3 wire from TD-AFB121HB to TD-AFB121TB.
- Connect loading system control to Stage 1, Stage 2, Stage3 if necessary.

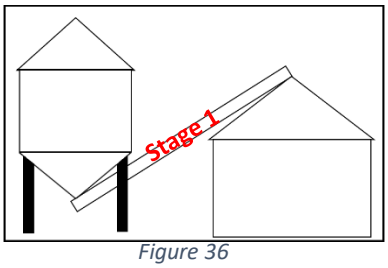


Figure 36

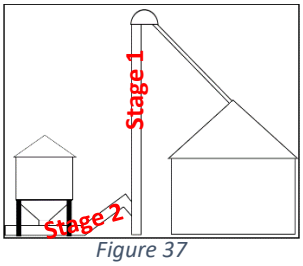


Figure 37

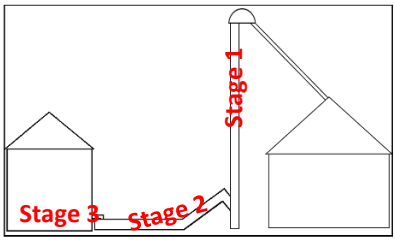


Figure 38

- Stage 1 is initial loading system, stage 2 is secondary, stage 3 is tertiary. Ex.(Figure 34, 35, 36)
- Plug ethernet cable into RJ45 plug on bottom of box.
- Plug power supply into female adapter on bottom side of box.
- Plug power supply into AFCI protected outlet.

To tie into Sukup Burner

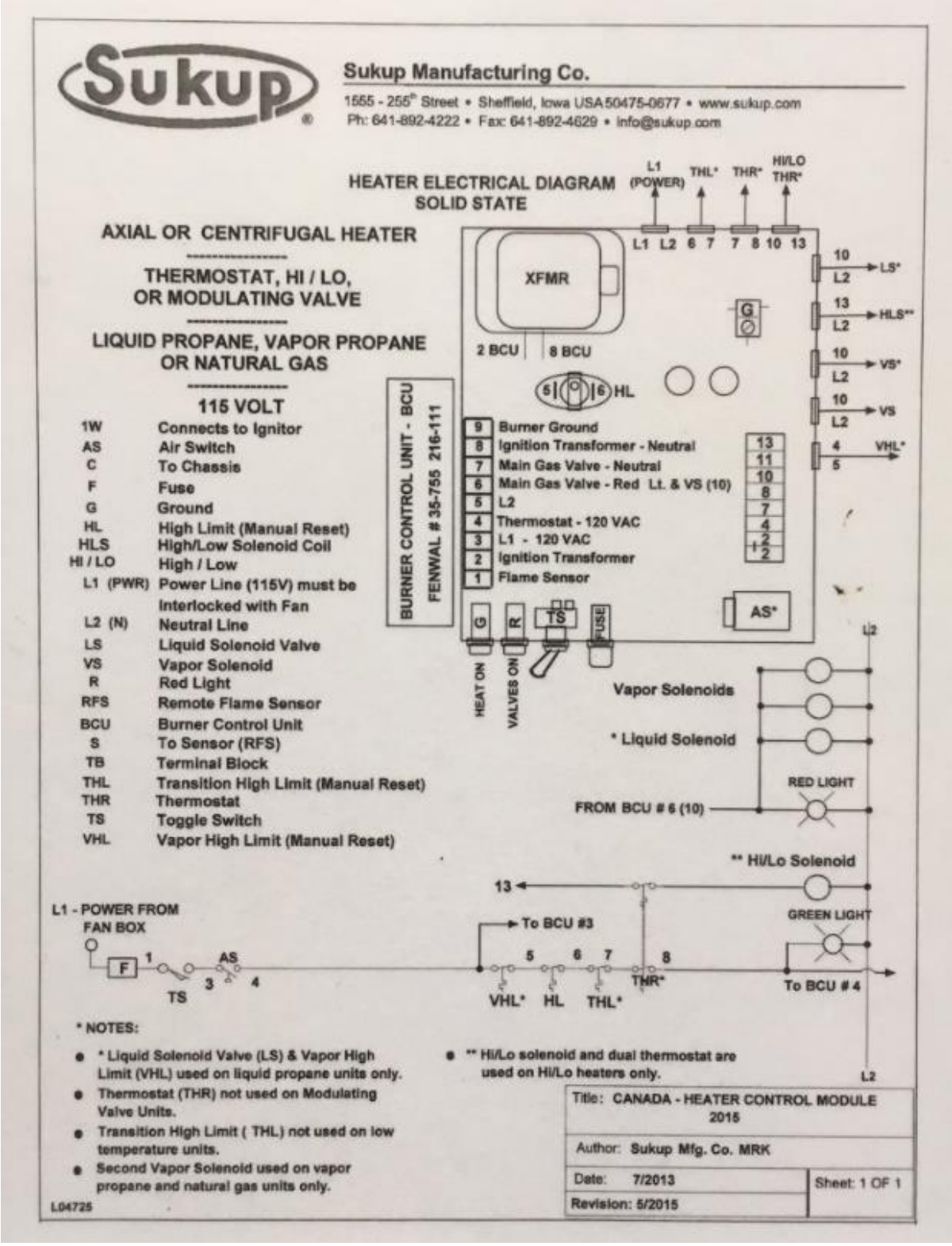


Figure 39

Sukup Manufacturing Co.
1555 255th St, Box 677
Sheffield, Iowa 50475 USA

FAN
(with heater power block)
ELECTRICAL DIAGRAMS

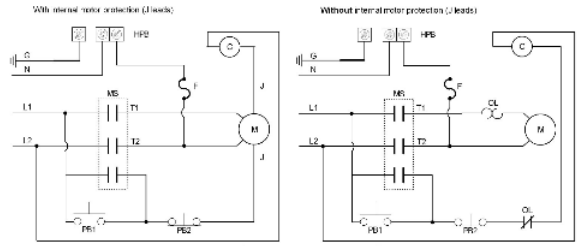
NOTES:

- **Customer must provide means of disconnect, short circuit, and ground fault protection**
- **For motors without internal protection, correctly sized thermal units must be used in overload relay.**
- **Control circuit voltages are the same as that of the incoming power supply.**
- **Wire motor as per nameplate diagram.**

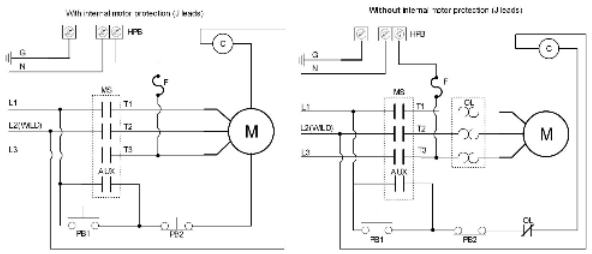
KEY:

M	**- Motor**
MS	**- Magnetic Starter**
C	**- Magnetic Starter Coil**
OL	**- Overload Relay**
PB1	**- Start Button (Green)**
PB2	**- Stop Button (Red)**
HPB	**- Heater Power Block**
F	**- Fuse**
N	**- Neutral Terminal**
G	**- Ground Terminal**
AUX	**- Auxiliary Contact**
XFMR	**- Control Transformer**
L1,L2,L3	**- Incoming Lines**
T1,T2,T3	**- Contactor Terminals**
J	**- Motor Leads w/ Internal Protection**

