

# Temperature Control Panel Wiring Diagram

**Model: IFPA-120-IP-35A**

**Shift Controls, Inc.**

*Installed Options:*

Interlock Relay, RLY-1

[www.shift-controls.com](http://www.shift-controls.com)

[support@shift-controls.com](mailto:support@shift-controls.com)

720.532.1776

## Temperature Control Panel Specifications

Model Number	IFPA-120-IP-35A
Rated Voltage	120 VAC
Phases	Single
Power Controller	Zero Crossing SCR
Rated Frequency	60 Hz
SCCR	100 kA
Control Voltage	120 VAC
Maximum Fuse Size	45 Amps, Class J, High Speed
Maximum Full Load Current	35 Amps, Resistive
Maximum Load	4.20 kW
Enclosure Type	Nema 4X
Operating Environment	0 - 35 deg C, 10-85% RH, Non-Condensing, Indoor Use Only

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

DRAWING TYPE: WIRING SCHEMATIC

DRAWING DESCRIPTION: CONTROL PANEL SPECIFICATIONS AND WIRE COLOR STANDARDS

DRAWING NUMBER: E-IFPA-120-IP-35A  
SHEET NUMBER: SHEET i



### 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	Main Power Branch Fusing	600	45 Amps	Class J	High Speed	JHL	DFJ	N/A
F3	Control Circuit Supply Fusing	250	1 Amp	5x20mm	Fast-Acting	GMA	GMA	235

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

**FUSE SIZING NOTES:**

1) The maximum resistive heater load is 35 Amps / 4.20 kW at 120 VAC 1-Phase.

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

Heater Full Load Rating		Fuse Size, Current Rating										
		Littlefuse ® LRUJ63 Fuse Reducers Required for 1-30A Fuses								No Fuse Reducers Required		
		8A	10A	12A	15A	17.5A	20A	25A	30A	35A	40A	45A
Full Load Power, kW	Minimum	0.58	0.73	0.87	1.09	1.27	1.45	1.82	2.18	2.55	2.91	3.27
Full Load Power, kW	Maximum	0.77	0.96	1.15	1.44	1.68	1.92	2.40	2.88	3.36	3.84	4.20
Full Load Current, Amps	Minimum	4.85	6.06	7.27	9.09	10.6	12.1	15.2	18.2	21.2	24.2	27.3
Full Load Current, Amps	Maximum	6.40	8.00	9.60	12.0	14.0	16.0	20.0	24.0	28.0	32.0	35.0

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

DRAWING DESCRIPTION FUSE AND FIELD WIRING SPECIFICATIONS
--

DRAWING NUMBER E-IFPA-120-IP-35A
SHEET NUMBER SHEET ii



Standard Wire Colors	
120VAC, 1-Phase Power	Black (BK)
Neutral / Grounded AC	White (WH)
Ground Wires	Green (GN)
AC Control Power, 120VAC Ungrounded AC	Black (BK)
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	Main Power Line (L1, L2, GND)	Copper	300 VAC	75 C	14AWG, 1.6mm See Note 1	6AWG, 4.1mm See Note 1	13.3 in*lb, 1.5 N*m	15.9 in*lb, 1.8 N*m
4, 5, 6	Heater Power Load (T1, T2, GND)	Copper	300 VAC	75 C	14AWG, 1.6mm See Note 1	6AWG, 4.1mm See Note 1	13.3 in*lb, 1.5 N*m	15.9 in*lb, 1.8 N*m
91, 92	User Programable Alarm (Dry Contacts)	Copper	Class I	60 C	26AWG, 0.4mm See Note 1	10AWG, 2.5mm See Note 1	5.3 in*lb, 0.6 N*m	7.0 in*lb, 0.8 N*m
93, 94	Temp. Retransmit (4-20mA Sourcing)	Copper	Class II See Note 2	60 C	26AWG, 0.4mm See Note 1	10AWG, 2.5mm See Note 1	5.3 in*lb, 0.6 N*m	7.0 in*lb, 0.8 N*m
95, 96	RS-485 Modbus Communication	Copper	Class II See Note 2	60 C	26AWG, 0.4mm See Note 1	10AWG, 2.5mm See Note 1	5.3 in*lb, 0.6 N*m	7.0 in*lb, 0.8 N*m
97, 98	Thermocouple Input	TC Wire	Class II See Note 2	60 C	24AWG	14AWG Solid 16AWG Stranded	3.5 in*lb, 0.4 N*m	3.5 in*lb, 0.4 N*m
A1, A2	External Interlock (Option)	Copper	Class I	60 C	26AWG, 0.4mm See Note 1	14AWG, 1.6mm See Note 1	3.5 in*lb, 0.4 N*m	3.5 in*lb, 0.4 N*m

