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# INSTALLATION INSTRUCTIONS

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## TEC20 TEC20H ELECTRONIC CONTROLLER



*Heating & Cooling Products*

**BARD MANUFACTURING COMPANY**  
**Bryan, Ohio 43506**

*Since 1914...Moving ahead, just as planned.*

Manual: 2100-306D  
Supersedes: 2100-306C  
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## **\*\* IMPORTANT \*\***

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians. Please read entire manual before proceeding.

### **SHIPPING DAMAGE**

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

### **GENERAL**

These instructions explain the operation, installation and troubleshooting of the TEC20 controller.

All internal wiring is complete. Only attach low voltage field wiring to designated terminal strips.

The controller is for use with Bard air conditioning wall mount series units only. The TEC20 is for use with units with or without economizers.

Each unit should be sized to handle the total load of the structure.

It is recommended that a five (5) minute compressor time delay relay be installed in each unit.

The TEC20 controller is suitable for both 50 and 60 HZ operation.

### **THEORY OF OPERATION**

The controller is used to control two wall mount air conditioners from one thermostat. It provides total redundancy for the structure and equal wear on both units. It can be used with units with economizers but both units must be equipped alike. That is, both must have economizers or both must be without economizers. See Figure 1 for component locations.

### **TIMER**

The timer is a 24 hour or 7 day on/off timer. The change over period is user selectable. Once every period the timer contacts switch positions. This determines which unit will be the primary unit and which will be the secondary unit for the next period. At the end of this period, the contacts switch again and the primary unit becomes the secondary unit and vice versa. Every 1,3,7,14 or 28 days the primary and secondary units switch providing equal wear on the units. For timer speed up, push and hold timer speedup switch. See Figure 1. Release switch after controller has switched. Timer speed up is supplied for ease of troubleshooting.

In the event of a unit failure, the changeover time jumper may be set to 0 days. This will prevent the TEC20 from switching lead and lag units. Push the push-button to make the functional unit the lead unit if necessary. If power is lost the controller will remember which unit was the lead unit when power is reapplied.

### **SEQUENCE OF OPERATION**

#### **COOLING – TEC20**

1. On a call for first stage cooling, the blower and either the economizer or compressor of the primary unit is energized. The enthalpy control on the economizer, if equipped, will make the decision as to which is energized. If not equipped with economizers, the compressor will energize. First stage cooling LED will light.
2. On a call for second stage cooling, the blower and either the economizer or compressor of the secondary unit is energized. There is a fixed 4° F differential between first and second stage. The enthalpy control on the economizer, if so equipped, will make the decision as to which is energized. If not equipped with economizers, the compressor will energize. Second stage cooling LED will Light. There is a built-in 10 second delay before Stage 2 is energized.

#### **HEATING**

1. On a call for first stage heat, the electric heat in the primary unit will be energized. First stage heating LED will light
2. On a call by the thermostat for second stage heat, the electric heat of the secondary unit will be energized. There is a fixed 4° F differential between first and second stage. Second stage heating LED will light. There is a built-in 10 second delay before Stage 2 is energized.

### **INSTALLATION INSTRUCTIONS**

#### **MOUNTING**

Included in the controller carton is the controller and installation instructions..

The controller should be installed on a vertical wall approximately four (4) feet above the floor away from drafts and outside doors or windows. Four (4) mounting holes are provided for mounting to the wall, and holes for conduit connections are provided in both the base, side and top of the controller. The controller should not be mounted directly to a block wall; space away from wall with insulation or plywood.

Once mounted, slide the thermistor sensor up into the fitting on the top of the TEC20. Position the sensor so that 15/16 inch is protruding from the top of the fitting. Tighten the fitting to hold the sensor in position.

## LOW VOLTAGE FIELD WIRING

The TEC20 is powered from the air conditioners that it is controlling, low voltage only.

Circuitry in the TEC20 isolate the power supplies of the two air conditioners so that no back feeds or phasing problems can occur. Additionally if one air conditioner loses power the TEC20 and the other air conditioner are unaffected and will continue to operate normally.

Connect the low voltage field wiring from each unit per the low voltage field wiring diagrams in Figure 2.

For continuous blower operation, jumper R to G at the low voltage terminal block of the unit, instead of from Y to G.

## FIRE SUPPRESSION CIRCUIT

To disable the TEC20 and shut down both air conditioners, terminal F1 and F2 may be used. The F1 and F2 terminals must be jumpered together for normal operation. A normally closed set of contacts may be connected across the terminals and the factory jumper removed for use with a field installed fire suppression system. The contacts must open if a fire is detected. See Figure 2, wiring diagram, on Page 4. Contacts should be rated for pilot duty operation at 2 amp 24 VAC minimum.

