

# Temperature Control Panel Wiring Diagram

**Model: IFPA-480-3P-64A**


**Shift Controls, Inc.**

Installed Options:  
 None

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## Temperature Control Panel Specifications

|                           |  |
|---------------------------|--|
| Model Number              | IFPA-480-3P-64A  |
| Rated Voltage             | 480 VAC  |
| Phases                    | Three (3)  |
| Power Controller          | Zero Crossing SCR  |
| Rated Frequency           | 60 Hz  |
| SCCR                      | 100 kA   |
| Control Voltage           | 120 VAC; internal control transformer                    |
| Maximum Fuse Size         | 80 Amps, Class J, High Speed                             |
| Maximum Full Load Current | 64 Amps, Resistive                                       |
| Maximum Load              | 53.2 kW  |
| Enclosure Type            | Nema 4X Enclosure, Nema 12 Cooling Fan and Vent          |
| Operating Environment     | 0 - 35 deg C, 10-85% RH, Non-Condensing, Indoor Use Only |

| REV.         | DATE     | DRAWN BY   | DESCRIPTION      | DRAWING DESCRIPTION                                      | DRAWING NUMBER    |  |
|--------------|----------|------------|------------------|--|-------------------|---|
| A            | 03/14/16 | B. KETTLER | FOR CONSTRUCTION | CONTROL PANEL SPECIFICATIONS<br>AND WIRE COLOR STANDARDS | E-IFPA-480-3P-64A |   |
| DRAWING TYPE |          |            |                  |  | WIRING SCHEMATIC  |   |

Fuse Replacement Voltage, Amperage, Class and Type Reference

FUSE REPLACEMENT NOTES:

1) Fuses are to be replaced with fuses of the same voltage rating, current rating, and fuse type.

| Fuse Name  | Description                          | Voltage Rating | Maximum Value | Fuse Type |             | Manufacturer Equivalent |          |            |
|------------|--------------------------------------|----------------|---------------|-----------|-------------|-------------------------|----------|------------|
|            |                                      |                |               |           |             | Edison                  | Bussmann | Littelfuse |
| F1, F2, F3 | Main Power Branch Fusing             | 600            | 80 Amps       | Class J   | High Speed  | JHL                     | DFJ      | N/A        |
| F4, F5     | Control Transformer Primary Fusing   | 500            | 1 Amp         | Midget    | Time-Delay  | MEQ                     | FNQ      | FLQ        |
| F6         | Control Transformer Secondary Fusing | 250            | 1 Amp         | Midget    | Fast-Acting | MOL                     | BAF/BAN  | BLF        |

Main Branch Fuse Protection (F1, F2, F3) Ampacity Reference Table

FUSE SIZING NOTES:

1) The maximum resistive heater load is 64 Amps / 53.2 kW at 480 VAC 3-Phase.

2) Fuses are to be sized 125-165% of the heater full load.

| Heater Full Load Rating |         | Fuse Size, Current Rating                                   |      |      |      |      |                           |      |
|-------------------------|---------|---|------|------|------|------|---------------------------|------|
|                         |         | Littlefuse ® LRUJ16 Fuse Reducers Required for 35-60A Fuses |      |      |      |      | No Fuse Reducers Required |      |
|                         |         | 35A   | 40A  | 45A  | 50A  | 60A  | 70A                       | 80A  |
| Full Load Power, kW     | Minimum | 17.6  | 20.2 | 22.7 | 25.2 | 30.2 | 35.3                      | 40.3 |
| Full Load Power, kW     | Maximum | 23.3  | 26.6 | 29.9 | 33.3 | 39.9 | 46.6                      | 53.2 |
| Full Load Current, Amps | Minimum | 21.2  | 24.2 | 27.3 | 30.3 | 36.4 | 42.4                      | 48.5 |
| Full Load Current, Amps | Maximum | 28.0  | 32.0 | 36.0 | 40.0 | 48.0 | 56.0                      | 64.0 |

| REV.             | DATE     | DRAWN BY   | DESCRIPTION      |
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| A                | 03/14/16 | B. KETTLER | FOR CONSTRUCTION |
| DRAWING TYPE     |          |            |                  |
| WIRING SCHEMATIC |          |            |                  |