208 - 230 VOLT, SINGLE PHASE



208 - 230 VOLT, THREE PHASE



380 - 460 VOLT, THREE PHASE

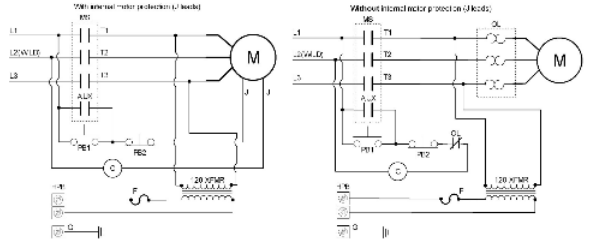


Figure 40

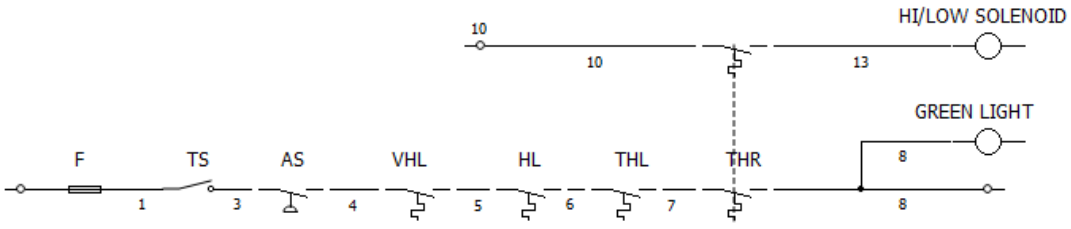


Figure 41

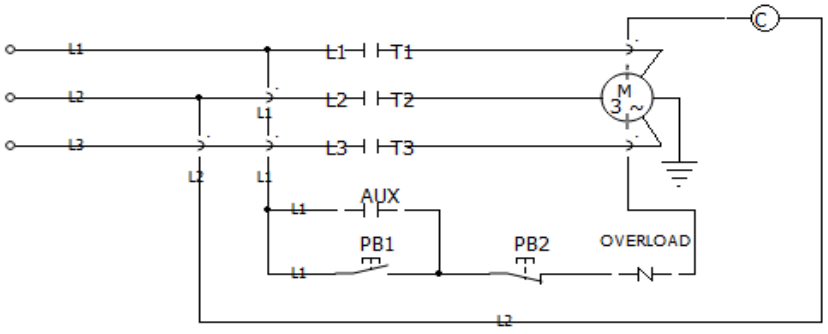


Figure 42

1)

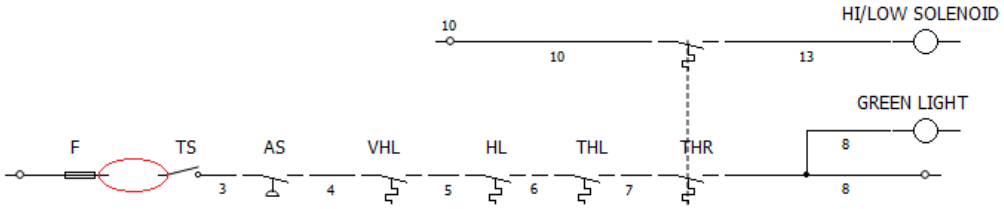


Figure 43

- Disconnect wire #1 between “F” and “TS” in the burner control box.

2)

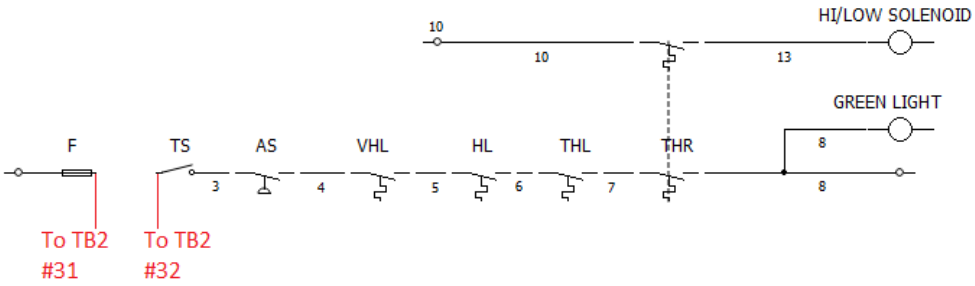


Figure 44

- Connect a wire between “F” in the burner control box and #31 of TB2
- Connect a wire between “TS” in the burner control box and #32 of TB2

3)

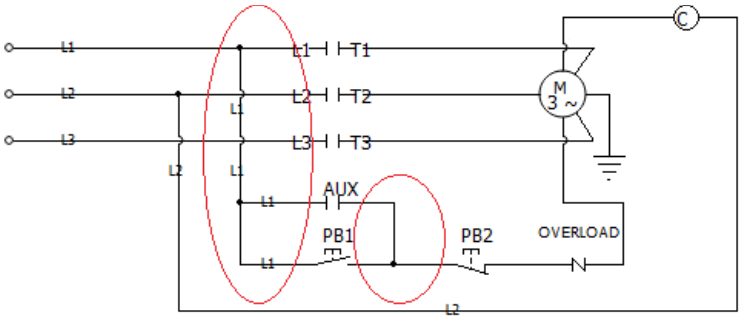


Figure 45

- Disconnect wire between L1, AUX, and PB1.
- Disconnect wire between AUX, PB1 and PB2.

4)

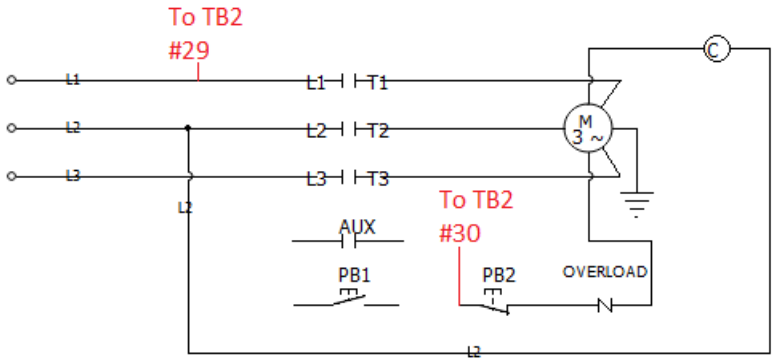


Figure 46

- Run wire from “L1” to terminal “29” of TB2.
- Run wire from “PB2” to terminal “30” of TB2.