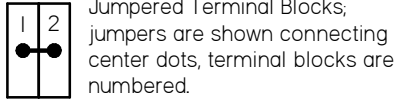
REV.	DATE	DRAWN BY	DESCRIPTION
A	03/14/16	B. KETTLER	FOR CONSTRUCTION
DRAWING TYPE			
WIRING SCHEMATIC			

DRAWING DESCRIPTION
FUSE AND FIELD WIRING SPECIFICATIONS

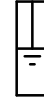
DRAWING NUMBER
E-IFPA-120-IP-35A
SHEET NUMBER
SHEET iii



## Wiring Schematic Typical Symbols and Standards



Jumpered Terminal Blocks; jumpers are shown connecting center dots, terminal blocks are numbered.



Grounded Terminal Block - grounded to DIN Rail and back panel



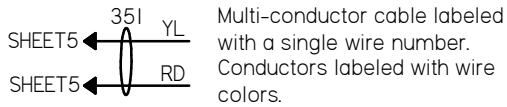
Fuse holder and fuse,



Customer field wiring connection, at terminal block, denoted by circles

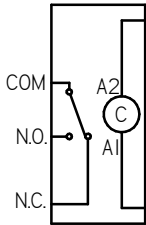


Customer Supplied Field Wiring

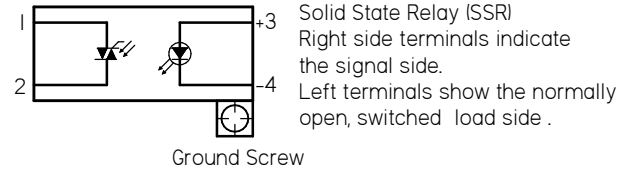


Multi-conductor cable labeled with a single wire number. Conductors labeled with wire colors.

--- Customer supplied, field wiring

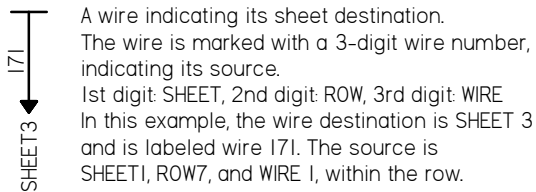


SPDT Mechanical Relay  
Relay Coil marked as "C"  
Switched contacts marked as Common, Normally Open (N.O.) and Normally Closed (N.C.).



Solid State Relay (SSR)  
Right side terminals indicate the signal side.  
Left terminals show the normally open, switched load side.

