

Instructions for Field Retrofit of a Model 98A Digital Temperature Controller in place of a Model 85 Temperature Controller

Instruction Bulletin
24806-003-01 Rev 0
July 2013



Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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

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

NOTICE
NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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INTRODUCTION

The following is a set of instructions for retrofitting a Model 98A Digital Temperature controller in place of an existing Model 85 Temperature controller.

This instruction bulletin is divided into the following sections:

- 1- Safety Precautions
- 2- Parts included in retrofit kit
- 3- Removal of existing Model 85 controller
- 4- Transformer Center Panel modifications
- 5- Model 98A Digital Temperature Controller and Thermocouple installation
- 6- Completing the retrofit installation
- 7- Reference Drawings

While a great effort has been done to assure that this instruction bulletin is accurate and provides enough detail to assure a problem free retrofit installation, all retrofit installations are different and therefore the finished installation may vary from the photographs shown.

SECTION 1 SAFETY PRECAUTIONS:

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off power before installing, removing, or working on this equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Ensure all personnel, tools, controller wiring, and other work material or equipment are cleared from the transformer and the control box before turning ON power to the controller.
- Before applying power, make sure that all personnel and equipment are clear of the blowers or fans.
- Replace all devices, doors, and covers before turning on power to this equipment.

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

Read and understand this entire instruction bulletin as well as the instruction bulletin for the Model 98A Digital Temperature Controller for Medium Voltage Transformers and the instruction bulletin that was provided with the transformer before installing, operating or maintaining this equipment. (Refer to instruction bulletin #43500-054-34.)

Disconnect power and verify that the transformer is de-energized before installing this equipment. Do not rely on visual indications such as switch position or fuse removal for determining a de-energized condition. Always assume that a terminal is energized unless it has been checked with a properly rated meter to ensure that the terminal is de-energized and grounded.

SECTION 2 PARTS INCLUDED IN RETROFIT KIT:

The following parts are included in this retrofit kit. Please verify that you have all of the parts before beginning the retrofit procedure. If you are missing any of these items please contact a Schneider Electric Services at 1-888-778-2733.

- a. Qty-1 Model 98A Digital Temperature Controller pre-mounted and wired to mounting panel.
- b. Model 98A Digital Temperature Controller Fuses:
Qty-1 1 amp MDA-1
Qty-1 20 amp MDA-20
- c. Hardware Package including:
Qty-6 3/8-16 x 1-1/4" Bolts
Qty-6 3/8-16 Nuts
Qty-6 3/8 Split Ring Lock Washers
Qty-12 3/8 Flat Washers
2 Doz. Wire Tie's
Qty-4 1/4-20 x 1" Bolts
Qty-4 1/4-20 Nuts
Qty-4 1/4-20 Nuts
Qty-8 1/4 Flat Washers
Qty-4 Wire Clamps
- d. Qty-1 Glass Polyester Thermocouple Support Rod.
- e. Qty-60ft Thermocouple Wire.
- f. Qty-1 Model 98A Digital Temperature Controller Danger Label, p/n 43500-169-09
- g. Qty-6 Fan/Blower Danger Label, p/n 43500-169-02
- h. Model 98A Digital Temperature Controller Instruction Bulletin, p/n 43500-054-34

SECTION 3 REMOVAL OF EXISTING MODEL 85 CONTROLLER:

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off power before installing, removing, or working on this equipment.
- Always use a properly rated voltage sensing device to confirm power is off.

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

Remove the transformer enclosure front panels to gain access to the interior of the transformer. Note: The front and rear center panels of the transformer are not removable.

Remove the existing thermistor wiring from the transformer coils and cut all wire tie supports.

Disconnect all wiring from the rear on the Model 85 Controller (See Figure 1). Note the locations of the wires and the wire numbers. The new Model 98A Digital Temperature Controller wires will connect to these terminals.

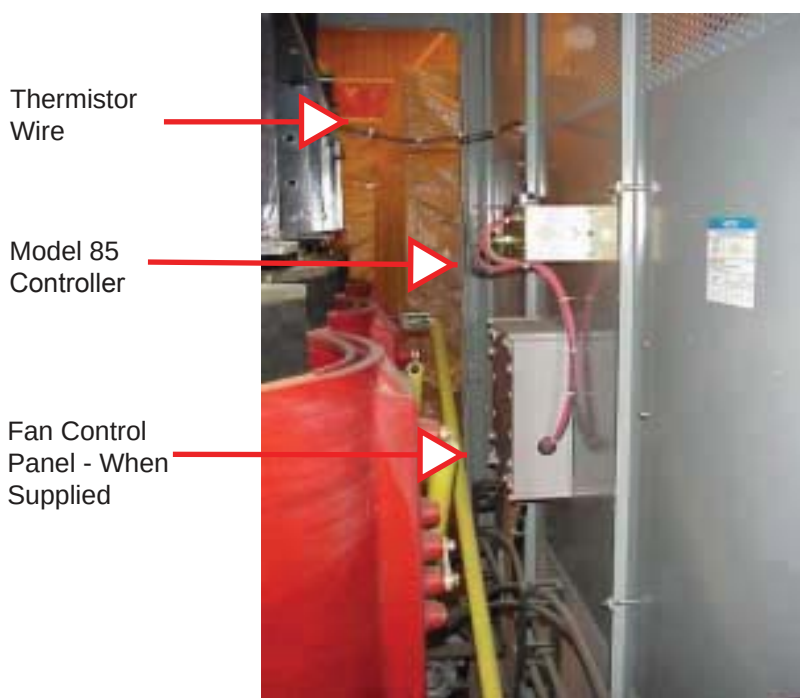
On units with a Fan Control Panel, disconnect all of the wiring coming from the Model 85 Controller connected to the panel. Note the locations of the wires that you are removing. The new Model 98A Digital Temperature Controller will connect to the same terminals.