5)

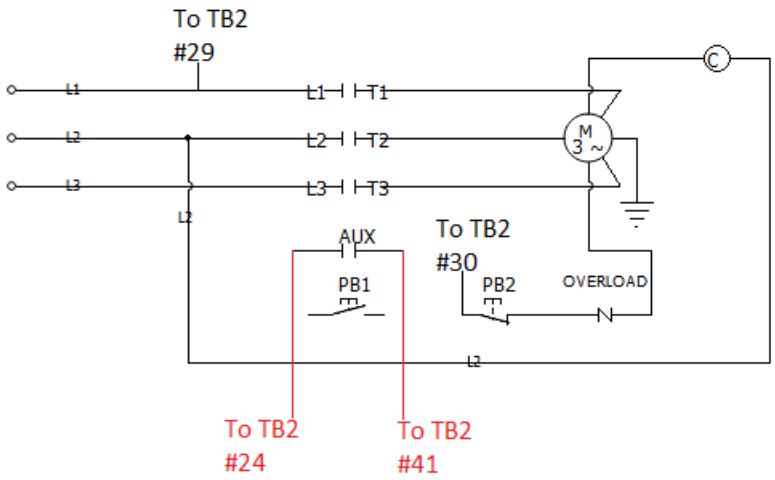


Figure 47

- Run wire from the normally open “AUX” contact of the fan coil to terminal “24” of “TB2”
- Run wire from the other side of the normally open “AUX” contact of the fan coil to terminal “41” of “TB2”

6) Hi/Low Burner Option*

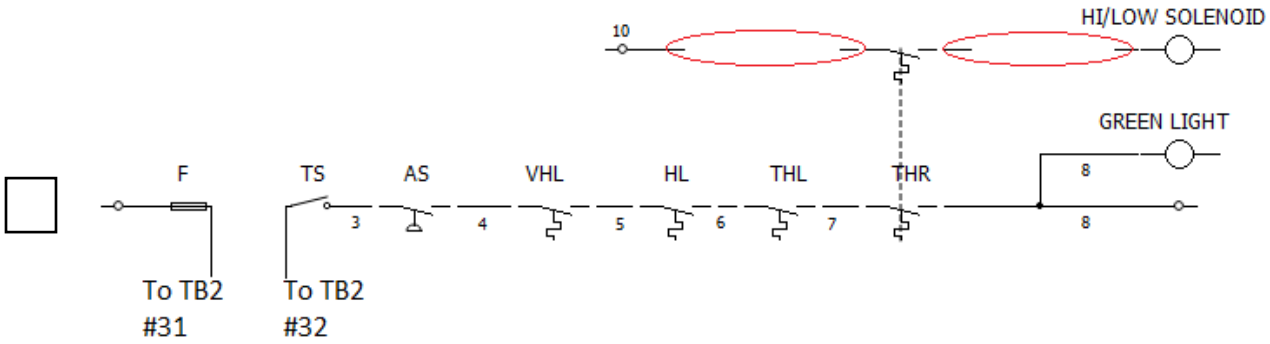


Figure 48

- Disconnect wire #10 between the terminal block on the back of the burner control box and thermostat.
- Disconnect wire #13 between the terminal block on the back of the burner control box and thermostat.

7) Hi/Low Burner Option*

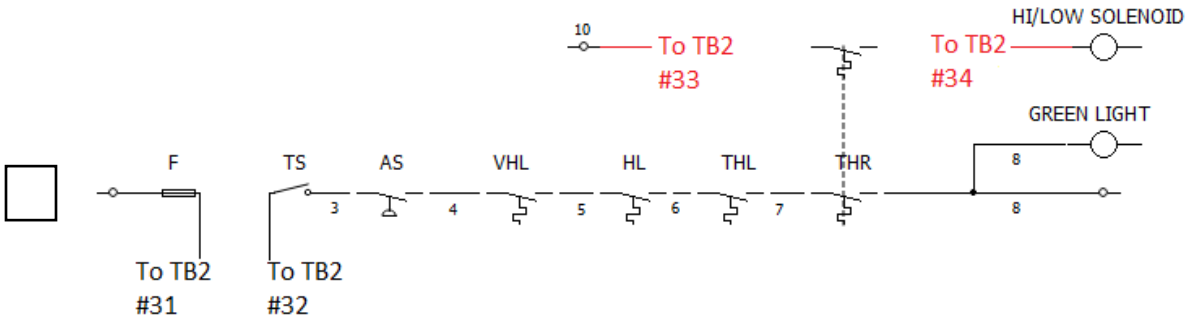


Figure 49

- Connect a wire between terminal #10 on the back of the burner control box and #33 of TB2.
- Connect a wire between terminal #13 on the back of the burner control box and #34 of TB2.

Farm Fans Burner Hookup

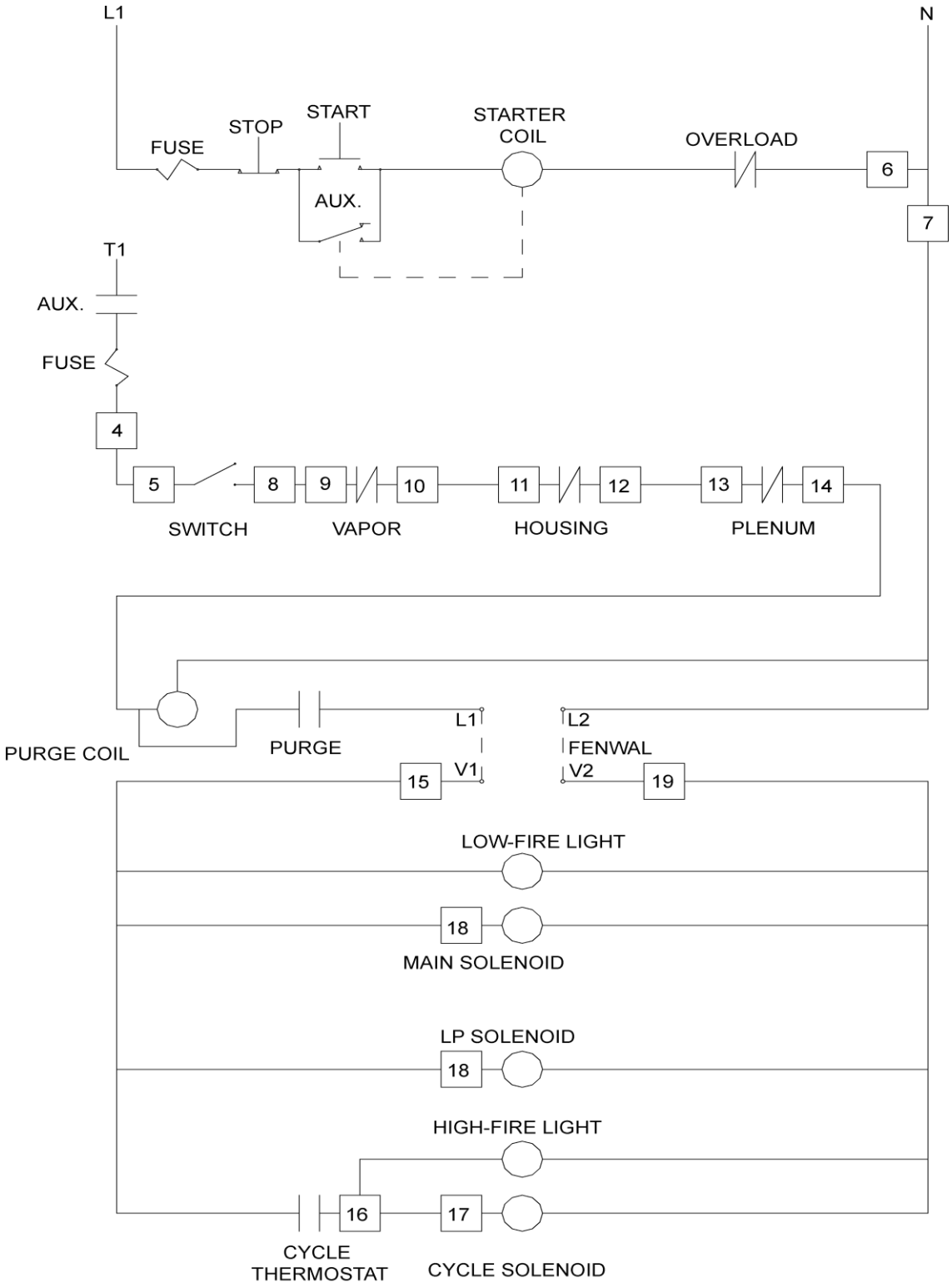


Figure 50

1)