Ground Screw



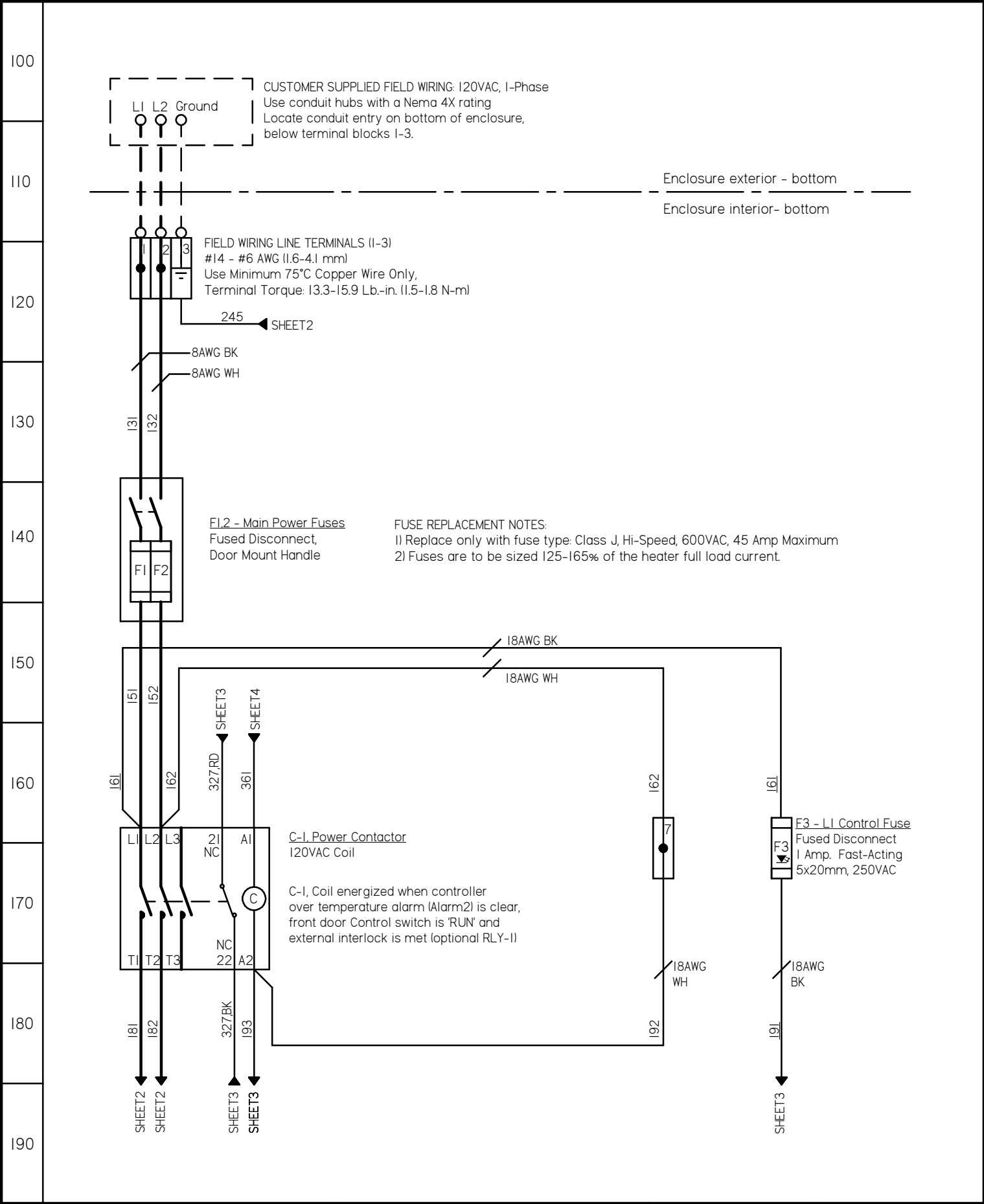
A wire indicating its sheet destination. The wire is marked with a 3-digit wire number, indicating its source.  
1st digit: SHEET, 2nd digit: ROW, 3rd digit: WIRE  
In this example, the wire destination is SHEET 3 and is labeled wire 171. The source is SHEET 1, ROW 7, and WIRE 1, within the row.



A wire indicating its sheet source. The wire is arriving at a terminal is marked with a 3-digit wire number, indicating its source.  
1st digit: SHEET, 2nd digit: ROW, 3rd digit: WIRE  
In this example, the wire source is SHEET 1 and is labeled wire 171. The source is SHEET 1, ROW 7, and WIRE 1, within the row.