Remove the Model 85 Controller from its chassis and unbolt the chassis from the center panel. Remove any remaining wiring and thermistor wire supports.

SECTION 3

REMOVAL OF EXISTING MODEL 85 CONTROLLER: (cont.)

Figure 1: Typical Model 85 Controller wiring.



SECTION 4

TRANSFORMER CENTER PANEL MODIFICATIONS:

⚠ CAUTION

PANEL MODIFICATION HAZARD

Before cutting the center panel verify that there are no wires, cables or other obstructions within the new cutout area.

Failure to follow these instructions will result in equipment damage.

Remove any exterior unit nameplates that are within the cutout or mounting panel area and save for later reinstallation. Refer to drawing 24806-007-01 located in Section 7 of this bulletin for the cutout size and mounting hole locations.

Before cutting the new opening be sure that there is adequate room for the new mounting panel to mount flush with the transformer center panel. Adjust the cutout location as necessary.

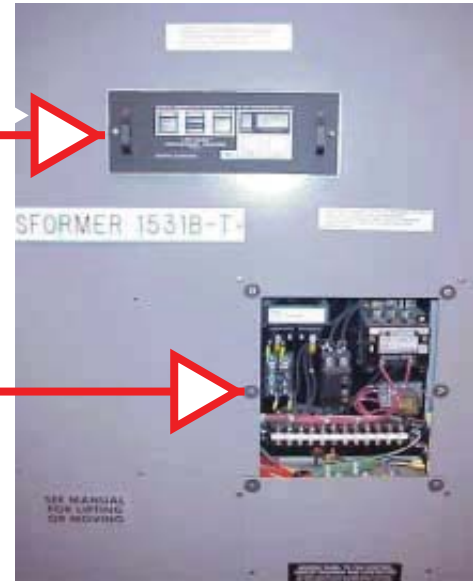
Take all necessary precautions to assure that no metal fillings fall into the transformer coils. Smooth any rough edges of the cutout before installing the new controller.

SECTION 4 TRANSFORMER CENTER PANEL MODIFICATIONS: (cont.)

Figure 2: Typical Existing Model 85 Controller Installation

New cutout for
Model 98A
Controller Asm.

Fan Control
Panel – When
Supplied



SECTION 5 MODEL 98A DIGITAL TEMPERATURE CONTROLLER AND THERMOCOUPLE INSTALLATION :

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off power before installing, removing, or working on this equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Assure proper electrical clearance of a minimum of 6 inches through air for medium voltage coils and leads and a minimum of 1 inch through air for low voltage coils and leads.
- Assure the sensor tubes and the thermocouples are installed in the low voltage coils only.
- Replace all devices, doors, and covers before turning on power to this equipment.

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

After cutting the opening (refer to drawing 24806-007-01) in the transformer center panel, mount the new Model 98A Digital Temperature Controller using the provided 3/8" hardware. On outdoor installations, seal the edges of the new controller panel with clear silicone.

On units with a Fan Control Panel, route the pig-tailed wires from the bottom of the Model 98A Controller into the panel through the hole previously used by the old controller. (Refer to drawing 24806-001-5X)

On units without the Fan Control Panel, connect the wires from the new Model 98A Controller to the existing terminals that the old Model 85 Controller were connected.

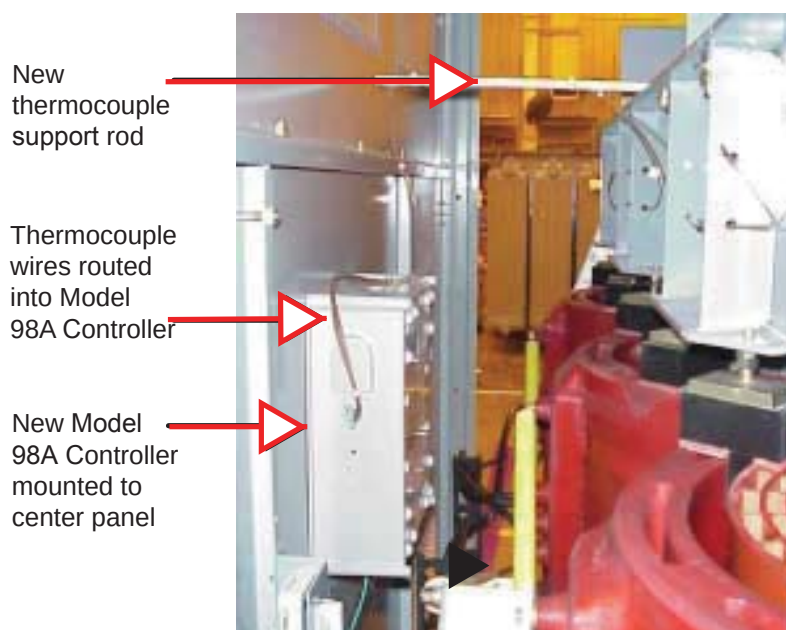
Refer to wiring diagram 24806-004-001 located in the Section 7 along with the previous controller wiring diagram that was furnished with the transformer for the wiring connections.