|                                      |  |
|--------------------------------------|--|
| DRAWING DESCRIPTION                  |  |
| FUSE AND FIELD WIRING SPECIFICATIONS |  |

|                |                   |
|----------------|-------------------|
| DRAWING NUMBER | E-IFPA-480-3P-64A |
| SHEET NUMBER   | SHEET ii          |



| Standard Wire Colors                   |   |
|--|---|
| 480VAC, 3-Phase Power                  | Brown (BR), Orange (OR), Yellow (YL)        |
| Ground Wires                           | Green (GN)                                  |
| AC Control Power, 120VAC Ungrounded AC | Red (RD)                                    |
| Neutral / Grounded AC                  | White (WH)                                  |
| Thermocouple Cable                     | Type K - Yellow Cable, Type J - Black Cable |
| DC Signal wires                        | 2-Conductor Cable                           |
| RS-485, Data                           | 2-Conductor Cable                           |

**Customer Supplied Wire Size, Rating and Terminal Tightening Torque Reference**

NOTES:  
 1) Conductor Sizing to be Determined by NEC and Local Codes  
 2) Control wiring (Terminals 93-98) to be Class II unless customer supplied circuits to Alarm I (Terminals 91, 92) are greater than 150 Volts. If customer supplied wiring is greater than 150 Volts, then all control wiring (Terminals 91-98) are to be Class I.

| Terminal Number | Description                           | Wire               |                        |                      |                            |                               | Tightening Torque     |                       |
|-----------------|---------------------------------------|--------------------|------------------------|----------------------|----------------------------|-------------------------------|-----------------------|-----------------------|
|                 |                                       | Conductor Material | Minimum Voltage Rating | Minimum Temp. Rating | Minimum Wire Size          | Maximum Wire Size             | Minimum               | Maximum               |
| 1, 2, 3, 4      | Main Power Line (L1, L2, L3, GND)     | Copper             | 600 VAC                | 75 C                 | 14AWG, 1.6mm<br>See Note 1 | 4AWG, 5.2mm<br>See Note 1     | 23 in*lb,<br>2.5 N*m  | 26 in*lb,<br>3.0 N*m  |
| 5, 6, 7, 8      | Heater Power Load (T1, T2, T3, GND)   | Copper             | 600 VAC                | 75 C                 | 14AWG, 1.6mm<br>See Note 1 | 4AWG, 5.2mm<br>See Note 1     | 23 in*lb,<br>2.5 N*m  | 26 in*lb,<br>3.0 N*m  |
| 91, 92          | User Programable Alarm (Dry Contacts) | Copper             | Class I                | 60 C                 | 26AWG, 0.4mm<br>See Note 1 | 10AWG, 2.5mm<br>See Note 1    | 5.3 in*lb,<br>0.6 N*m | 7.0 in*lb,<br>0.8 N*m |
| 93, 94          | Temp. Retransmit (4-20mA Sourcing)    | Copper             | Class II<br>See Note 2 | 60 C                 | 26AWG, 0.4mm<br>See Note 1 | 10AWG, 2.5mm<br>See Note 1    | 5.3 in*lb,<br>0.6 N*m | 7.0 in*lb,<br>0.8 N*m |
| 95, 96          | RS-485 Modbus Communication           | Copper             | Class II<br>See Note 2 | 60 C                 | 26AWG, 0.4mm<br>See Note 1 | 10AWG, 2.5mm<br>See Note 1    | 5.3 in*lb,<br>0.6 N*m | 7.0 in*lb,<br>0.8 N*m |
| 97, 98          | Thermocouple Input                    | TC Wire            | Class II<br>See Note 2 | 60 C                 | 24AWG                      | 14AWG Solid<br>16AWG Stranded | 3.5 in*lb,<br>0.4 N*m | 3.5 in*lb,<br>0.4 N*m |
| A1, A2          | External Interlock (Option)           | Copper             | Class I                | 60 C                 | 26AWG, 0.4mm<br>See Note 1 | 14AWG, 1.6mm<br>See Note 1    | 3.5 in*lb,<br>0.4 N*m | 3.5 in*lb,<br>0.4 N*m |