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-120-IP-35A
DRAWING TYPE WIRING SCHEMATIC				SHEET NUMBER SHEET iv	SHIFT SHIFT-CONTROLS.COM



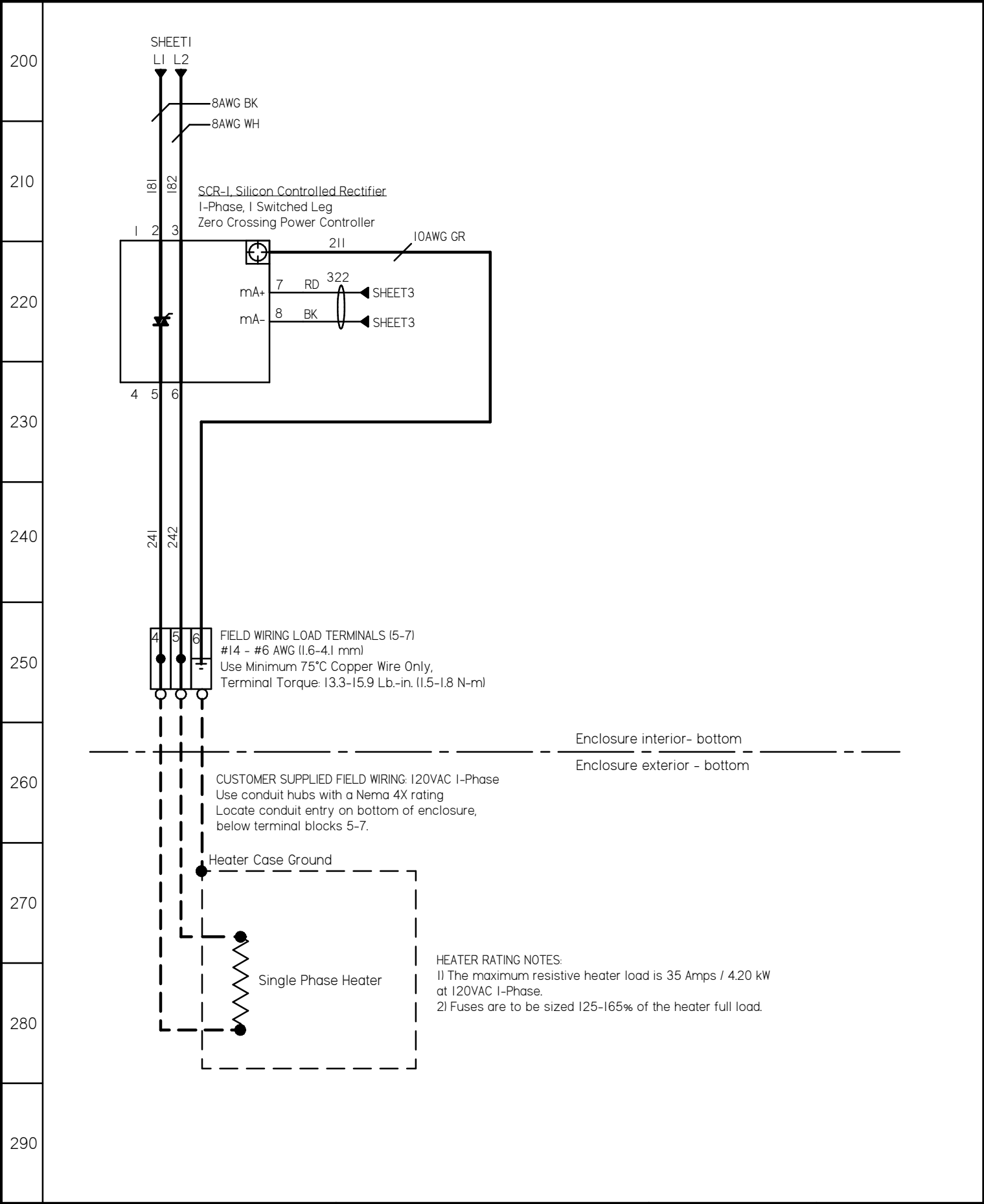
REV.	DATE	DRAWN BY	DESCRIPTION
A	03/14/16	B. KETTLER	FOR CONSTRUCTION

DRAWING TYPE: WIRING SCHEMATIC

DRAWING DESCRIPTION: FUSED DISCONNECT, CONTACTOR, AND CONTROL TRANSFORMER

DRAWING NUMBER: E-IFPA-120-IP-35A  
 SHEET NUMBER: SHEET 1 of 4





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

DRAWING TYPE: WIRING SCHEMATIC

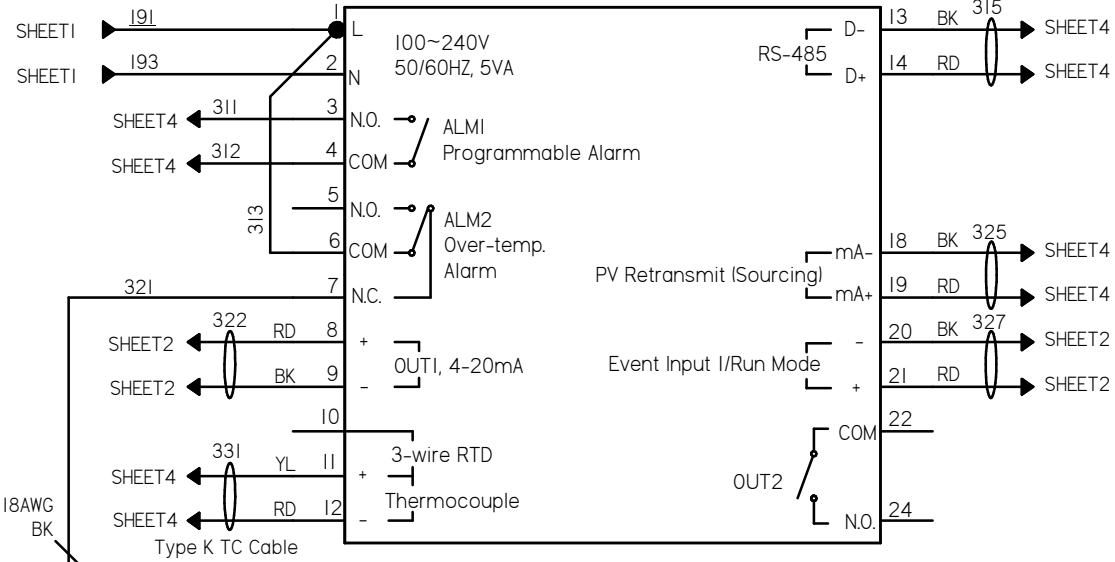
DRAWING DESCRIPTION: POWER CONTROLLER AND ENCLOSURE COOLING

DRAWING NUMBER: E-IFPA-120-IP-35A  
 SHEET NUMBER: SHEET 2 OF 4

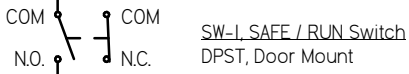


300  
310  
320  
330  
340  
350  
360  
370  
