SQUARE D

Instruction Bulletin

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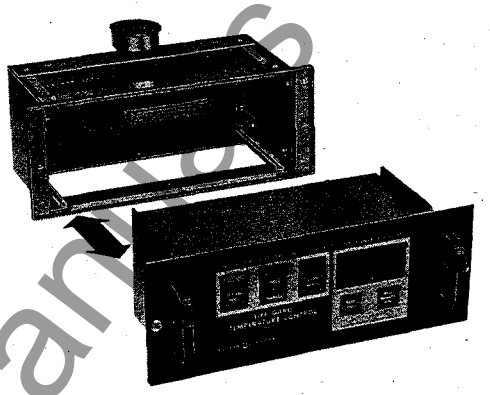
Monroe, NC, U.S.A.

Temperature Control System Model 85A[1]

INSTALLATION AND REMOVAL

After transformer is energized and tested, slide control into housing and turn screws a quarter turn to lock in place.



⚠ CAUTION

Testing transformer can damage control system. Remove Model 85 during any transformer tests to prevent the possibility of transient voltages damaging MOD 85 electronics. Failure to observe this precaution may damage Model 85 fan control.

DIGITAL DISPLAY

The digital LED display range is from 24°C to 255°C in 1°C increments. Characters are 0.56" high and clearly legible under all lighting conditions.

The Model 85A provides a choice of either:

A. Continuous scanning of the three sensors with a three second display period for each coil temperature and corresponding coil number.

B. Digital display of the temperature and number of the hottest coil only.

For each display mode, two additional options are available:

1. Continuous temperature display.
2. Display only when the "Read/Reset" or the "Read Memory Max" switch panels are pressed.

See Page 4, Display Configuration, to change operation.

For all display modes, the highest temperature reached by any coil in any previous interval will be displayed for three seconds when the "Read Memory Max" switch panel is pressed. This temperature will be cancelled and replaced by the immediate maximum temperature when both "Read/Reset" and "Read Memory Max" switch panels are pressed simultaneously. Thereafter, any succeeding higher temperature will be retained in memory for later recall.

[1]Model 85 was built prior to 1989 and Model 85A after 1989. The two are **NOT** interchangeable.

CONTROLS

System Test. Press to cycle control through self test.

Fan Mode. Press to switch fans on manual or auto.

Alarm Silence. Press to silence horn.

Read/Reset. Press to display temperature readings.

Read Memory Max. Press to display highest temperature since memory was last reset.

Press Read/Reset and Memory Max *together* to reset max temperature memory.

CONTROL MODE LIGHT PANELS

Three LED panels are provided to indicate control mode conditions. When the green panel is lighted, it indicates that the control module is energized. Similarly, the lighted yellow panel indicates that the fan circuit is energized. A lighted red panel indicates that one or more coils are above normal temperature (alarm horn will sound).

FAN MODE CONTROL AND INDICATORS

Selection of two modes of fan operation is provided by the "Fan Mode" switch panel. When this switch panel is depressed, the fan mode may be changed from manual to auto or vice versa. In the auto mode, the fans are turned on and off automatically at specified programmed temperature set points. In the manual mode, the fans operate continuously, totally independent of all temperature set points. The selected fan mode is indicated by one of the LEDs in the "Fan Mode" switch panel.

HIGH TEMPERATURE ALARM

If the operating temperature of the transformer coils increases to the programmed "alarm" set point, the red LED indiator and the alarm horn are activated, thus warning that the maximum designed temperature rise has occurred (80°C, 115°C or 150°C). This temperature is within the maximum temperature rating of the insulation system, and the transformer may continue to operate. The alarm horn may be silenced by briefly depressing the "Alarm Silence" switch panel. The red LED panel, however, will remain lighted until the transformer temperature decreases to the programmed "Alarm Off" set point. The LED panel is then de-energized and the silencer relay is automatically reset.

If a temperature of 185°C is detected[2] by one of the sensors, the control will initiate the emergency shutdown mode. Permanent insulation damage will occur above this maximum insulation system temperature. At this point, the Red LED panel flashes and three dashes replace the temperature numbers. Actual shutdown or other function can be accomplished by means of an optional, accessory relay.

FAN AND ALARM RELAYS

The Fans and High Temperature alarm are switched on and off by double-pole, double-throw relays located under the top cover of the control. Contacts are accessible on back of the control carriage. In normal operation these relays are energized. They de-energize to turn on fans or alarms. Therefore, if control power is lost but fan and/or alarm power is present, the fans and alarm will come on.

TROUBLE SHOOTING

- If the alarm is on but nothing on the control is lighted, check the FUSE. It is located under the top cover in the right rear corner. It is a 5x20mm 250V 2 amp (Radio Shack 270-1244).

*220°C for Dry-Type Transformers with 220°C insulation.