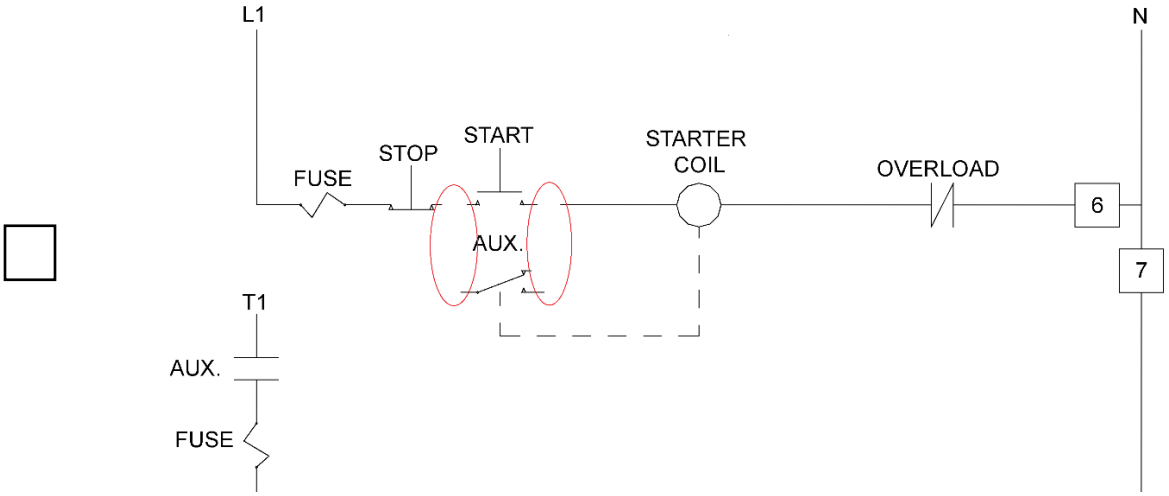


Figure 51

- Disconnect wire between the “STOP”, “START”, “AUX” and “STARTER COIL” in dryer #1 control box.

2)

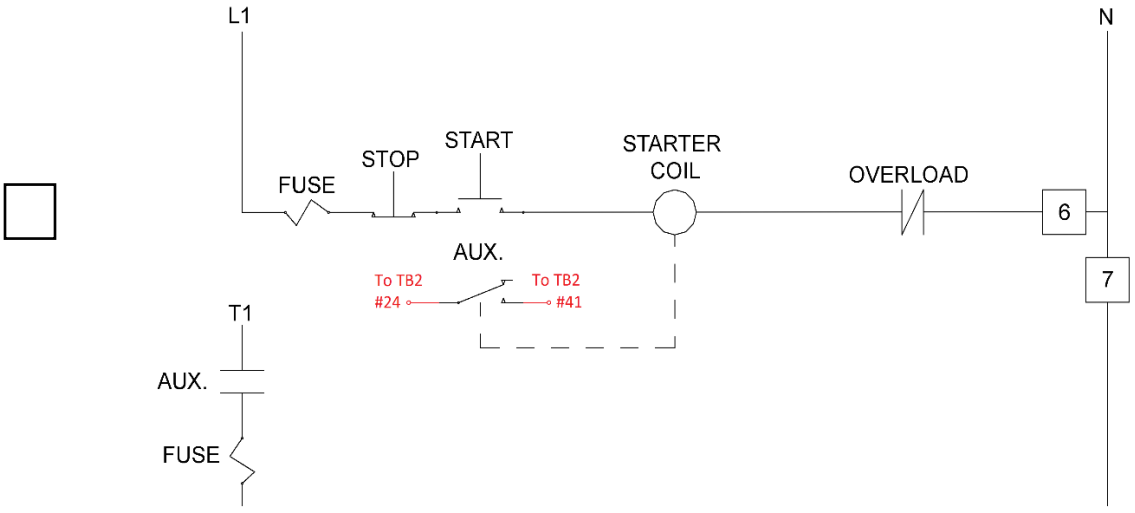


Figure 52

- Run wire from the normally open “AUX” contact of the fan coil in dryer control box #1 to terminal “24” of “TB2”
- Run wire from the other side of the normally open “AUX” contact of the fan coil in dryer control box #1 to terminal “41” of “TB2”

3)

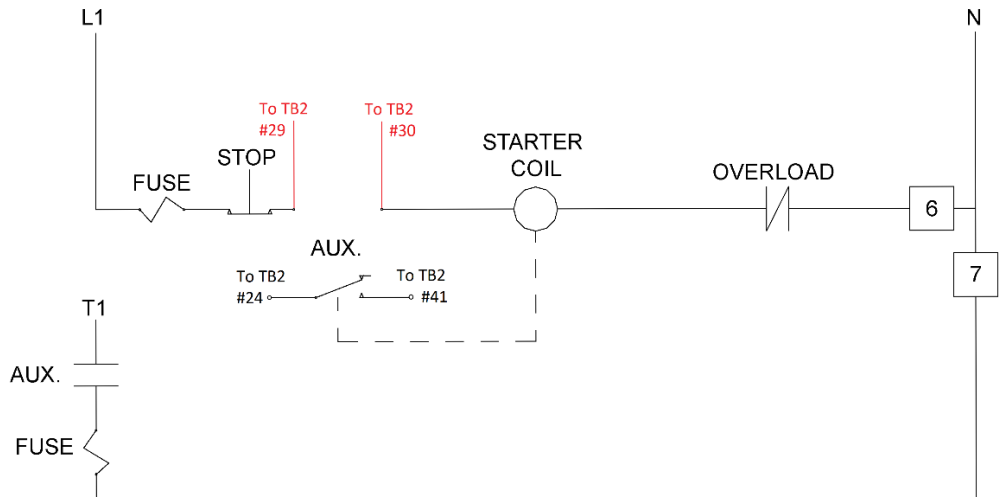


Figure 53

- Run wire from “STOP” push button of burner control box #1 to terminal “29” of TB2.
- Run wire from “STARTER COIL” of burner control box #1 to terminal “30” of TB2.

4)

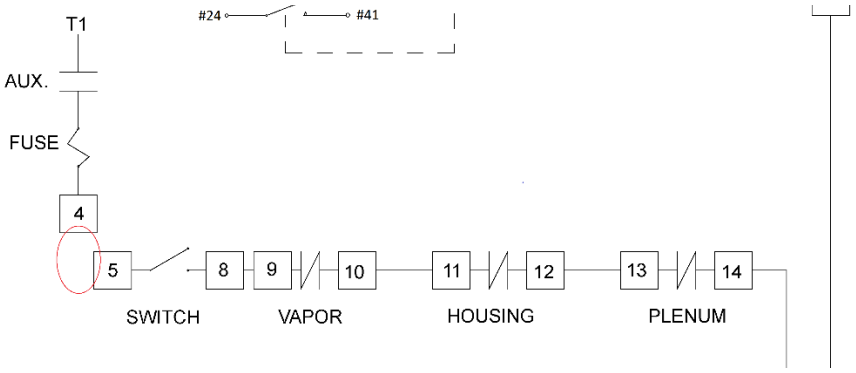


Figure 54

- Disconnect wire between terminal “4” and “5” of burner control box #1.

