Model 98A Digital Temperature Controller
For Medium Voltage Transformers
Class 7300, 7400

ENGLISH

Instruction Bulletin

43500-054-34R1
11/2011

Retain for future use.

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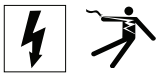
Hazard Categories and Special Symbols

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 an electrical hazard exists that 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.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.

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 Model 98A digital temperature controller can continuously monitor up to three Type K thermocouples in the windings of a dry type transformer. Based on winding temperatures, the controller has the capability to perform the following functions.

- The controller can display the current winding temperature of each phase. It also stores and displays the highest phase temperature, identifying which phase caused that high temperature.
- The controller can operate relays that activate the fans or blowers, sound the high temperature alarm, or actuate a high temperature trip. The controller compares the highest of the three phase temperatures to temperature set points that are stored in the controller's memory. These set points can be reviewed from the controller.
- The default state of the Alarm relay is normally energized so that the alarm sounds upon power failure (fail-safe). The default state of all other relays is normally de-energized (non-fail-safe).
- An internal audible device (buzzer) sounds when the alarm is ON. The audible device can be silenced using the Front Panel Silence button without changing the state of the Alarm relay.
- Two auxiliary relays with non-energized default states are available.
- A Fan Exerciser circuit turns the fans ON for one minute every seven days.
- The controller can interface as part of a complete PowerLogic™ power monitoring and control system manufactured by Schneider Electric. The controller can transfer real-time information to the PowerLogic system about the winding temperatures, status of the relays, and the temperature set points contained within the controller's memory. Once in the PowerLogic system, the information can be used in tables, graphs, and reports.
- The controller can be tested to check its operation at any time. However, the controller continuously performs internal checks and will display error codes if a problem with its operation is detected.

Table 1 shows the outputs from the controller. For details about the functionality of the controller, see "Operation" on page 13.

Table 1: Controller Outputs

Data	Reading	Action
Current Temperature	Left Phase	Displays corresponding phase temperature on the LCD..
	Center Phase	
	Right Phase	
	Maximum Stored	Displays corresponding maximum phase temperature on the LCD..
Relay Set Points and Status	Fan	Activates fans or blowers and lights up the fan LED.
	Alarm	Sounds the alarm buzzer and lights up the alarm LED.
	Trip	Actuates a relay and lights up the trip LED.
	Auxiliary 1	Actuates a relay and lights up the AUX1 LED.
	Auxiliary 2	Actuates a relay and lights up the AUX2 LED.

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NOTE: This instruction bulletin is not an application guide for the Model 98A controller or a substitute for adequate training in safe working procedures for this and related electrical equipment. Installation of this electrical equipment may require special licenses or training. Consult applicable national, industry, and local codes for specific requirements that may apply.

The successful operation of this device depends on various factors such as installation, service conditions, and maintenance. Unless designed for other specific applications, this device should be installed on a transformer that is operating under the conditions specified in IEEE C57.12.01.

NOTE: If additional information is needed that is not covered by this instruction bulletin, contact your local Schneider Electric representative.

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.
- Read and understand this entire instruction bulletin before operating or maintaining the Model 98A Digital Temperature Controller. Also read and understand the bulletin that ships with the transformer before installing, operating, or maintaining a dry type transformer. Follow all applicable local and national codes.
- The controller is designed to be operated and maintained while the transformer is energized. However, many parts of the transformer operate at high voltages. DO NOT TOUCH any transformer parts. Use only electrically insulated tools when working around electrical equipment.
- Disconnect all power and verify the transformer is de-energized before servicing the transformer. Operation of a primary protective device may be evidence of a faulted transformer. Do not re-energize the transformer until the cause of operation of the primary protective device is found and corrected.
- 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 is checked with a properly rated meter to ensure the terminal is de-energized and grounded.

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

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Installation

The Model 98A controller is installed on the transformer at the factory when the transformer is ordered with a forced air cooling package, with provisions for future air cooling (package without fans), or with provisions for transformer monitoring only.

NOTE: Any disassembly and reassembly of the enclosure or any other part of the transformer will be the sole responsibility of the owner and may void the warranty. Square D Services is available to ensure a factory-authorized installation of the controller.

The Model 98A controller is factory installed in a control box that allows access to the controller without de-energizing the transformer. Do not energize the transformer if the box has been tampered with or removed.

The control box provides additional user safety and shields the controller from free flowing air currents, such as those caused when the fans turn on. Moving air could cause the controller to report incorrect readings.

If the controller has been purchased separately and has not been factory installed, contact Square D Services for recommended installation instructions.

Connections

The type of connection required depends on the use of the controller.

- **Power connections**—If the controller is factory installed without self-contained power, two power connections are required: one for control power and one for fan power. All other wiring is completed at the transformer manufacturing facility.
- **Remote monitoring connections**—If the controller is being used with a remote display and remote alarm, the controller must be wired for this use.
- **PowerLogic system connections**—If the controller is part of a PowerLogic power monitoring and control system, the controller must be connected to the PowerLogic system.