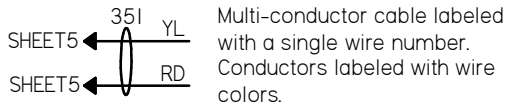
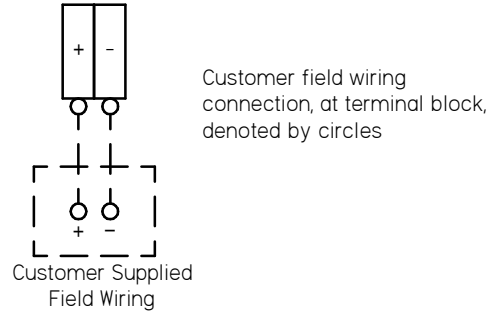
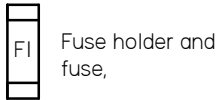
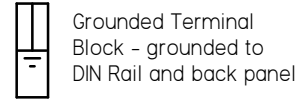
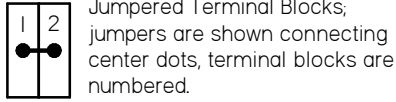
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|------------------|----------|------------|------------------|
| A                | 03/14/16 | B. KETTLER | FOR CONSTRUCTION |
| DRAWING TYPE     |          |            |                  |
| WIRING SCHEMATIC |          |            |                  |

| DRAWING DESCRIPTION                     |
|---|
| FUSE AND FIELD<br>WIRING SPECIFICATIONS |

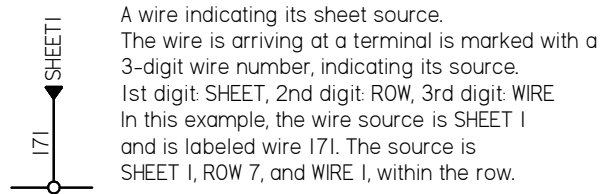
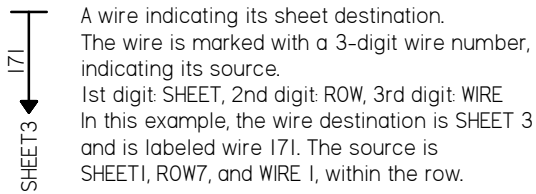
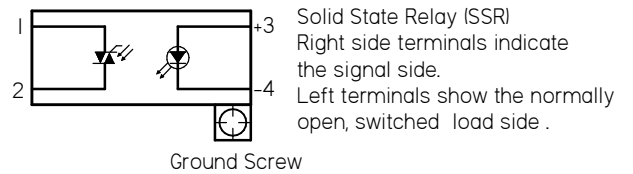
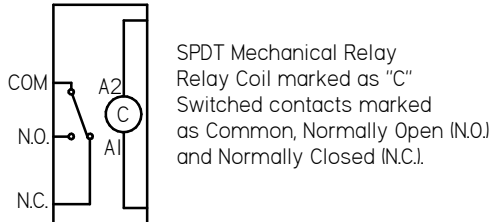
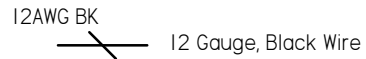
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|-------------------|
| E-IFPA-480-3P-64A |
| SHEET NUMBER      |
| SHEET iii         |