Install the new thermocouple support rod to the top core clamp as shown in figure 3 using the 3/8" hardware provided. The support rod does not have to be centered. If the rod is too long it can be trimmed.

SECTION 5

MODEL 98A DIGITAL TEMPERATURE CONTROLLER AND THERMOCOUPLE INSTALLATION: (cont.)

Figure 3: Controller Installation and Typical Thermocouple Wire Routing



Next make the three thermocouples. Begin by cutting approximately 20ft (6m) from the coiled thermocouple wire that is provided in the kit. Strip 1.0" (25mm) from one end of the thermocouple wire. (Note: There is an outer covering of insulation and each of the bimetal wires is also insulated. This insulation must be removed as well). After completely stripping the wires, twist the ends together tightly (see Figure 4C). Repeat for each thermocouple. Do not solder the connection.

Starting on one phase of the transformer insert the stripped end of the thermocouple wire into the insulating tube or thermowell hole until it stops (approx. 4" (100mm) for the tube and 2" (50mm) for the hole) (see Figure 4A and 4B).

Route the wire up to the transformer top core clamp and toward the thermocouple support rod. The thermocouple wire must be firmly supported to assure proper electrical clearance of a minimum of 6 inches through air for medium voltage coils and leads and a minimum of 1 inch through air for low voltage coils and leads. To keep the wires secure route or weave them through any available holes in the core clamp flange or gussets. The wire should not be coiled or allowed to sag. Route the wire under the thermocouple support rod and through the first hole closest to the transformer clamp. The wire is then routed along the top of the rod and then down through the second hole at the end of the rod and finally into the right side of the Model 98A Controller (see Figure 3). Fasten the wire to the thermocouple support rod with wire ties.

Once all three thermocouple wires have been run into the Model 98A Controller connect the thermocouple wires to the controller as shown in Figure 5. Leave enough slack in the wires to allow full opening of the Model 98A Controller. Support the wires using the provided thermocouple clamp. See the wiring diagram 24806-004-01 in Section 7 of this bulletin for the wiring connections.

After completing the thermocouple wire connections seal the thermowell holes in the coils with clear silicone.

SECTION 5 MODEL 98A DIGITAL TEMPERATURE CONTROLLER AND THERMOCOUPLE INSTALLATION: (cont.)

Figure 4A: Sensor Well

Temperature Sensor tube well located in the LV coils. Typical for all LV coils. Located adjacent to the HV connections of the transformer. (Dry type coil)



Figure 4B: Thermowell Hole



Temperature Sensor tube well located in the LV coil. Typical for all LV coils. Located adjacent to the HV connections of the transformer. (Cast type coil)

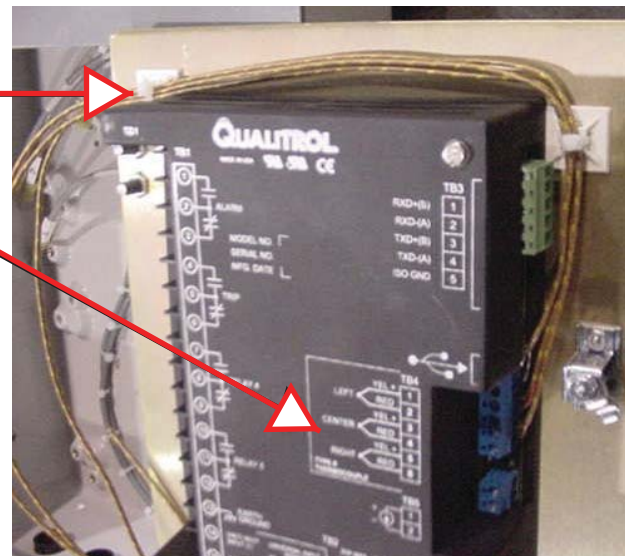
Figure 4C: Completed Thermocouple



Figure 5: Thermocouple Connections

Thermocouple clamp

Thermocouple connections



SECTION 6

COMPLETING THE RETROFIT INSTALLATION:

Apply the Model 98A Controller Danger label, p/n 43500-169-09 next to the Model 98A Controller. The label can be applied above or below or to the right or left of the controller (see Figure 6).

Apply the Fan/Blower Danger label, p/n 43500-169-02, to the bottom core clamp near the fans or blowers. Apply three labels on the front and the remaining three labels to the back (see Figure 7).