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⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Review “Safety Precautions” on page 6 before making any connections.
- 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.

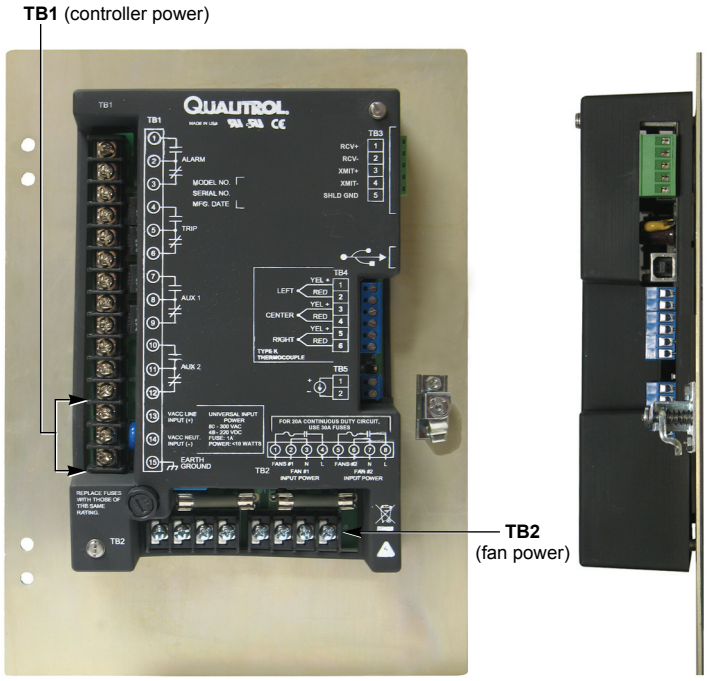
Failure to follow these instructions will result in death or serious injury.

Connecting to the Power Source

The Model 98A controller is equipped with a universal power supply (UPS) that can accept 80–300 Vac, 50/60 Hz or 48–220 Vdc to power the controller only. If the transformer is provided with a self-contained power supply, the power supply is factory-wired. When an external power supply is provided, see the wiring diagram provided with the transformer for power supply connections.

The power supply for the fans or blowers is factory-wired if the transformer is provided with a self-contained power supply. When an external power supply is provided, see the wiring diagram provided with the transformer for power supply connections.

Figure 1: Power Source Connections



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⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Before applying power, make sure all personnel and equipment are clear of the fans or blowers.

Failure to follow these instructions can result in injury or equipment damage.

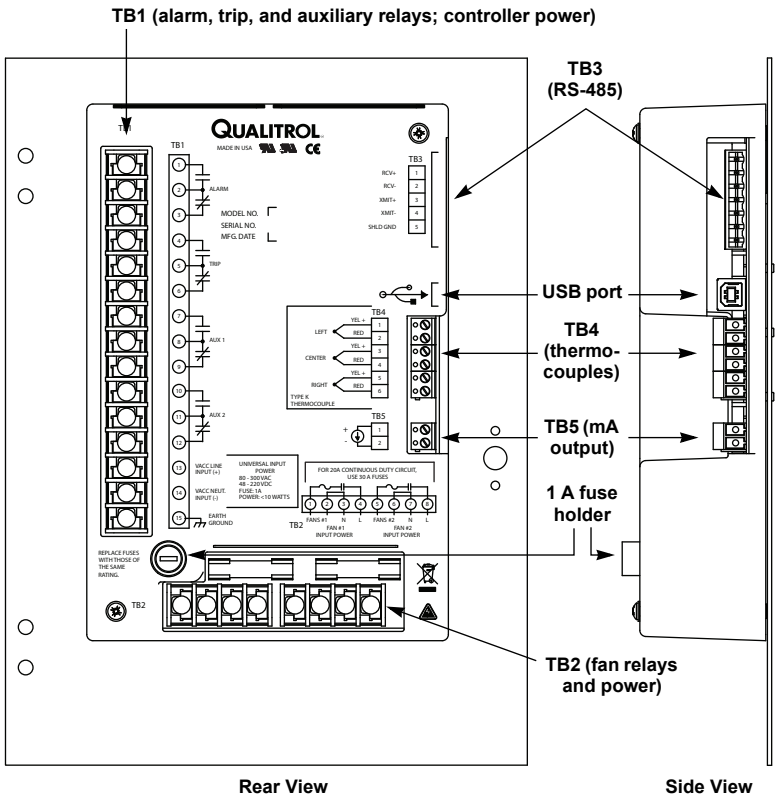
When the controller is powered on, the fans or blowers turn ON and then, after approximately one minute, OFF. This can be used as an initial test to ensure all fans or blowers are operating.