- If the fuse blows as soon as power is supplied, check the MOV (voltage surge protector) located beside the fuse. It could have absorbed an overvoltage and now be shorted as has happened when 230 volts has accidentally been supplied to the control. If that's the case, remove the bottom cover and look for vaporized circuit board traces, also.
- If the display shows dashes, press the READ button and see if they go away. Three dashes indicate an open thermistor in the coil number that is displayed. If the control has two thermistors detecting 25 or more and one detecting below 25, dashes will be displayed for the lower one.
- If the display shows 24 degrees on two or more coils but you know the coils are hotter, a thermistor is open, disconnected, misconnected, with broken leads or bad. If all three coils show 24, then it could be that switch 1 is closed instead of open meaning the control is set to be a slave rather than a master.
- If the display shows 134, check capacitor C11 for a broken lead. It is located on the main circuit board on the left edge.
- Checking thermistors can be done with an ohm meter from inside the Model 85 carriage. Looking into the carriage on the left of the circuit board are three groups of three solder joints. Each thermistor is connected to the outside solder joints of a group. Touching ohm meter leads there should give more than 100K ohms for 25 degrees C, above 10K for 85 degrees and 4K for 115.

AUXILIARY CONTACTS

The Model 85A Fan Control System provides two sets of auxiliary Form "C" relay contacts; one set switched by the fan control circuit and one switched by the alarm control circuit. Terminals for these contacts are located on the rear panel of the control.

The output for the emergency shutdown function is 6V D.C. at 300 MA maximum to power an optional external relay. Terminals for this output are also located on the rear panel of the control.

SYSTEM TEST

The Model 85A Fan Control System also incorporates a programmed system test function which is initiated when the "System Test" switch panel is depressed. Each of the various indicators and each segment of the numerical displays are tested in sequence. The upper left segments of the coil and temperature displays are not active and are not lighted during the test sequence.

During the test sequence, the fans operate briefly. The alarm horn is also tested at the end of the sequence and the Emergency Shutdown is not activated.

SET POINT TEMPERATURES

Rated Average Transformer Temperature Rise*	Switch Set Points					Emergency Shutdown Cast Resin Transformers
	Fans On	Fans Off	Alarm On	Alarm Off	Emergency Shutdown	
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	———

*Based on NEMA and ANSI Standards of 30°C average and 40°C maximum ambient for any 24 hour period below 3300 ft. altitude.

NOTE: The digital temperature displayed is always the TOTAL temperature of AMBIENT + HOT SPOT temperatures, not the AVERAGE temperature rise. (Example: A transformer is rated 150°C average temperature rise when carrying rated full load in a 20°C ambient temperature. The thermistor sensors are installed

near the theoretical hot spot of the coils. NEMA and ANSI 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. Note that the alarm would operate at this point providing ample warning that the transformer is approaching the maximum temperature limit of the insulation system.)

DISPLAY CONFIGURATION

Set points are permanently set in the memory of the unit but can be re-set or set to other values at the factory only.

Four small switches are located under the top cover in the left front corner of the unit. If Switch #2 is open the READ button must be pressed to light the display. If Switch #2 is closed the display stays lit continuously, but with reduced lamp life. If Switch #3 is open, only the hottest coil temperature is displayed. If it is closed, all three coil temperatures are displayed in sequence.

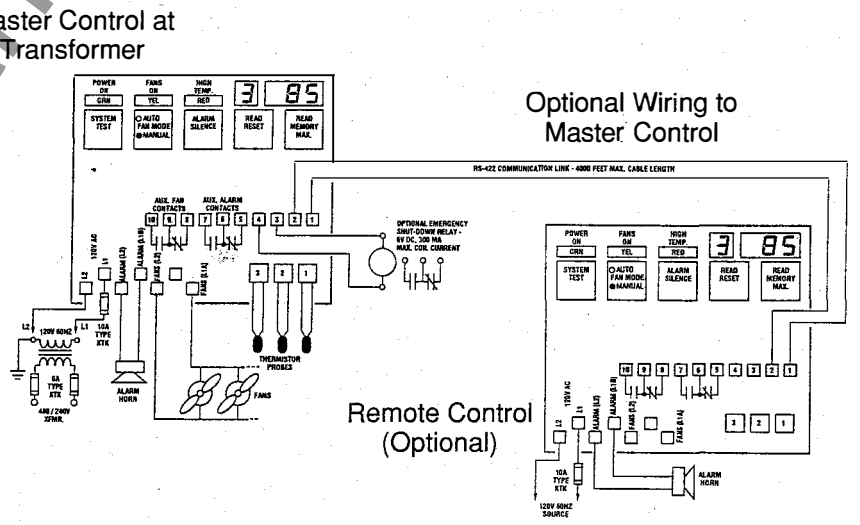
Switch #1 configures the controller for use as slave (closed) or master (open). Switch #4 is unused.

	Switch #1	Switch #2	Switch #3
Continuous Read	—	Closed	—
Push To Read	—	Open	—
Read-Hottest Coil	—	—	Open
Read All 3 Coils	—	—	Closed
Set Up As Slave	Closed	—	—
Set Up As Master	Open	—	—

REMOTE INDICATION AND CONTROL

In addition to providing control and readout functions when installed in a transformer, the Model 85A Fan Control System has the capability of providing complete readout and control at a remote location. One control module with temperature sensors is mounted in the transformer enclosure and is designated as the "Master". A second identical control without temperature probes is designated as the "Slave" for installation remote from the transformer. By means of an IEEE RS-422 two-wire communication link, the temperature may be monitored and all functions controlled at a remote location.

WIRING DIAGRAM



Notes:
1. Auxiliary fan and alarm contacts are rated 24 volts 3 amp. maximum.
2. Control fuse located on main circuit board. Schurter Cat. No. 034.1519 2A. 250V. Glass Tube Type. Remove top cover for access.

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