## Wiring Schematic Typical Symbols and Standards



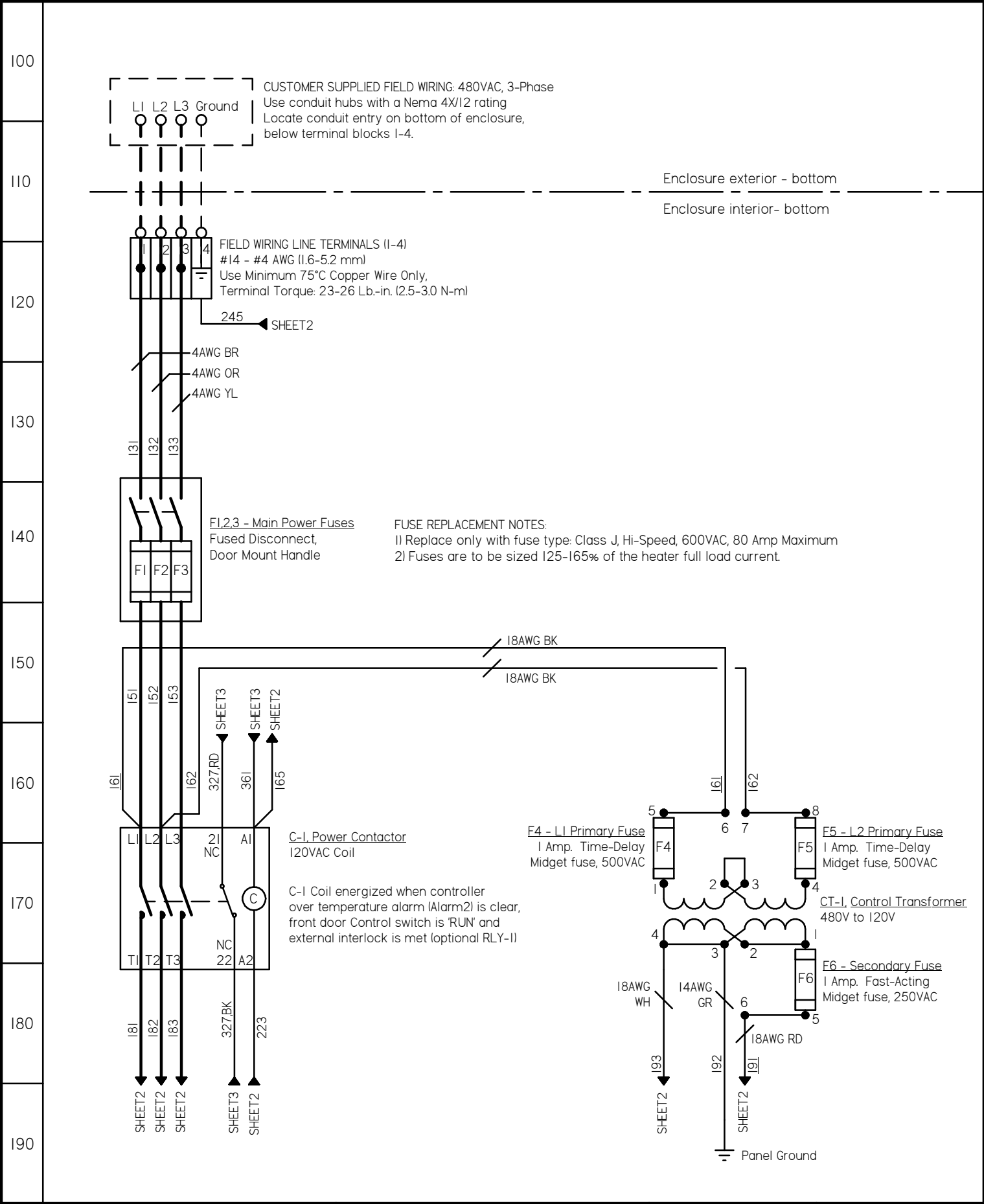
--- Customer supplied, field wiring



170

|                  |          |            |                  |  |                   |
|------------------|----------|------------|------------------|--|-------------------|
| REV.             | DATE     | DRAWN BY   | DESCRIPTION      | DRAWING DESCRIPTION                                      | DRAWING NUMBER    |
| A                | 03/14/16 | B. KETTLER | FOR CONSTRUCTION | TYPICAL SYMBOLS, STANDARDS and WIRE LABELING CONVENTIONS | E-IFPA-480-3P-64A |
| DRAWING TYPE     |          |            |                  |  | SHEET NUMBER      |
| WIRING SCHEMATIC |          |            |                  |  | SHEET iv          |