FUSING:

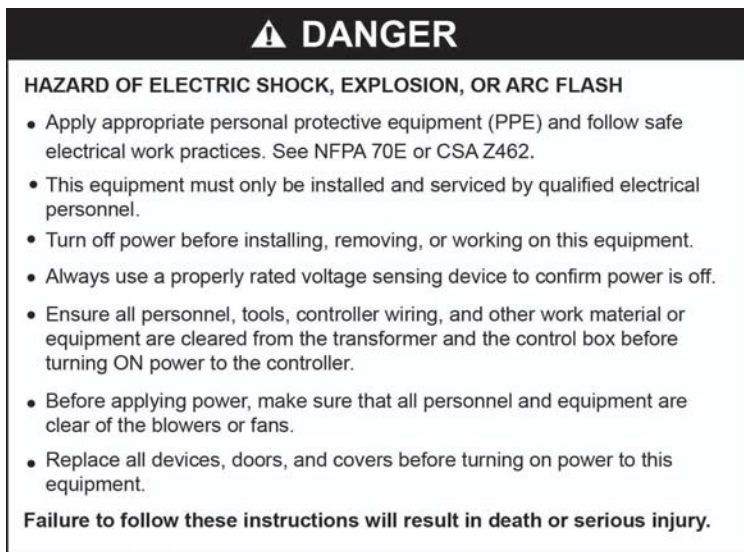
Two fuses are provided for the Model 98A Controller, a 1 amp and a 20 amp. If the Model 98A Controller is wired to the Fan Control Panel then install the 1 amp fuse in the rear of the Model 98A Controller in the 'F2' fuse location. If the Model 98A Controller is directly controlling the fans/blowers, install the 20 amp fuse in the 'F2' fuse location.

NOTE: This 20 amp fuse may not provide adequate protection for smaller loads. If a smaller fuse is required, it is the installers responsibility to correctly size the smaller fuse based on all applicable National Electrical Code rules and the fan/blower power requirements.

Refer to the Model 98A Digital Temperature Controller Instruction Bulletin for Power Logic Monitoring connections and MODBUS protocols.

Before energizing the Model 98A Controller for the first time, please review the controller operation procedure in the Model 98A Digital Temperature Controller Instruction Bulletin, p/n 43500-054-34. Also refer to the transformer instruction manual that came with the transformer for any startup testing that is required before re-energizing the transformer.