A 5 x 20 mm, 1 A, Type F fuse located in the round fuse holder on the back cover protects the controller. If the fuse blows, make sure the power input voltage connections have been properly made.

Do not replace and re-energize the controller until the situation is corrected. If it is determined that the controller is properly connected, ensure that all power is off, replace the fuse, and re-energize the controller. If the situation cannot be corrected, contact the Schneider Electric Customer Information Center at 1-888-778-2733, or send an e-mail to monroe-after-shipment@us.schneider-electric.com.

All other connections are pre-wired at the transformer facility. Table 2 on page 10 shows the pre-wired connections.

Figure 2: Wiring Terminals/Connectors



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⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

The transformer may not operate as designed if the fan, alarm, or trip settings are changed. Only an authorized Schneider Electric representative can make set point changes to the controller. If changes to the factory settings are needed, contact the Schneider Electric Customer Information Center at 1-888-778-2733, or send an e-mail to monroe-after-shipment@us.schneider-electric.com.

Failure to follow this instruction can result in injury or equipment damage.

Table 2: Factory Pre-wired Connections

Connection Type	Controller Terminal	Description	Connection Information
Thermocouples	TB4-1 to TB4-2	Thermocouple sensor #1 (left phase)	Type K thermocouples are standard. The yellow lead is connected to the positive terminal (1, 3, or 5) and the red lead is connected to the negative terminal (2, 4, or 6).
	TB4-3 to TB4-4	Thermocouple sensor #2 (center phase)	
	TB4-5 to TB4-6	Thermocouple sensor #3 (right phase)	
mA output	TB5-1, 2	Milliampere output current loop	Provides a current proportional to the present highest temperature. TB5-1 is the positive terminal.
Controller power	TB1-13, 14, 15	Universal power supply 80–300 Vac, 50/60 Hz or 48–220 Vdc	Required only if the transformer is not provided with a self-contained power supply.
Fan power	TB2-3, 4, 7, 8	Fan voltage	
Relay contacts	TB2-1, 2	Fan #1 controls the fans or blowers through a fuse.	Each fan circuit is protected by its own fuse and controlled by a separate relay with a SPST Form A contact.The contact is open when no power is applied to the unit. The alarm, trip, and auxiliary relay contacts are SPDT Form C. The alarm relay is normally energized and changes state when power is lost. The trip and auxiliary relays are normally de-energized and do not change state when power is lost.
	TB2-5, 6	Fan #2 controls the fans or blowers through a fuse. The Fan #2 circuit is electrically separate from the Fan #1 circuit.	
	TB1-1, 2, 3	Alarm—SPDT (Form C) contacts at TB1-1, 2, and 3 indicate an alarm condition. This relay is usually set to be energized in the normal state so that the loss of control power will cause an alarm.	
	TB1-4, 5, 6	Trip—SPDT (Form C) contacts at TB1-4, 5, and 6 indicate that the temperature being monitored has reached the trip state. This relay is usually set to be de-energized in the off state.	
	TB1-7, 8, 9	Auxiliary 1—SPDT (Form C) contacts at TB1-7, 8, and 9	
	TB1-10, 11, 12	Auxiliary 2—SPDT (Form C) contacts at TB1-10, 11, and 12	

Connecting to Remote Current Loop Output

The temperature controller provides a milliampere analog signal for use with remote meter or SCADA systems. Access this output on TB5 terminals 1 (+) and 2 (-). The output is preset at 4–20 mA.

USB Link

A USB data link is used by the factory to install the standard configuration. A USB plug is provided for this link.

NOTE: Connect a USB cable only when a configuration update is required. No permanent wires should be attached to this connector.

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Communications Wiring

The Model 98A controller is equipped with an RS-485 communication port. The RS-485 standard allows daisy chaining up to 32 devices on a single communications link.

A five-terminal connector on the side of the controller (Figure 3) provides a four-wire, RS-485 connection when wired as shown in Table 3. Connect terminals 1 and 3 and terminals 2 and 4 to create a 2-wire network.

The controller can be connected to the serial communication port of any Modbus™ master device, such as a PowerLogic EGX Ethernet gateway.

To daisy chain the Model 98A with other Modbus RTU-compatible devices, use a shielded communications cable containing one twisted pair for 2-wire networking or two twisted pairs for 4-wire networking. For example, use a Belden 9841 or equivalent cable for 2-wire networking or a Belden 9842 or equivalent cable for 4-wire networking. See Table 3 for the RS-485 terminal block connector designations.

The Model 98A controller is designed to interface with the PowerLogic power monitoring and control system from Schneider Electric using the Modbus RTU protocol. All communication setup functions that are normally performed at the controller can be performed remotely via a PC.

To set the parameters for the RS-485 connection, see “Communications Setup” on page 12.