380  
390

TIC-I, PID Temperature Controller  
Door Mount



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



360  
SHEET4

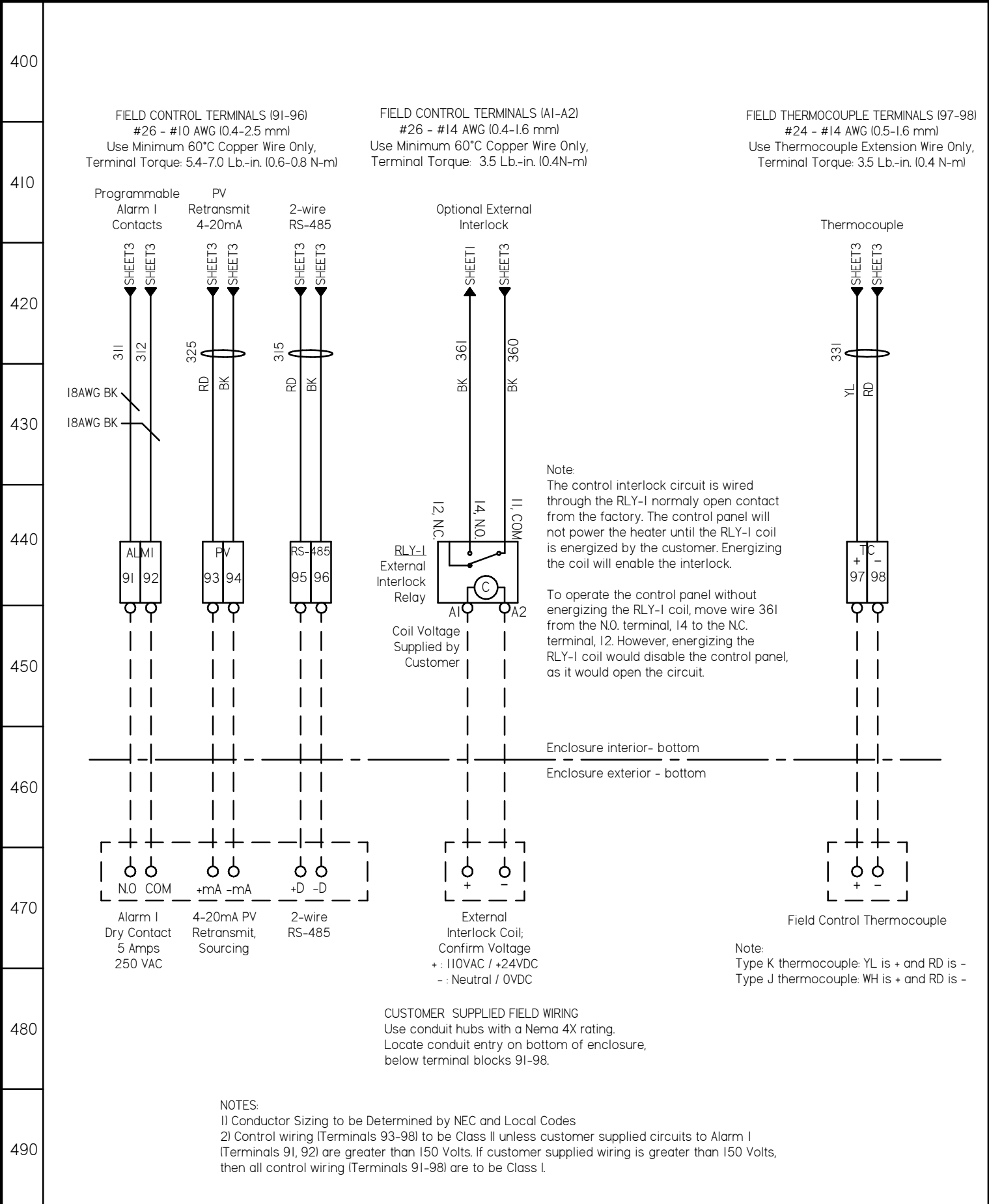
REV.	DATE	DRAWN BY	DESCRIPTION
A	03/14/16	B. KETTLER	FOR CONSTRUCTION

DRAWING TYPE: WIRING SCHEMATIC

DRAWING DESCRIPTION
TEMPERATURE CONTROLLER

DRAWING NUMBER
E-IFPA-120-IP-35A
SHEET NUMBER
SHEET 3 OF 4





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 CONTROL TERMINALS (A1-A2)  
 #26 - #14 AWG (0.4-1.6 mm)  
 Use Minimum 60°C Copper Wire Only,  
 Terminal Torque: 3.5 Lb.-in. (0.4N-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:  
 The control interlock circuit is wired through the RLY-I normally open contact from the factory. The control panel will not power the heater until the RLY-I coil is energized by the customer. Energizing the coil will enable the interlock.

To operate the control panel without energizing the RLY-I coil, move wire 361 from the N.O. terminal, 14 to the N.C. terminal, 12. However, energizing the RLY-I coil would disable the control panel, as it would open the circuit.

Enclosure interior- bottom  
 Enclosure exterior - bottom

CUSTOMER SUPPLIED FIELD WIRING  
 Use conduit hubs with a Nema 4X 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) 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	DRAWING DESCRIPTION	DRAWING NUMBER	SHEET NUMBER	SHIFT SHIFT-CONTROLS.COM
A	03/14/16	B. KETTLER	FOR CONSTRUCTION				
DRAWING TYPE				CONTROL FIELD CONNECTIONS	E-IFPA-120-IP-35A		SHEET 4 OF 4
WIRING SCHEMATIC					SHEET NUMBER		