Figure 6: Model 98A Controller Label Installation



Danger Label
43500-169-09

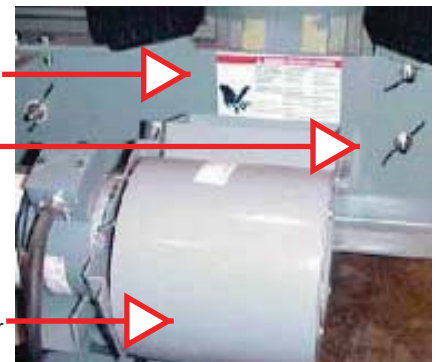


Figure 7: Fan/Blower Label Installation

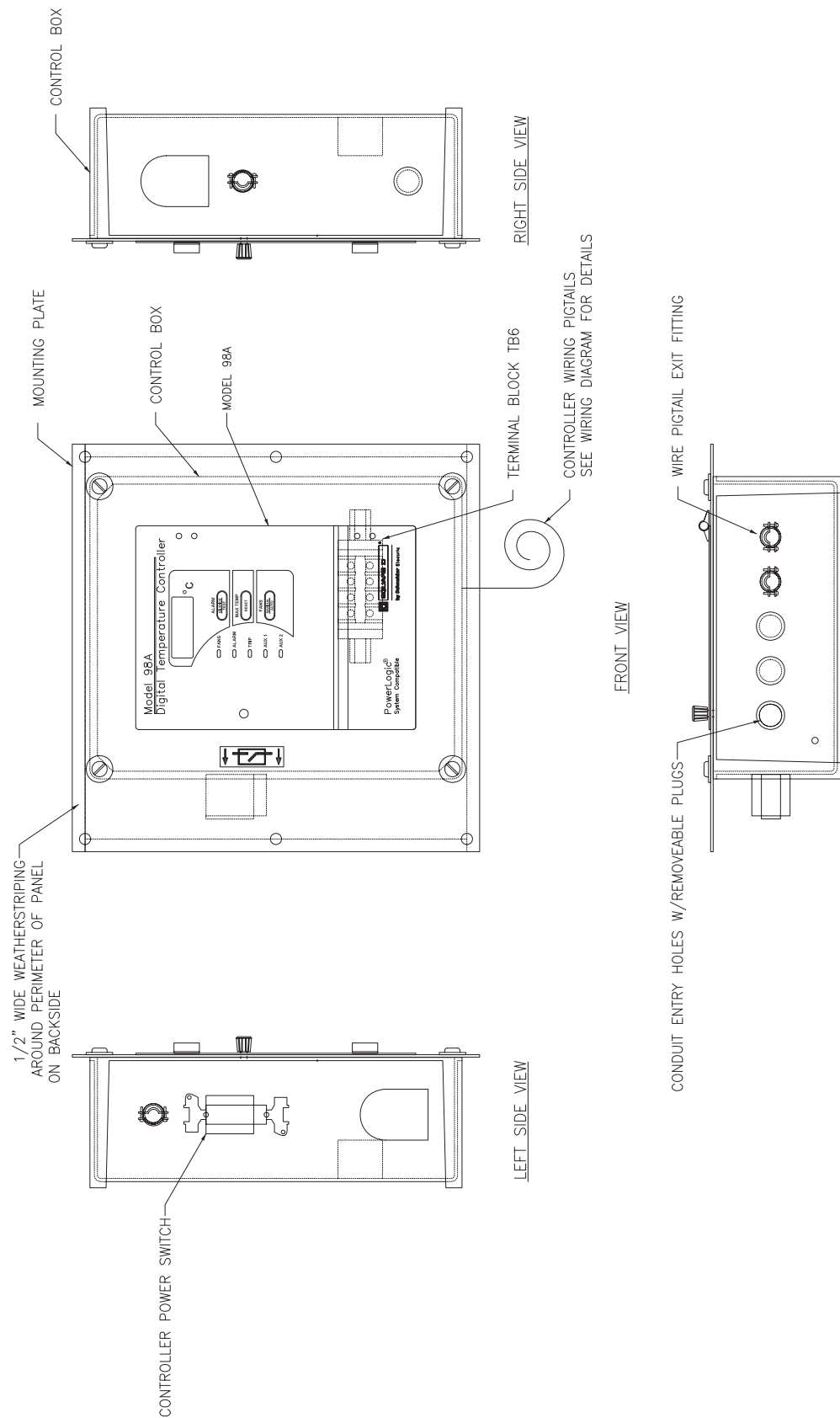
Danger Label
43500-169-02

Bottom Core
Clamp

Typical Blower

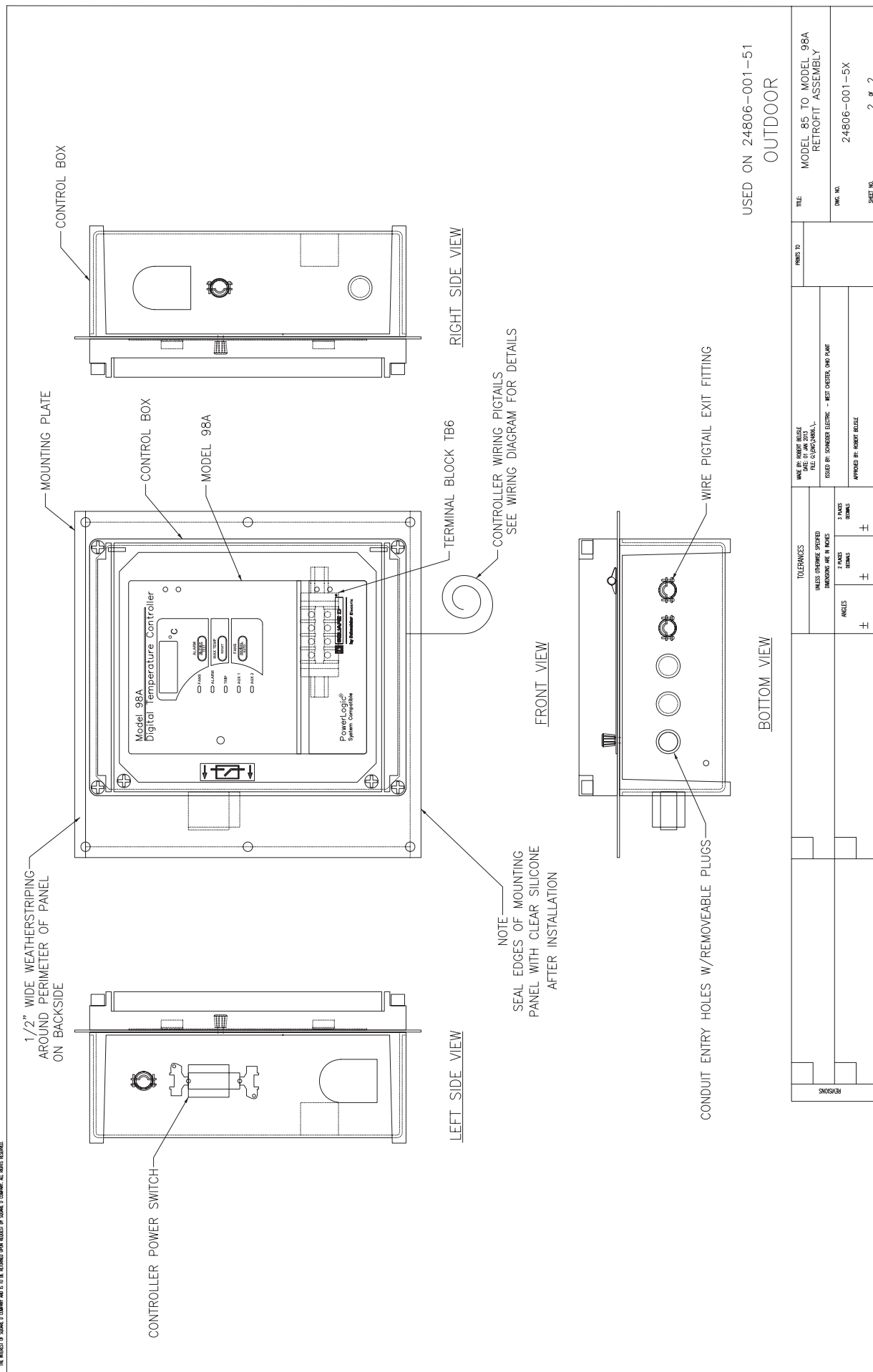


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USED ON 24806-001-50
INDOOR

[illegible]