Figure 3: RS-485 Terminal Connections

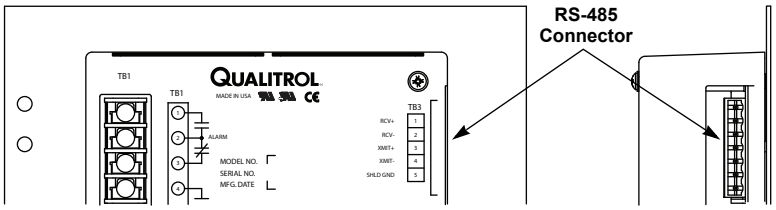

Table 3 shows the block connector designations for the RS-485 terminals.

Table 3: RS-485 Terminal Connector Designations

Terminal Number	Designation
1	Receive +
2	Receive –
3	Transmit +
4	Transmit –
5	Shield ground

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Communications Setup

The communications setup of the Model 98A controller can be changed from the front panel by the following procedure:

1. Press and hold all three buttons until the unit stops cycling through the readings (approximately ten seconds).

   The controller then displays the current baud rate. See Table 4.

Table 4: Baud Rates

Display	Bits per Second
12	1200
24	2400
48	4800
96	9600
192	19,200

   Pressing the SILENCE/TEST (top) button will step the display **up** through the baud rate choices shown in Table 4. Pressing the MANUAL/AUTO (bottom) button will step the display **down** through the choices.

2. When the desired baud rate is displayed, press the RESET (middle) button.

   The display then shows the current parity setting:

Table 5: Parity Settings

Display	Description
PE	Even parity (standard)
PO	Odd parity
P--	No parity

3. When the desired parity is displayed, press the RESET (middle) button.

   The display then shows the current stop-bit setting.

   If parity is even or odd, the display will show S1 and cannot be changed.

   If no parity has been selected, the number of stop bits can be set to 1 or 2 (S1 or S2). S1 is used if the unit is communicating through a modem; otherwise, S2 is standard.

4. When the desired stop bit is displayed, press the RESET (middle) button. The display shows the current address setting.

   Pressing the SILENCE/TEST (top) button will step the display **up** through the addresses. Pressing the MANUAL/AUTO (bottom) button will step the display **down** through the addresses.

   NOTE: Legal Modbus addresses are 1-255.

5. Press the RESET (middle) button to return the controller to normal operation and save the settings. If a button is not pressed for 30 seconds, the unit will automatically return to normal operation and the communications setup will be unchanged.

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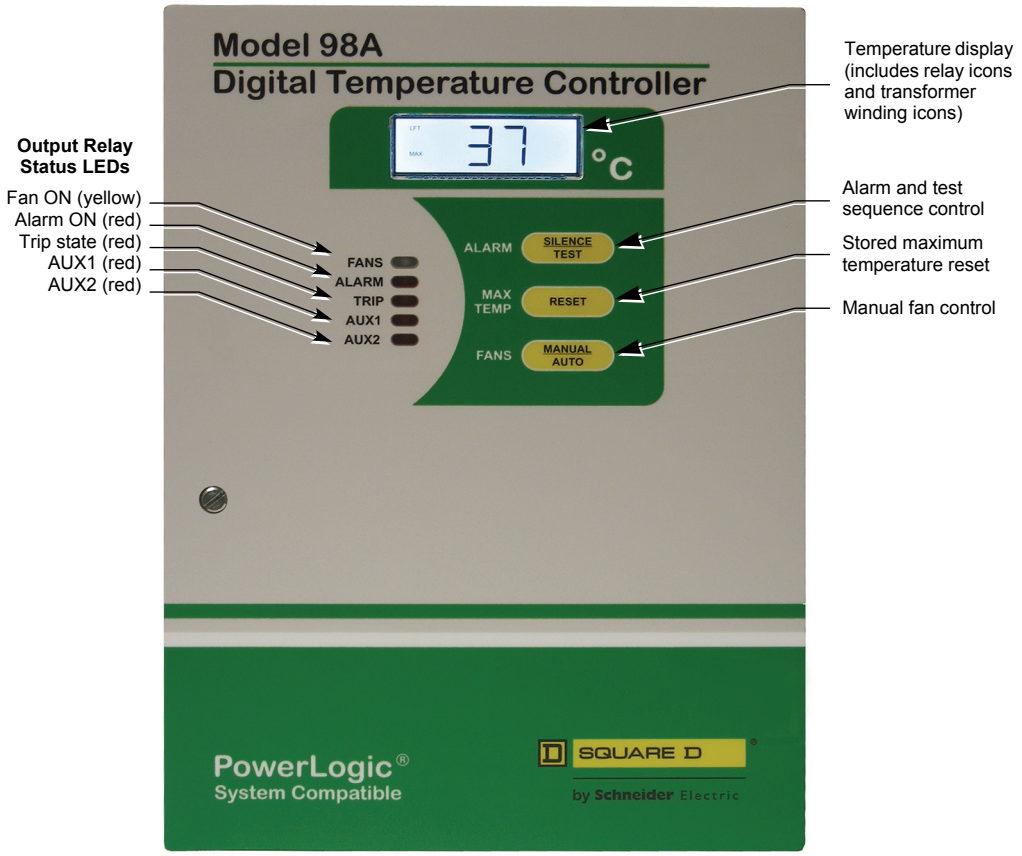
Operation

The front panel of the Model 98A controller displays transformer temperature data, communicates the state of the outputs, and allows review of the set points. It is also possible to control the fans and alarm, and reset the maximum temperature setting using the buttons on the front panel.