5)

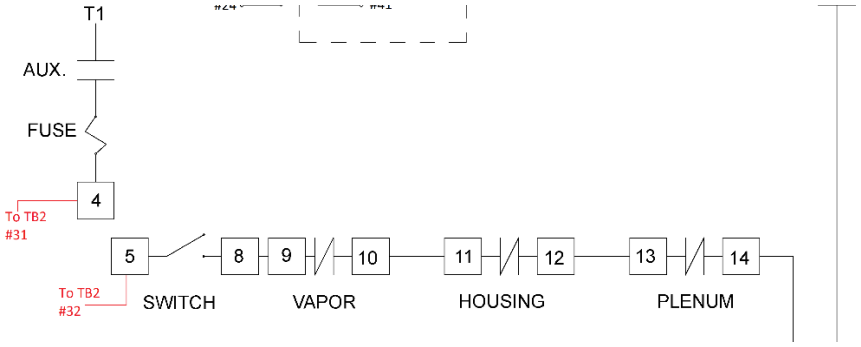


Figure 55

- Connect a wire between “F” in the burner control box #1 and #31 of TB2
- Connect a wire between “TS” in the burner control box #1 and #32 of TB2

6) Hi/Low Burner Option*

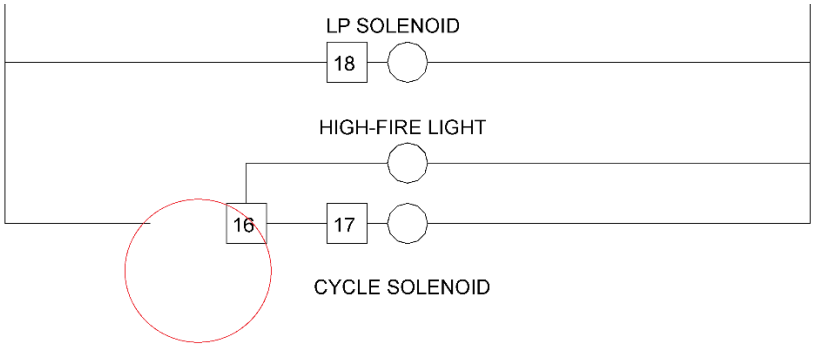


Figure 56

- Disconnect wire “15” and “16” of burner control box #1 between thermostat and terminals “15” and “16”.

7) Hi/Low Burner Option*

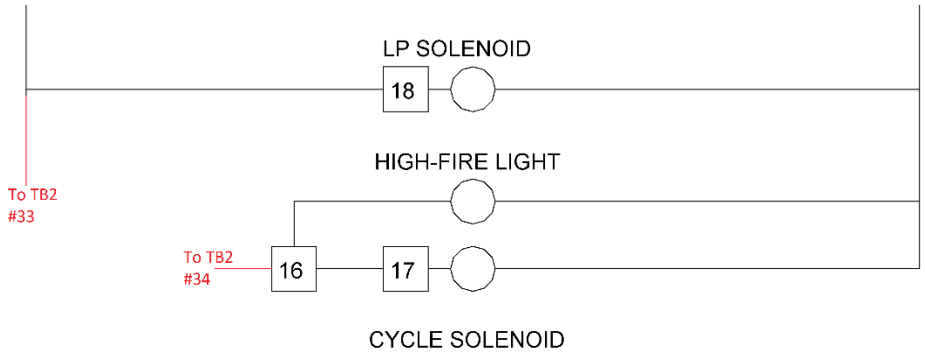


Figure 57

- Connect wire from terminal “15” of farm fans dryer panel #1 to terminal “33” of TB2
- Connect wire from terminal “16” of farm fans dryer panel #1 to terminal “34” of TB2

8)

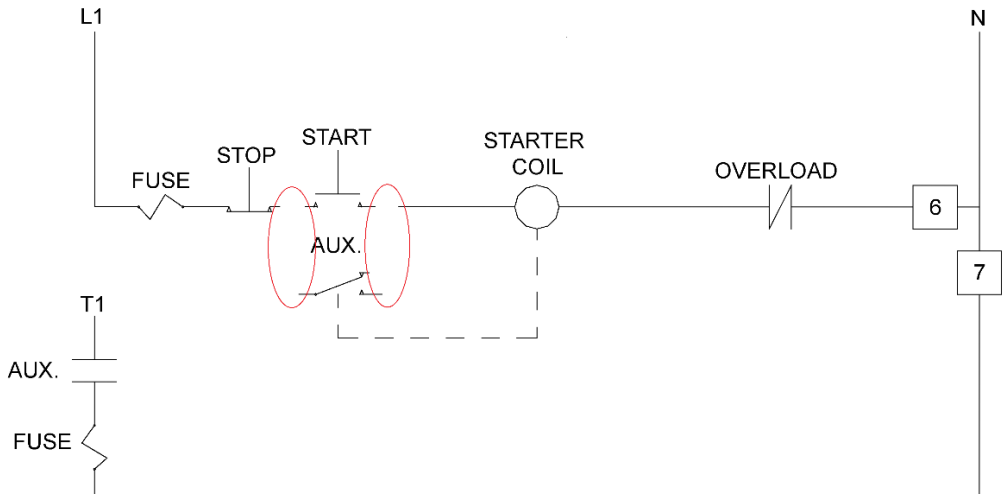


Figure 58

- Disconnect wire between the “STOP”, “START”, “AUX” and “STARTER COIL” in dryer control box #2.

9)

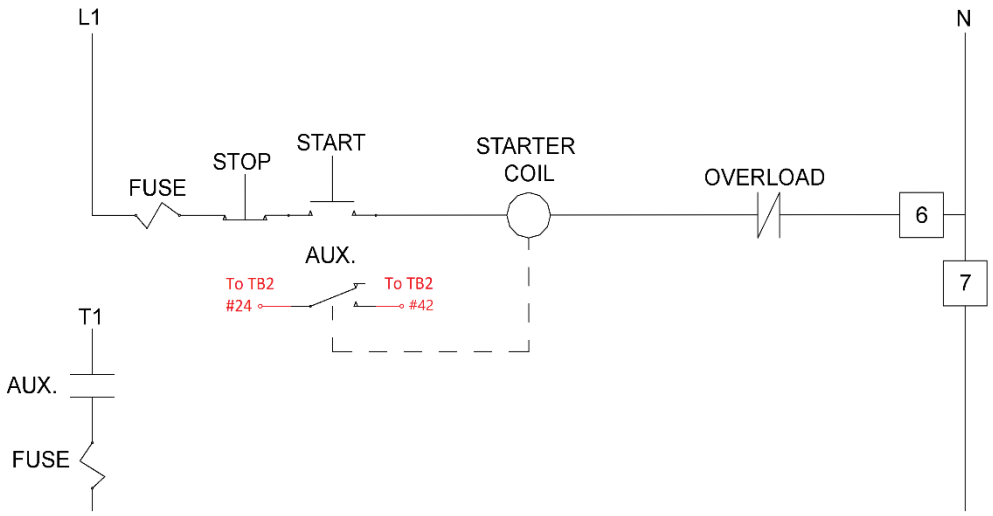


Figure 59

- Run wire from the normally open “AUX” contact of the fan coil in dryer control box #2 to terminal “24” of “TB2”
- Run wire from the other side of the normally open “AUX” contact of the fan coil in dryer control box #2 to terminal “42” of “TB2”