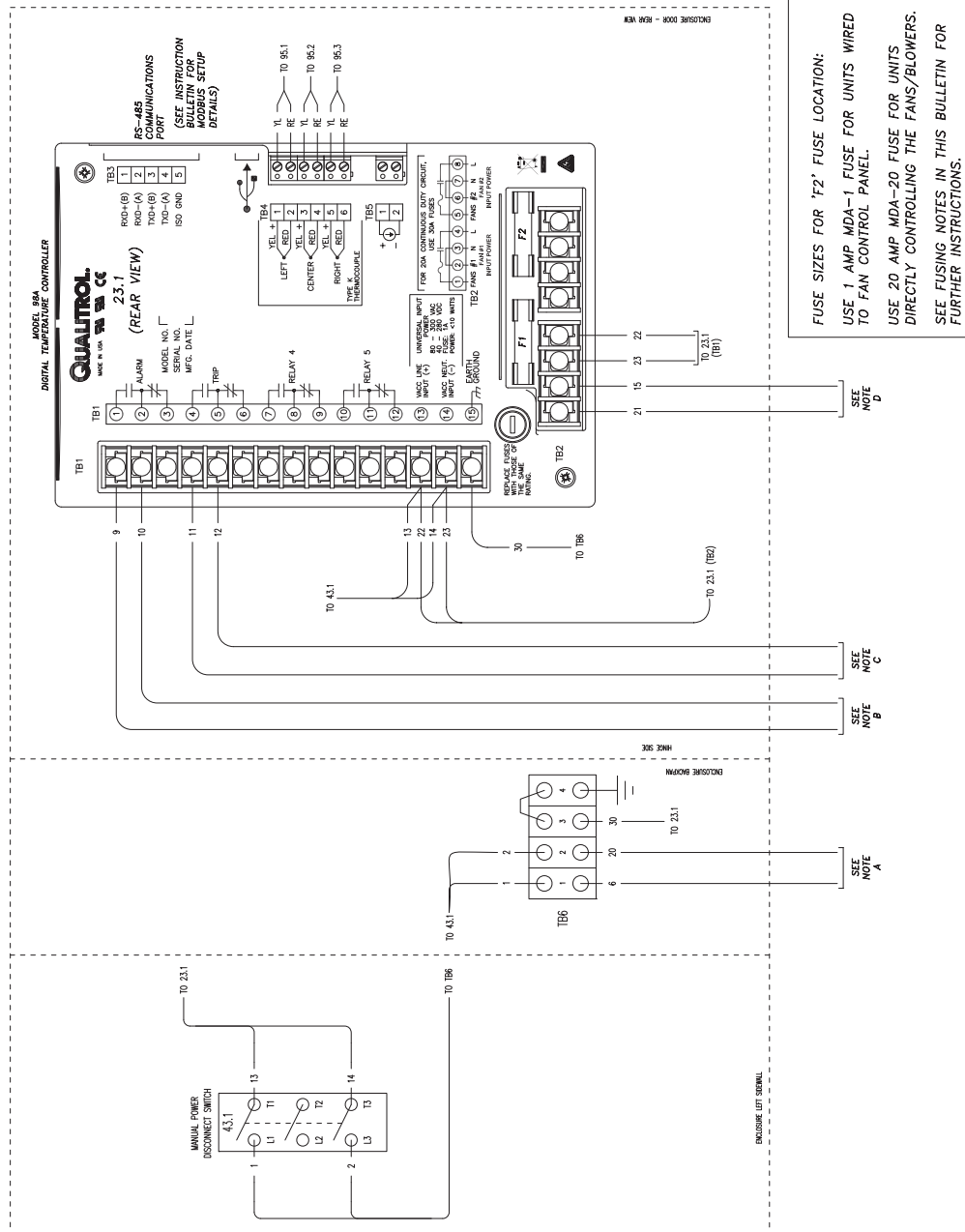


Figure 1 is a schematic diagram of a thermocouple circuit. It shows three identical thermocouple units connected in series. Each unit consists of a thermocouple (represented by a circle with 'YL' and 'RE' terminals) and a resistor (represented by a circle with '95.1', '95.2', and '95.3' inside). The units are labeled 'LEFT LV WINDING', 'CENTER LV WINDING', and 'RIGHT LV WINDING'. The output terminals are labeled 'TO 23 1'.