Output Relay Status LEDs

Figure 4: Front Panel Detail



Five LEDs indicate the status of the output relays:

- The yellow FANS LED illuminates when the fan relay is activated. This is triggered when the transformer temperature is above the temperature set point of the fan relay.
- The red ALARM LED indicates that the alarm relay is in the alarm state when the alarm temperature set point is exceeded.
- The red TRIP LED indicates that the trip relay is in the trip state when the maximum temperature set point is exceeded. The trip relay provides a contact that can be used to take the transformer off line.
- The red AUX1 LED indicates that the first auxiliary relay is in the active state.
- The red AUX2 LED indicates that the second auxiliary relay is in the active state.

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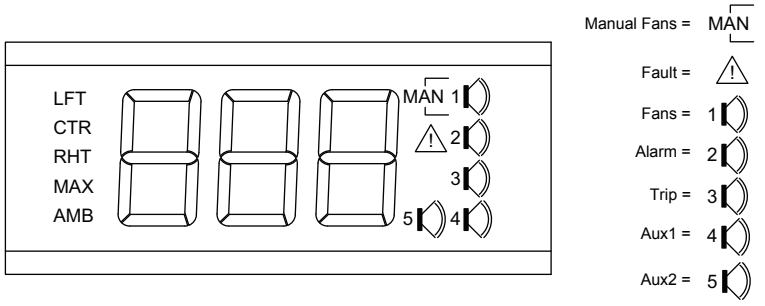
Temperature Display

The temperature display (Figure 5) consists of a three-digit, seven-segment, back-lit LCD display that can show temperatures from 0–250 °C and four individual icons that identify the temperature being displayed. The display shows each reading for approximately one second and then automatically steps to the next reading.

During normal operation, the display cycles through the three winding temperatures and the single highest temperature recorded. While the maximum stored temperature is displayed, both the MAX icon and the icon representing the winding that caused the maximum reading turn ON. The maximum temperature can be reset at any time (see “Resetting the Maximum Stored Temperature” on page 15). See “Thermocouples and the Temperature Display” on page 17 for technical details about the temperature readings.

Figure 5: Temperature Display



Manually Controlling the Fans or Blowers

Pressing the MANUAL/AUTO button manually activates the fan relay and turns the fans or blowers ON. The yellow FANS LED illuminates to show that the fans are ON and the Manual Fan icon (MAN) displays to show that the fan function is in manual mode.

When the fan function is in manual mode, pressing the MANUAL/AUTO button returns the function to automatic mode. If the temperature is below the set point that activates the fans, the fans will turn OFF and the yellow FANS LED and the Manual Fan icon (MAN) will no longer be displayed. However, if the temperature is above the set point, the Manual Fan icon (MAN) will no longer be displayed, but the fans or blowers and the FANS LED will remain ON until the temperature falls below the set point.

You can press the MANUAL/AUTO button any time to verify that the fan relay and the fans or blowers are operating properly.

Silencing the Alarm

Whenever an alarm is activated, an internal buzzer sounds and the ALARM LED illuminates. To silence the buzzer, press the SILENCE/TEST button. The buzzer remains off until a new alarm occurs. The ALARM LED remains illuminated until the temperature drops below the set point or the problem has been corrected. Silencing the buzzer does not eliminate the problem that caused the alarm. Promptly find and correct the situation that caused it.

If the buzzer sounds but the ALARM LED is not illuminated, check the 1 A fuse located in the round fuse holder on the back cover.

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Reviewing Set Points

When the alarm is not sounding, pressing the SILENCE/TEST button starts a test sequence to verify that the controller is operating properly and allows a review of the set points. The test sequence performs the following checks at two-second intervals:

1. Displays the FAN ON temperature set point and lights the FANS LED.
2. Displays the ALARM temperature set point and lights the ALARM LED.
3. Displays the TRIP temperature set point, and lights the TRIP LED.
4. Displays the AUX1 temperature set point and lights the AUX1 LED.
5. Displays the AUX2 temperature set point and lights the AUX2 LED.
6. Displays the ambient temperature inside the controller.
7. Displays 888 on the temperature display, turns on all icons on the display, turns on all relay status LEDs, and turns on the alarm.