10)

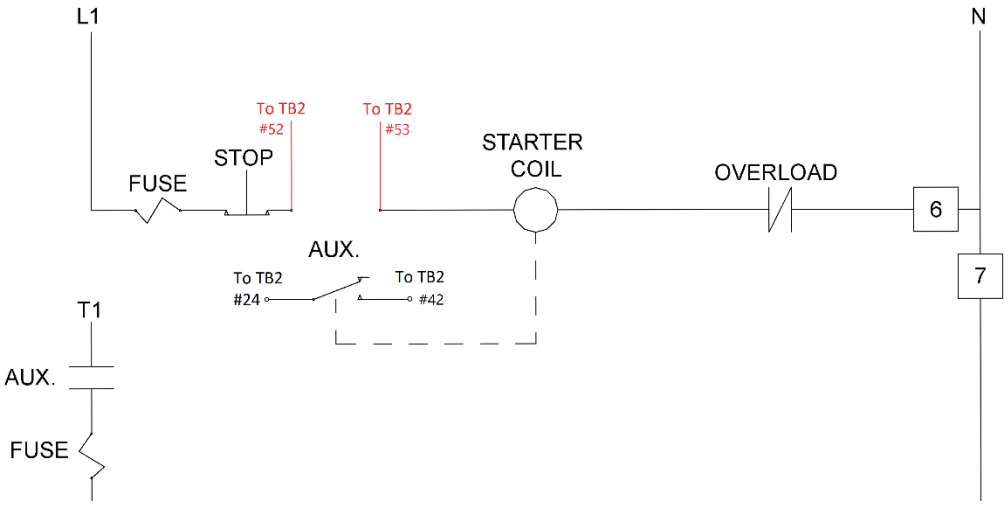


Figure 60

- Run wire from “STOP” push button of burner control box #2 to terminal “52” of TB2.
- Run wire from “STARTER COIL” of burner control box #2 to terminal “53” of TB2.

11)

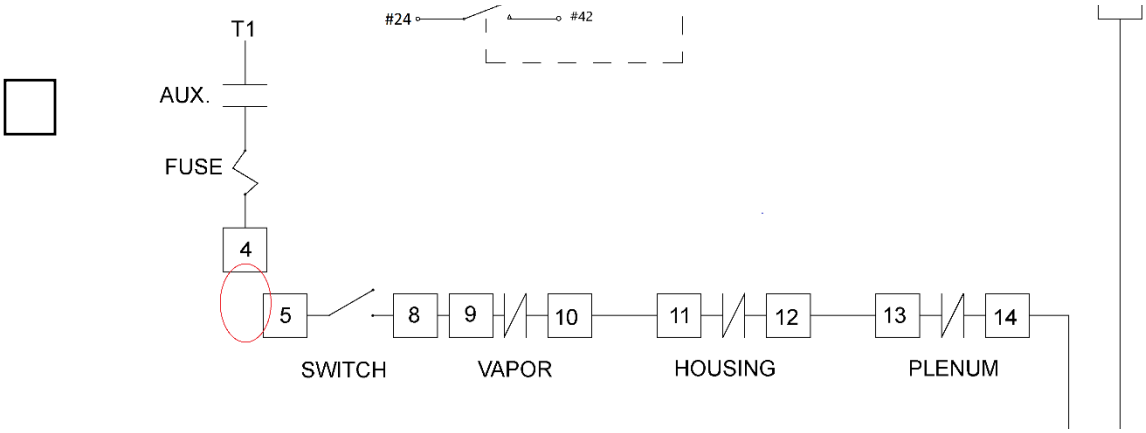


Figure 61

- Disconnect wire between terminal “4” and “5” of burner control box #2.

12)

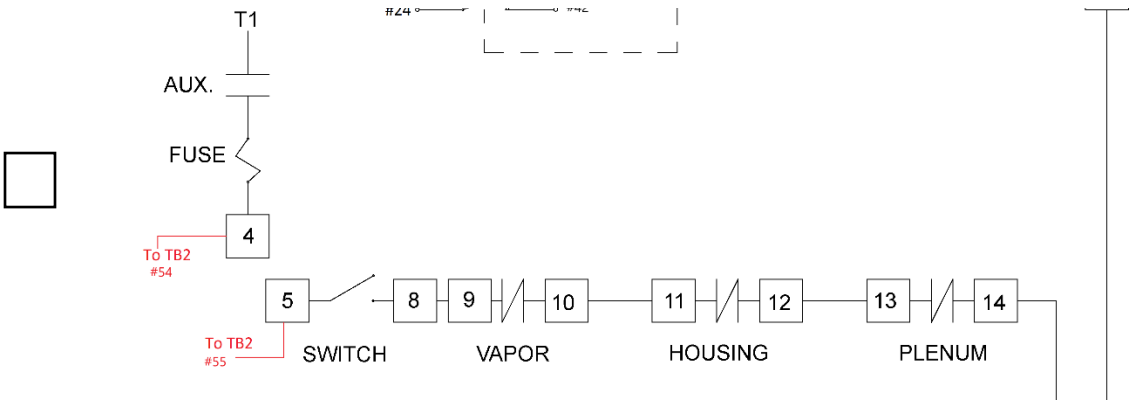


Figure 62

- Connect a wire between “F” in the burner control box #2 and #54 of TB2
- Connect a wire between “TS” in the burner control box #2 and #55 of TB2

13) Hi/Low Burner Option*

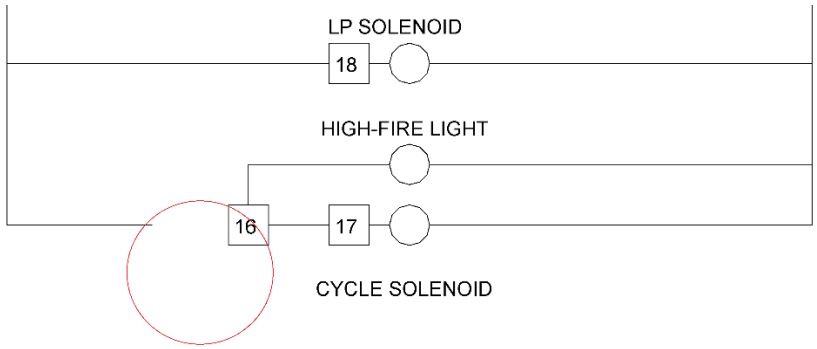


Figure 63

- Disconnect wire “15” and “16” of burner control box #2 between thermostat and terminals “15” and “16”.