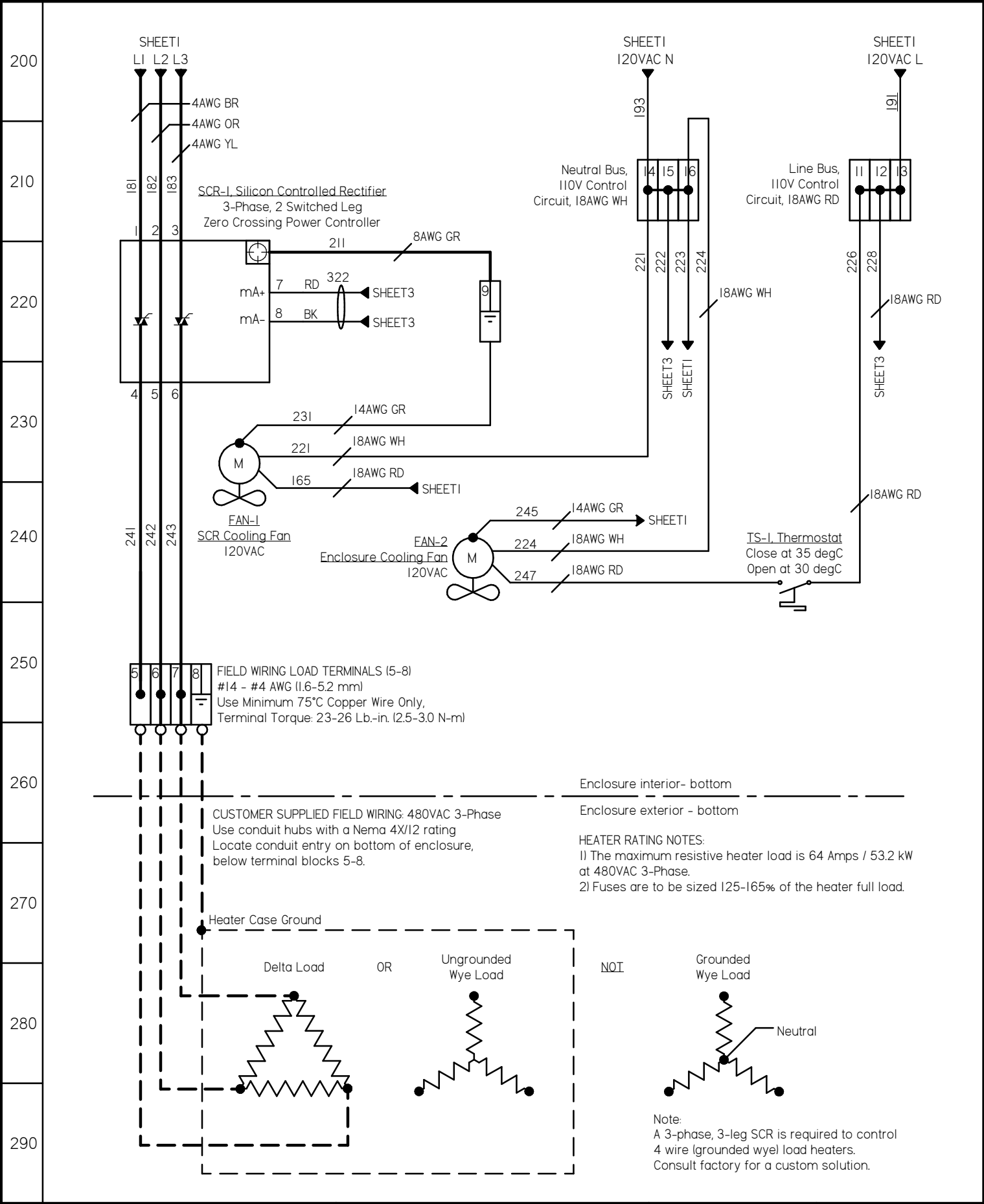
| REV. | DATE     | DRAWN BY   | DESCRIPTION      |
|------|----------|------------|------------------|
| A    | 03/14/16 | B. KETTLER | FOR CONSTRUCTION |

DRAWING TYPE: WIRING SCHEMATIC

DRAWING DESCRIPTION: FUSED DISCONNECT, CONTACTOR, AND CONTROL TRANSFORMER

DRAWING NUMBER: E-IFPA-480-3P-64A  
 SHEET NUMBER: SHEET 1 of 4





| REV. | DATE     | DRAWN BY   | DESCRIPTION      |
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DRAWING TYPE: WIRING SCHEMATIC