Resetting the Maximum Stored Temperature

Press the maximum temperature RESET button to clear the memory of the maximum stored temperature. This causes the current highest winding temperature to become the stored maximum temperature.

Controller Error Codes

During normal operation, the controller is constantly checking itself for proper operation. If a problem is detected, the controller displays one of the error codes described in Table 6.

Table 6: Error Codes

Display	Reason	Description	Corrective Action
– – –	Failed thermocouple or reversed connection	Shows **– – –** on the display when that particular sensor temperature should be displayed. Shows which sensor is malfunctioning. The system activates the alarm, turns ON the fans, and continues to function using the remaining input channels. If the controller detects an open-circuited thermocouple, the alarm sounds and the faulty channel is displayed. A failed thermocouple does not cause a trip. The **– – –** display also indicates a reversed thermocouple connection when the thermocouple is 30 °C below the terminal block temperature.	1. Inspect the thermocouples for possible damage. If damaged, repair or replace. 2. Make sure the thermocouples are wired according to the wiring diagram on page 9.
E11	Failed A/D converter	Shows **E11** on all channels, turns ON the fan relay, and activates the alarm.	1. Disconnect power to the controller. 2. Remove the hinges and disconnect the wiring. 3. Contact your Schneider Electric representative to obtain a Returned Material Authorization, then return the controller to the Schneider Electric Medium Voltage Transformer Facility.
E22	Failed ambient temperature sensor	Shows **E22** on all channels, sets ambient temperature to 30 °C, activates the alarm, turns ON the fans, and continues to operate using a 30 °C ambient temperature.	
E33	Failed EEROM after initial start up	Shows **E33** on all channels, continues to operate, activates the alarm, and turns ON the fan relay.	
	Failed EEROM at power up	Shows **E33** on all channels, turns ON the fan relay, and activates the alarm.	
Blank	Failed display driver	Blank temperature, that is, nothing is shown on the digital display. The controller continues to operate, activates the alarm, and turns ON the fan relay.	

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Maintenance

Inspect the controller regularly during normal transformer inspection. The frequency of inspection depends on operating conditions. If the controller is installed in a Square D™ brand transformer that is operating in usual service conditions as defined in IEEE C57.12.01, an inspection every five years may be sufficient. However, for unusual locations where the air is contaminated with particles such as dust or chemical fumes, the transformer and controller should be inspected every three months or sooner. After the first few inspections, determine a more definite schedule based on the existing conditions. Perform the following procedures for maintenance.

NOTE: If any problem is found during maintenance, contact your local Schneider Electric representative.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Before performing this procedure, review “Safety Precautions” on page 6.
- Before servicing the controller, turn OFF power to the controller and fans.

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

Testing the Fans or Blowers

The controller has an automatic fan exerciser that turns the fans ON for a short time at preset intervals. However, during a scheduled inspection of the transformer, turn the blowers or fans ON to confirm that they are working properly. See “Manually Controlling the Fans or Blowers” on page 14.

Testing the Controller

Start the controller’s test sequence by pressing the SILENCE/TEST button while an alarm is not sounding. The temperature display shows the stored set points and the internal temperature of the controller. The controller also tests the digital LCD display, all the LEDs, and the alarm buzzer. For details, see “Reviewing Set Points” on page 15.

Specifications

For reference purposes, typical controller specifications are shown in Tables 7–11.

Table 7: Factory Set Points

Rated Average Transformer Temperature Rise [a]	Relay Set Points					
	Fans or Blowers		Alarm		Emergency Shutdown	
	ON	OFF	ON	OFF	Dry Type Transformers	Cast-Coil Transformers
80 °C	110 °C	100 °C	125 °C	123 °C	220 °C	185 °C
115 °C	145 °C	135 °C	160 °C	158 °C	220 °C	185 °C
150 °C	180 °C	170 °C	195 °C	193 °C	220 °C	—

[a] Based on NEMA and IEEE Standards of 30 °C average and 40 °C maximum ambient for any 24-hour period below 3,300 ft. (990 m) altitude.

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Thermocouples and the Temperature Display

Three Type K thermocouple sensors are factory-connected to TB4-1(+) and 2(-); TB4-3(+) and 4(-); and TB4-5(+) and 6(-). See Figure 2 on page 9.

NOTE: If replacement of a thermocouple is required, use only Type K thermocouples. Connect the YELLOW lead to a positive terminal (1, 3, or 5) and the RED lead to a negative terminal (2, 4, or 6).

The digital temperature displayed is always the total of ambient plus approximate hot-spot temperatures, not the average temperature rise. For example, a transformer is rated for a 150 °C average temperature rise when carrying the rated full load in a 20 °C ambient temperature. The thermocouple sensors are installed near the theoretical hot spot of the coils. NEMA and IEEE standards permit a 30 °C maximum differential between average and hot-spot temperatures.