14) Hi/Low Burner Option*

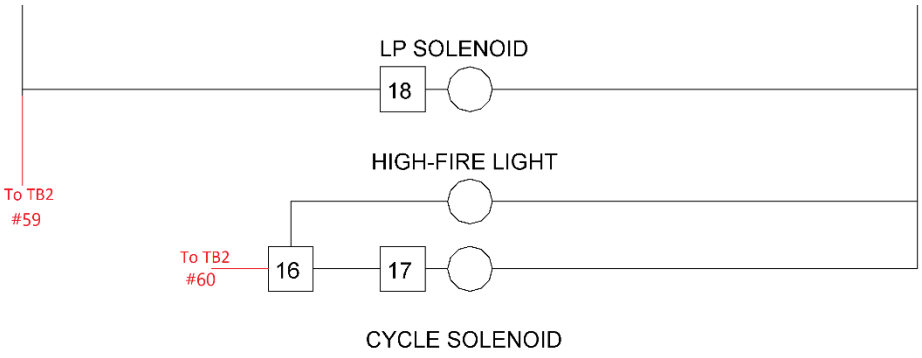


Figure 64

- Connect wire from terminal “15” of farm fans dryer panel #2 to terminal “59” of TB2
- Connect wire from terminal “16” of farm fans dryer panel to terminal “60” of TB2

Operation

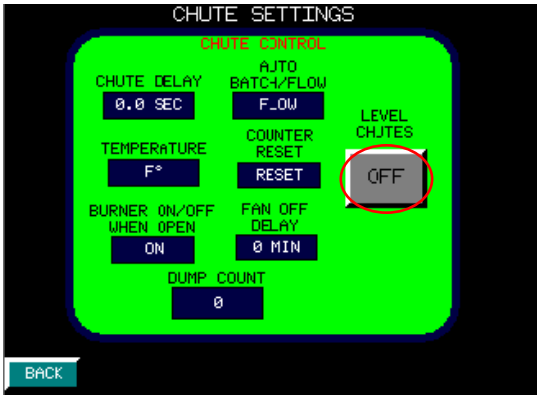


Figure 65

- To level chutes select the “LEVEL CHUTES” button.
- When “LEVEL CHUTES” is selected the button will turn yellow and read “ON”

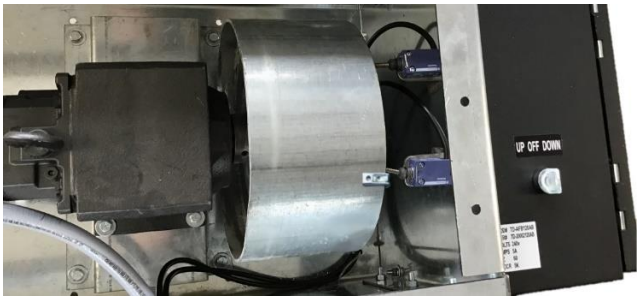


Figure 66

- When the “LEVEL CHUTES” option is selected the selector switch on the side of the actuator control box will light up green.
- Use the selector switch to raise or lower the chutes into the desired position.
- Once chutes are level install beam clamp so it is positioned against the “closed limit switch”. Ex. (Figure 66)

Figure 67

- The initial setting for large chutes should be 3.5sec and 45sec for smaller chutes. These times should only be used as a starting point.
- To set-up the proper chute time place a 1/4in dowel into the grain column see (Figure 67). Time how long it takes for the piece of dowel to travel from the top of the column to the chute while the grain is dumping.

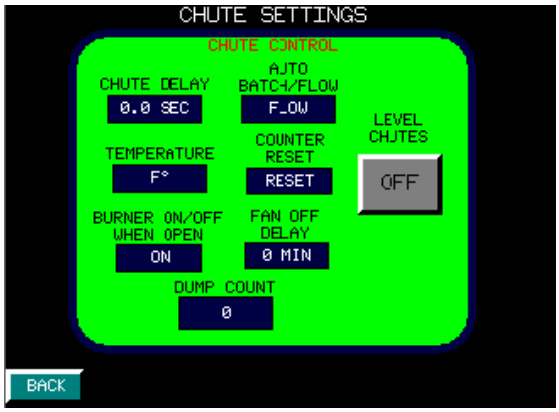


Figure 68

- Subtract 6 sec from the time and set “CHUTE DELAY”.
- “AUTO BATCH/FLOW” indicates how the loading and chutes will function.
- When set to “BATCH” the “CHUTYE DELAY” will automatically be set to 300sec. The loading will not run again until the chutes have lowered after the top has been filled once.
- When set to “FLOW” the chutes will follow the time set in “CHUTE DELAY” and the loading will follow the parameters set in the “LOADING SETTINGS” page.
- “TEMPERATURE” indicates the temperature unit the dryer will function in.
- “COUNTER RESET” resets the “DUMP COUNT”
- “BURNER ON/OFF WHEN OPEN” when in the “ON” position the burner will stay on when chutes are open. When in the “OFF” position the burner will shutoff when the chutes are ready to lower. The fan will run for the amount of time set in the “FAN OFF DELAY” section. After the fan shuts off the chutes will lower. The fan and burner will restart when the chutes are raised.
- “DUMP COUNT” keeps track of how many dumps there has been since the counter was reset last.

Figure 69

- "ON/OFF" selects which stages will be used.
- "AUTO" indicates how the loading stage will run.
- When in the "AUTO" position the stage will start and stop according to the parameters set in the "DELAY START" and "DELAY STOP" selections.
- Set "DELAY START" to the amount of time after grain has cleared from the bin top sensor that the first stage will start.
- Set "DELAY OFF" to the minimum amount of time the stage takes to clean out.
- If loading is turning on frequently while dryer is running increase delay off time of last stage by increments of 5 sec until loading is topping up once or twice between dumps.
- Be careful not to run loading too long as it can lead to plugging of equipment.

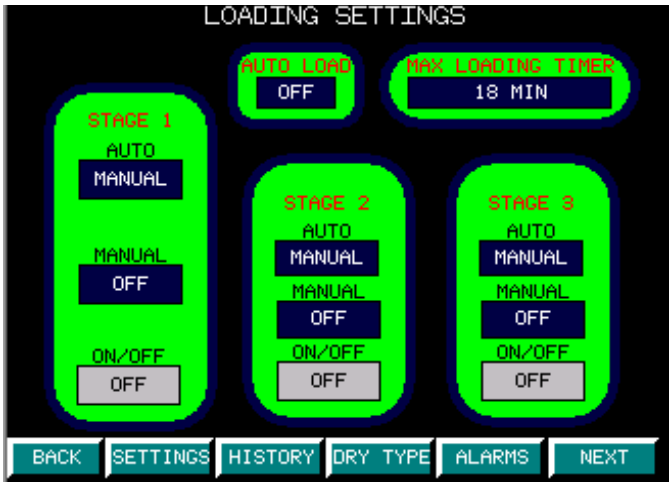


Figure 70

- When "AUTO" is in the "MANUAL" position and "MANUAL" is set to on the stage will run until "MANUAL" is switched to off or the overload trips.
- To set the "MAX LOADING TIMER" time how long it takes to fill the drying chamber from empty. Add %10 to the filling time and input it into "MAX LOADING TIMER". This will shut down the loading system if bin top rotary has not been reached within the time frame.

*Ignore if not controlling burner or aeration fan.