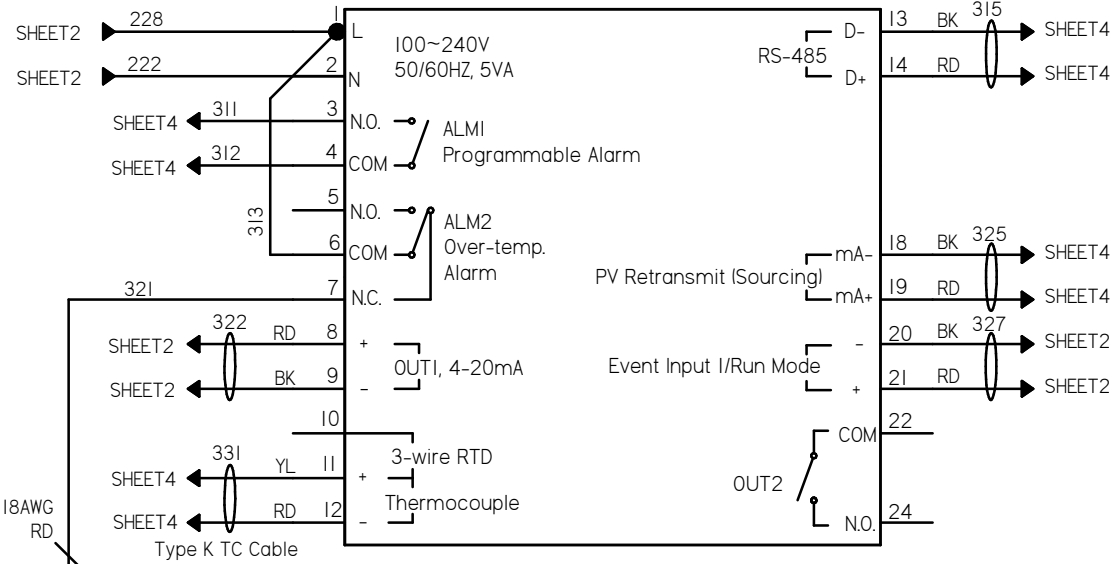
DRAWING DESCRIPTION: POWER CONTROLLER AND ENCLOSURE COOLING

DRAWING NUMBER: E-IFPA-480-3P-64A  
SHEET NUMBER: SHEET 2 OF 4



300  
310  
320  
330  
340  
350  
360  
370  
380  
390

TIC-I, PID Temperature Controller  
Door Mount



Note:  
Type K thermocouple: YL is + and RD is -  
Type J thermocouple: WH is + and RD is -

COM N.O. COM N.C. SW-I, SAFE / RUN Switch  
DPST, Door Mount

18AWG RD  
361  
SHEET1

| REV. | DATE     | DRAWN BY   | DESCRIPTION      |
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DRAWING TYPE: WIRING SCHEMATIC