Therefore, the digital display would indicate approximately 20 °C + 30 °C + 150 °C = 200 °C total. The alarm would operate at this point to warn that the transformer is approaching the maximum temperature limit of the insulation system.

Table 8: Performance Specifications

Performance Measurement		Specification		
Input Power		80–300 Vac, 50/60 Hz, < 10 W 48–220 Vdc, universal power supply, < 8 W		
Range		0–250 °C		
Display Resolution		1 °C increments		
Accuracy		±3 °C		
Memory Retention		40 years (with power OFF)		
Relay Ratings		**Volts**	**Resistive**	**Horsepower**
	Fans	120 Vac	30 A	1 Hp
		240 Vac	30 A	2 Hp
	Alarm and Trip	120 Vac	10 A	—
		240 Vac	8 A	—
Remote Output Current Loop		0–1 mA = into 10,000 Ω maximum load		
		0–10 mA = into 1,000 Ω maximum load		
		0–20 mA = into 500 Ω maximum load		
		4–20 mA = into 500 Ω maximum load		
		0–5 V		
Accuracy		±3 °C		

Table 9: Mechanical Specifications (Panel Mount Unit)

Mechanical Measurement	Specification
Front Panel	8 in. (203.2 mm) Wide x 11 in. (279.4 mm) High Graphic overlay is UV resistant for outdoor use.
Mounting Panel	Panel mount through 5.37 in. (136.4 mm) Wide x 7.97 in. (202.4 mm) High cutout.
Depth	2.22 in. (56.4 mm)
Weight	3 lbs. (1.4 kg)
Terminals	Screw terminal; maximum 12-gauge wire

Table 10: Approvals

Registered per UL standard 873.
Registered per Canadian standard C22.2 No. 24-93.
Declaration of Conformance CE.

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ENGLISH

Table 11: Model 98A Register List

Modbus Register No.	Description	Comments
Read Registers		
40001	Temperature left phase	Normal temp range is 0–255d in low byte. A value of 8000h indicates invalid data.
40002	Temperature center phase	
40003	Temperature right phase	
40004	ETM status	bit 0 = **1** = some other bit is 1 bit 1 = **1** = ON, fan state bit 2 = **1** = ON, alarm state bit 3 = **1** = ON, trip state bit 4 = **1** = ON, buzzer state bit 5 = **1** = ON, manual fan state bit 6 = **1** = ON, auxiliary relay 1 bit 7 = **1** = ON, auxiliary relay 2
40005	Maximum stored temperature	Normal temperature range is 0–255d in low byte.
40006	Phase with maximum stored temperature	bit 0 is always a **1** bit 1 = **1** indicates maximum stored temp was left phase bit 2 = **1** indicates maximum stored temp was center phase bit 3 = **1** indicates maximum stored temp was right phase
40007	Temperature at unit's terminal block	The low byte indicates temperature at the instrument terminal block in °C. Temperatures below zero will show as zero.
40008	Diagnostic status	bit 0 = **1** = some other bit is 1 bit 1 = **1** = failed A/D converter bit 3 = **1** = failed terminal block temperature sensor bit 4 = **1** = failed EEROM bit 5 = **1** = failed display driver
40009	Phase status	bit 0 = **1** = some other bit is 1 bit 1 = **1** = left phase disabled bit 2 = **1** = center phase disabled bit 3 = **1** = right phase disabled bit 4 = **1** = left phase has failed sensor bit 5 = **1** = center phase has failed sensor bit 6 = **1** = right phase has failed sensor bit 7 = **1** = fan exerciser is disabled
40010	Fan setpoint	Setpoint and deadband are 8-bit data in the low order byte.
40011	Alarm setpoint	
40012	Trip setpoint	
40013	Fan deadband	
40014	Alarm deadband	
40015	Trip deadband	
40016	Fan exercise interval	1–720 hours (up to 30 days)
40017	Fan exercise run time	1–120 minutes
40018	Time since last ran exercise	1–720 hours (up to 30 days)
40019	Firmware version	
48188	Device I.D.	15060d (15060–15069 reserved for ETM)
Write Registers		
40050	Set manual fan function ON/OFF	0001 turns the fan ON. 0000 sets the fan to AUTO.
40051	Reset maximum stored temperature	0001 sets the maximum temperature stored to the current maximum temperature.
40052	Reset unit	0001 resets the unit.
40053	Buzzer control	0001 turns the buzzer ON. 0000 turns the buzzer OFF.