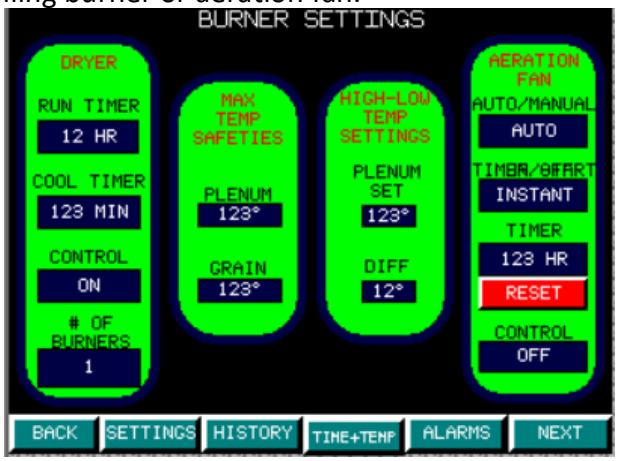


Figure 71

- "DRYER" only used if controlling burner.
- "RUN TIME" is the amount of time the burner will be on before shutting down.
- "COOL TIMER" is the amount of time the burner fan will run after the burner shuts off.
- "CONTROL" turns the dryer control on and off.
- "# OF BURNERS" number of burners being controlled.
- "MAX TEMP SAFTIES" should be set slightly higher than the plenum set point and the grain set point to prevent fires and damage to the burner and bin.
- "HIGH-LOW TEMP SETTINGS" (only used on burners with high/low control).
- The "PLENUM SET" is the temperature the plenum will reach before switching from high to low flame.
- The "DIFF" is the amount the temperature will drop after reaching the "PLENUM SET" point before the high flame will start again.
- "AERATION FAN" (only used if controlling aeration fan).
- "AUTO/MANUAL" controls how the aeration fan will be controlled. When in "AUTO" the fan will follow the parameters set in the "TIME START" and "TIMER" settings.
- "TIMER START" controls when the timer will start. "INSTANT" will start the timer as soon "CONTROL" is turned on. "AFTER DRY" will start the timer after the burner fan shuts down.
- "TIMER" is the amount of time until the aeration fan will shut down according to the parameters set in the "TIMER START" selection.
- "CONTROL" turns the aeration fan control on and off.

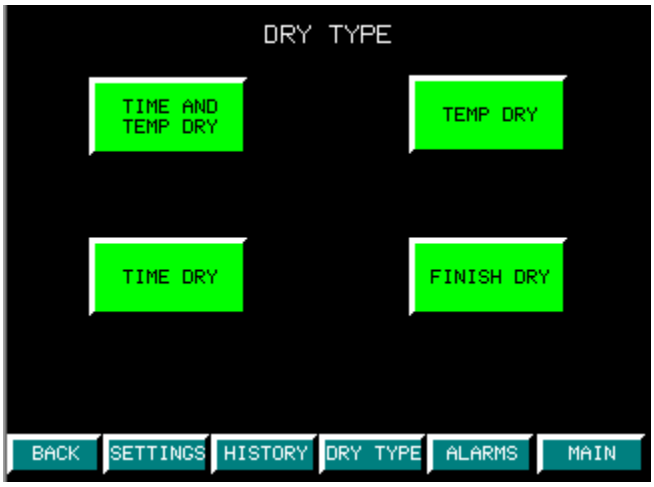


Figure 72

- "DRY TYPE" selects the type of drying that will be used to control the chutes.
- "TIME AND TEMP DRY" the dryer must reach both time and temperature set points to lower the chutes.
- "TEMP" the dryer must reach the temperature set point to lower the chutes.
- "TIME" the dryer must reach the time set point to lower the chutes.
- "FINISH DRY" the chutes are controlled by the "UP" and "DOWN" buttons in the finish dry section.

Figure 73

- "TIME + TEMP DRY" when set to "ON" will allow the chutes to lower when the parameters set in the "DRY TIMER" and "SET TEMP" are met.
- "AUTO LOAD" allows control the user to stop and start the auto loading from the drying page.
- "DRY TIMER" sets the minimum amount of time between dumps.
- "SET TEMP" sets the minimum the overall grain temperature must reach before the chutes will lower.
- "REMAINING" displays the amount of time left before the "DRY TIMER" parameter is reached.
- "DRYER CONTROL" allows control of the burner from the drying page.

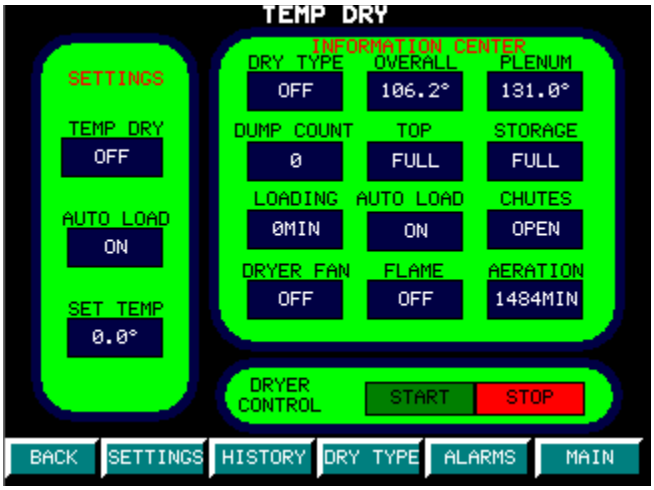


Figure 74

- "TEMP DRY" when set to "ON" will allow the chutes to lower when the parameter set in the "SET TEMP" section is met.
- "AUTO LOAD" allows control the user to stop and start the auto loading from the drying page.
- "SET TEMP" sets the point the overall grain temperature must reach before the chutes will lower.
- "DRYER CONTROL" allows control of the burner from the drying page.

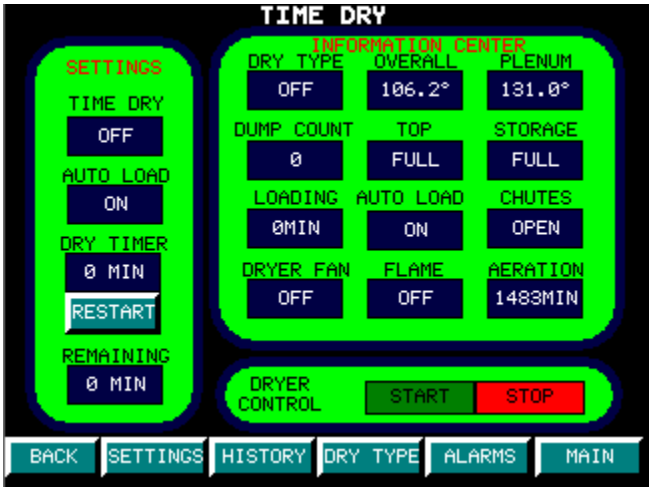


Figure 75

- "TIME DRY" when set to "ON" will allow the chutes to lower when the parameter set in the "DRY TIMER" is met.
- "AUTO LOAD" allows control the user to stop and start the auto loading from the drying page.
- "DRY TIMER" sets the minimum amount of time between dumps.
- "REMAINING" displays the amount of time left before the "DRY TIMER" parameter is reached.
- "DRYER CONTROL" allows control of the burner from the drying page.

Figure 76

- "FINISH" when set to "ON" will allow the chutes to be controlled by the "OPEN" and "CLOSED" buttons.
- "AUTO LOAD" allows control the user to stop and start the auto loading from the drying page.
- "DRYER CONTROL" allows control of the burner from the drying page.