NOTES:

FOR UNITS WITH A FAN CONTROL PANEL

- A. 120VAC FROM CONTROL BOX. SEE EXISTING WIRING DIAGRAM FOR CONNECTION POINTS.
- B. HIGH TEMPERATURE ALARM. TO TERMINAL BLOCK IN CONTROL BOX, TERMINALS 7 AND 8.
- C. HIGH TEMPERATURE TRIP. TO TERMINAL BLOCK IN CONTROL BOX, TERMINALS 9 AND 10.
- D. COOLING EQUIPMENT CONTROL OUTPUT. TO TERMINAL BLOCK IN CONTROL BOX OR CONTACTOR. SEE EXISTING WIRING DIAGRAM FOR CONNECTION POINTS.

FOR UNITS WITHOUT A FAN CONTROL PANEL

- A. 120VAC POWER: SPlice WIRES TO EXISTING POWER WIRES. SEE EXISTING WIRING DIAGRAM FOR CONNECTIONS.
- B. HIGH TEMPERATURE ALARM: SPlice WIRES TO EXISTING HIGH TEMPERATURE ALARM WIRES. SEE EXISTING WIRING DIAGRAM FOR CONNECTIONS.
- C. HIGH TEMPERATURE TRIP: SPlice WIRES TO EXISTING HIGH TEMPERATURE TRIP WIRES. SEE EXISTING WIRING DIAGRAM FOR CONNECTIONS.
- D. COOLING EQUIPMENT CONTROL OUTPUT: SPlice WIRES TO EXISTING FAN CONTROL WIRES. SEE EXISTING WIRING DIAGRAM FOR CONNECTIONS.

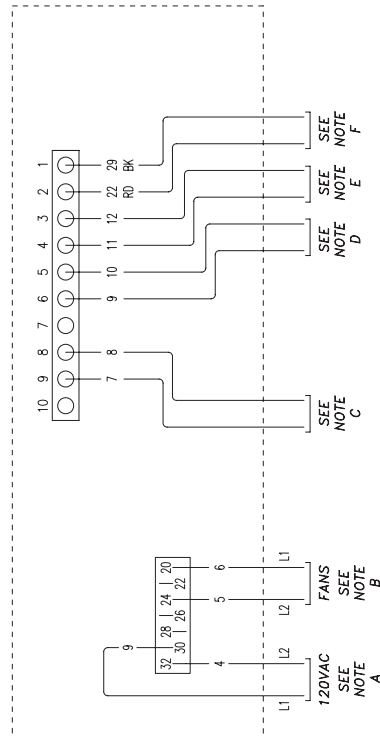
SEE THE MODEL 98A DIGITAL TEMPERATURE
CONTROLLER INSTRUCTION BULLETIN
43500-054-34) FOR COMPLETE INSTALLATION
AND OPERATING INSTRUCTIONS.

READ AND UNDERSTAND THIS MANUAL BEFORE
WIRING AND ENERGIZING CONTROLLER.

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SQUARE D MODEL 85-A CONTROLLER
(FACING BACK SIDE)



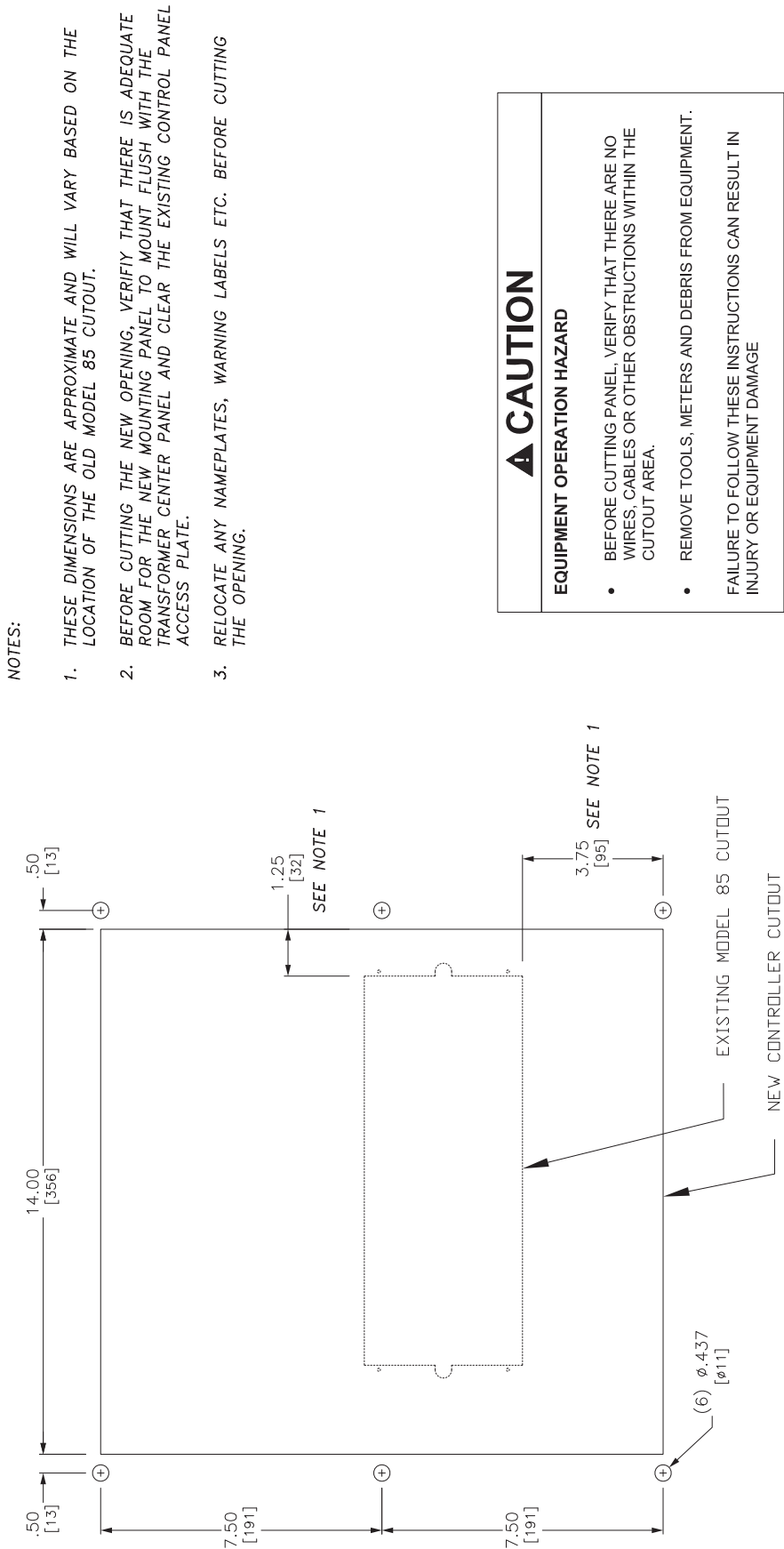
NOTES:

- A. 120VAC POWER: CONNECTS TO WIRES #6 AND #20 FROM THE MODEL 98A.
- B. COOLING EQUIPMENT CONTROL OUTPUT. CONNECT TO WIRES #15 AND #21 FROM THE MODEL 98A.
- C. FAN ALARM CONNECTIONS ARE NO LONGER USED.
- D. HIGH TEMPERATURE ALARM. CONNECT TO WIRES #9 AND #10 FROM THE MODEL 98A.
- E. HIGH TEMPERATURE TRIP. CONNECT TO WIRES #11 AND #12 FROM THE MODEL 98A.
- F. COMMUNICATION CABLE IS NO LONGER USED. SEE THE MODEL 98A INSTRUCTION BULLETIN (43500-054-34) FOR THE AVAILABLE COMMUNICATIONS OPTIONS.

TYPICAL MODEL 85 WIRING CONNECTIONS – FOR REFERENCE ONLY
THE ACTUAL CONNECTIONS MAY VARY FOR YOUR TRANSFORMER
REFER TO THE WIRING DIAGRAM THAT WAS PROVIDED
WITH THE TRANSFORMER

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THIS DOCUMENTARY DRAWING IS FOR INFORMATION ONLY. IT IS NOT TO BE USED FOR CONSTRUCTION. THE INFORMATION IS FOR INFORMATION ONLY. IT IS NOT TO BE USED FOR CONSTRUCTION. THE INFORMATION IS FOR INFORMATION ONLY. IT IS NOT TO BE USED FOR CONSTRUCTION.



NOTES:

1. THESE DIMENSIONS ARE APPROXIMATE AND WILL VARY BASED ON THE LOCATION OF THE OLD MODEL 85 CUTOUT.
2. BEFORE CUTTING THE NEW OPENING, VERIFY THAT THERE IS ADEQUATE ROOM FOR THE NEW MOUNTING PANEL TO MOUNT FLUSH WITH THE TRANSFORMER CENTER PANEL AND CLEAR THE EXISTING CONTROL PANEL ACCESS PLATE.
3. RELOCATE ANY NAMEPLATES, WARNING LABELS ETC. BEFORE CUTTING THE OPENING.

CAUTION

EQUIPMENT OPERATION HAZARD

- BEFORE CUTTING PANEL, VERIFY THAT THERE ARE NO WIRES, CABLES OR OTHER OBSTRUCTIONS WITHIN THE CUTOUT AREA.
 - REMOVE TOOLS, METERS AND DEBRIS FROM EQUIPMENT.
- FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR EQUIPMENT DAMAGE

REVISIONS		TOLERANCES		APPROVED BY		TITLE	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		MADE BY: ROBERT BELLE DATE: 05 MAY 2013 FILE: 24806-007-01		MODEL 85 TO MODEL 98A PANEL CUTOUT DETAIL	
		ANGLES		ISSUED BY: SCHEMATIC ELECTRIC - WEST CHESTER, OHIO		DWG. NO.	
		±		3 DIMENSIONS ± 0.06		24806-007-01	
				APPROVED BY: ROBERT BELLE		SHEET NO.	
						1 OF 1	

**Instructions for field retrofit of a Model 98A Digital
Temperature Controller in place of a Model 85
Temperature Controller**

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