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Nashville, TN 37217
1-888-778-2733
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43500-054-34R1 11/2011
Replaces 43500-054-34, 06/2011
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WM TAO & ASSOCIATES
CONSULTING ENGINEERS

Shop Drawing Submittal Review

Transmitted To: Cannon Design

Date: July 19, 2016

Attention: **stl-cac@cannondesign.com**

Contact Person / WTA Field Inspector: Patrick Garner

Project Name: Webster University-**ISB**

Reviewed by: Bill Shaw

Project No. WT 14127.01

[ ] UPS [ ] Courier [X] **Email**

Copies	No.	Description
1 PDF	264000E01	(Submittal No. 264000-001) Electrical Distribution

Submittal Review Comments

Circuit breaker size and position shall match panel schedules on sheets EO503, 504, 505, & 506.

c: **Kelvin Patel**
Kpatel@cannondesign.com

[ ] Furnish as Submitted [ ] Furnish as Noted

[ ] Rejected [X] ***Revise & Resubmit**

[ ] Reviewed [ ]

Corrections or comments made on shop drawings during this review do not relieve contractor from compliance with requirements of drawings and specifications. This check is only for review of general conformance with the design concept of project and general compliance with information given in contract documents. Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

7955 Manchester Road, Suite 125 • St. Louis, Missouri 63143-2711 • Phone: 314-884-7600 • Fax: 314-884-7601

If enclosures are not as noted, please notify us at once.

Sara Trout (314) 884-7645

WTASHOP - Webster ISB - 26 4000-001

From: STL-CAC <STL-CAC@CANNONDESIGN.COM>
To: 'Patrick Garner' <pgarner@wmtao.com>, WTASHOP <wtashop@wmtao.com>
Date: 7/5/2016 11:40 AM
Subject: Webster ISB - 26 4000-001
Cc: "Patel, Kelvin" <kpatel@CANNONDESIGN.COM>, "Grossman, Lynn" <lgrossman@C...
Attachments: 264000-001 Electrical Distribution.pdf

Attached for review.

Melissa Pirtle
Construction Admin
CANNONDESIGN
1100 Clark Ave
St. Louis, Missouri 63102
T 314.425.8797 • M
cannondesign.com

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

Joe Voypick
SUBMITTED BY

264000-001
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

264000
SPECIFICATION SECTION / PARAGRAPH

Guarantee Electrical
MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

◯ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ◯ Shop Drawings
- ◯ Samples (_____ copies)
- ◯ LEED Submittal
- ◯ Certification / Qualifications
- ◯ Record Documents
- ◉ Product Data
- ◯ Coordination Drawing
- ◯ Calculations
- ◯ Schedules
- ◯ O&M Manuals
- ◯ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ◯ Information Only ◯ Record

REMARKS OR DEVIATIONS

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

Joe Voypick
REVIEWED BY

7/5/16
DATE

To be completed by Reviewer

26 4000-001
CANNON DESIGN SUBMITTAL NUMBER

7/5/16
RECEIVED DATE

- ◯ A. No Exceptions Taken
  No further review of submittal is required.
- ◯ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ◯ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ◯ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ◯ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ◯ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ◯ See attached sheet(s) for additional comments

REVIEWED BY

DATE

77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0114

Paric Corporation

PROJECT: 15051-Webster University Interdisciplinary Science Building

DATE: 07/05/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: Electrical Distribution

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☑ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other: Product Data	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		264000-001	1		07/05/2016	Electrical Distribution	Submitted

NOTES:

CC: Paric Corporation, Kathy Bathe

Project Coordinator: Paric Corporation, Kathy Bathe

Signed: _____
Devin Gates

GUARANTEE
ELECTRICAL CONSTRUCTION

3415 Bent Avenue
St. Louis, MO 63116
Phone: (314) 772-5400
Fax: (314) 772-2526

Transmittal

To Paric Corporation

Date 7/1/16

Job Number 11317

Job Name Webster Univ. ISB Building

Attention Devin Gates

Transmittal Number 11317-005

We are sending you:

- X Attached
- ___ Under separate cover, the following:
- ___ Preliminary Drawings
- ___ Samples
- ___ Construction Drawings
- ___ Copy of Letter
- ___ Specifications
- ___ Other

Quantity	Drawing #	Date/Revision	Description
1			Submittal for Distribution - Spec Section
			26 40 00

These are transmitted as checked:

- X For Your Review & Comment
- X For Approval
- ___ For Your File
- ___ As Requested
- ___ Approved As Noted
- ___ Returned For Corrections
- ___ Approved As Submitted
- ___

Copy: Transmittal Enclosure

___ ___
___ ___
___ ___

Rick Branstetter

Signed: Rick Branstetter, Project Manager

Webster University ISB

Approval Drawing Package

Factory Order #: 37999262

06/13/2016

Distributor:
Graybar

Contractor/Installer:
Guarantee Electric / TD4

Consulting Engineer:
Wm Tao & Associates

Lou Feldhaus
Sales Representative

Jake Kaufman
Project Manager
North American Operating Division
(636) 329-2265
jacob.kaufman@schneider-electric.com

Life Is On Schneider Electric

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Schneider Electric

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