| DRAWING DESCRIPTION    |
|------------------------|
| TEMPERATURE CONTROLLER |

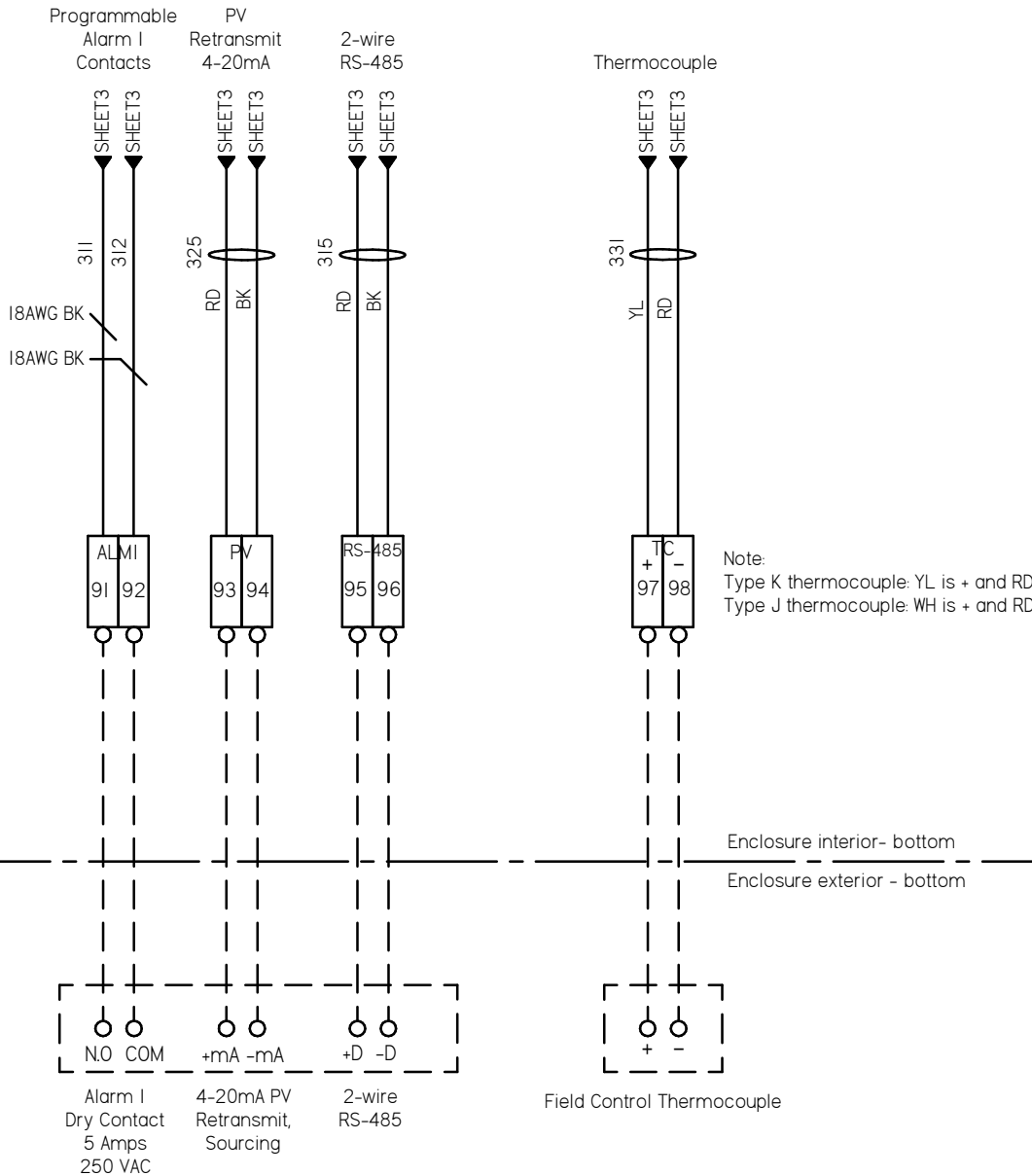
| DRAWING NUMBER    |
|-------------------|
| E-IFPA-480-3P-64A |
| SHEET NUMBER      |
| SHEET 3 OF 4      |



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FIELD CONTROL TERMINALS (91-96)  
 #26 - #10 AWG (0.4-2.5 mm)  
 Use Minimum 60°C Copper Wire Only,  
 Terminal Torque: 5.4-7.0 Lb.-in. (0.6-0.8 N-m)

FIELD THERMOCOUPLE TERMINALS (97-98)  
 #24 - #14 AWG (0.5-1.6 mm)  
 Use Thermocouple Extension Wire Only,  
 Terminal Torque: 3.5 Lb.-in. (0.4 N-m)



Note:  
 Type K thermocouple: YL is + and RD is -  
 Type J thermocouple: WH is + and RD is -

CUSTOMER SUPPLIED FIELD WIRING  
 Use conduit hubs with a Nema 4X/12 rating.  
 Locate conduit entry on bottom of enclosure,  
 below terminal blocks 91-98.

NOTES:  
 1) Conductor Sizing to be Determined by NEC and Local Codes  
 2) Control wiring (Terminals 93-98) to be Class II unless customer supplied circuits to Alarm I (Terminals 91, 92) or optional Interlock (Terminals A1, A2) are greater than 150 Volts. If customer supplied wiring is greater than 150 Volts, then all control wiring (Terminals 91-98) are to be Class I.

| REV. | DATE     | DRAWN BY   | DESCRIPTION      |
|------|----------|------------|------------------|
| A    | 03/14/16 | B. KETTLER | FOR CONSTRUCTION |

DRAWING TYPE: WIRING SCHEMATIC

DRAWING DESCRIPTION: CONTROL FIELD CONNECTIONS

DRAWING NUMBER: E-IFPA-480-3P-64A  
 SHEET NUMBER: SHEET 4 OF 4