*IMPORTANT NOTE: Bard models employ an electronic blower control that has a 60 second blower off-delay. In order to have immediate shutdown of the blower motor in addition to disabling the run function of the air conditioners will require a simple wiring modification at the blower control located in the electrical control panel of the air conditioners being controlled by the lead/lag controller. To eliminate the 60 second blower off-delay disconnect and isolate the wire that is factory connected to the "R" terminal on the electronic blower control, and then connect a jumper from the "G" terminal on the blower control to the "R" terminal on the blower control. The electronic blower control will now function as an on-off relay with no off-delay, and the blower motor will stop running immediately when the F1-F2 fire suppression circuit is activated (opened).*

## HIGH TEMPERATURE ALARM (TEC20H ONLY)

The TEC20H includes a bimetal thermostat to sense high shelter temperature. The thermostat has normally open contacts only that close on rise of shelter temperature. Connect the red wires to the high temperature alarm inputs of the building monitoring system. Contact ratings on this thermostat are 125 VA at 24 VAC.

Low temperature alarm is not included in the TEC20, TEC20H or TEC40.

## ADJUSTMENTS

### COOLING SETPOINT – Front of TEC20

Set the cooling setpoint in degrees C° or F° as indicated on the front of the TEC20.

### DEAD BAND – Back of Front Cover

The dead band is the span between heating setpoint and cooling setpoint where no heating or cooling takes place. The cooling setpoint minus the dead band equals the heating setpoint. Adjustable from 2 to 20° F.

### ON/OFF SWITCH – Back of Front Cover

This disables the TEC20. This switch must be ON for any heating or cooling to operate.

### CHANGEOVER TIME JUMPER – Back of Front Cover

The changeover period for the lead and lag units can be adjusted to 0, 1, 3, 7 or 28 days.

If the jumper is set to 7 days, the lag unit will become the lead unit in 7 days.

The 0 day position is supplied in the event of a unit failure or if only one air conditioner is used with the TEC20. If the unit needs to run for a time and not switch to the lag unit, set the jumper to "0" and push the lead change push-button to make the functional or single unit the lead unit. When the jumper is in the 0 position the lead and lag units will never switch.

### LEAD CHANGE PUSH-BUTTON – Back of Front Cover

Pushing the lead change push-button will immediately change the lead unit to the lag unit. It also resets the lead/lag changeover timer.

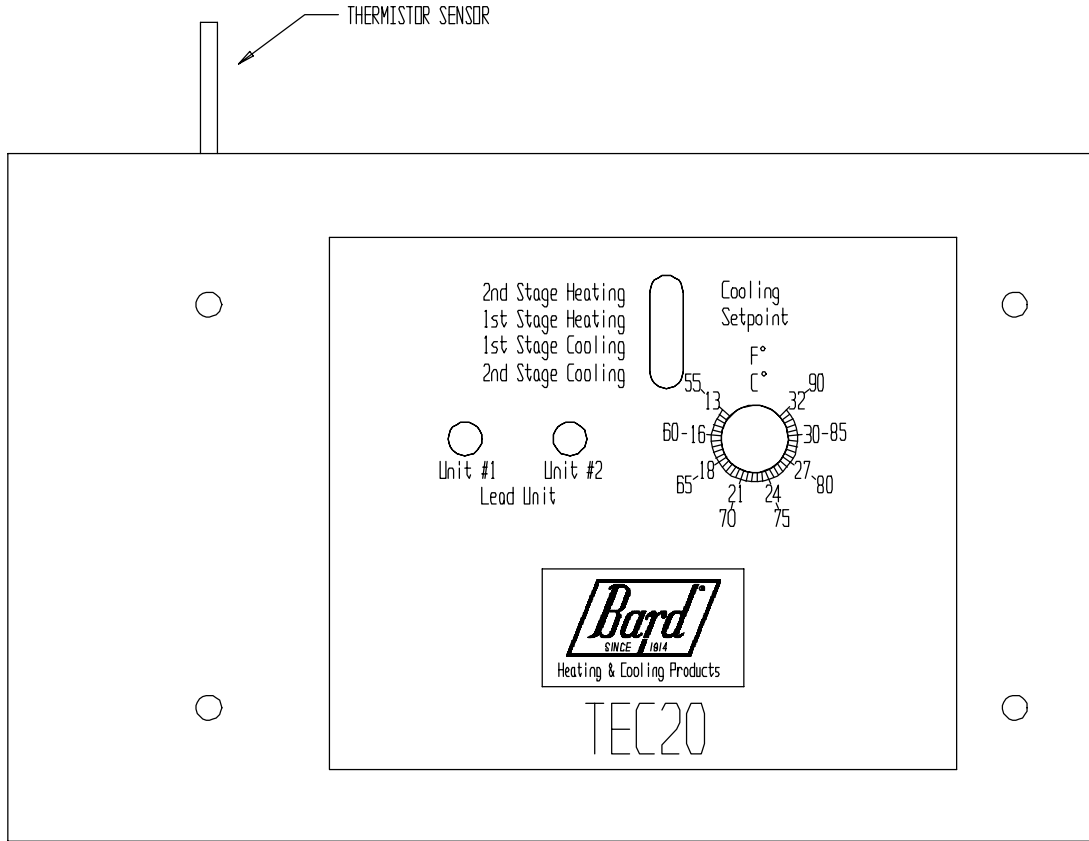
### TEST MODE JUMPER – Back of Front Cover (Lower Left)

To test the lead/lag timing, place the jumper across the two pins. The changeover time is accelerated to seconds instead of days.

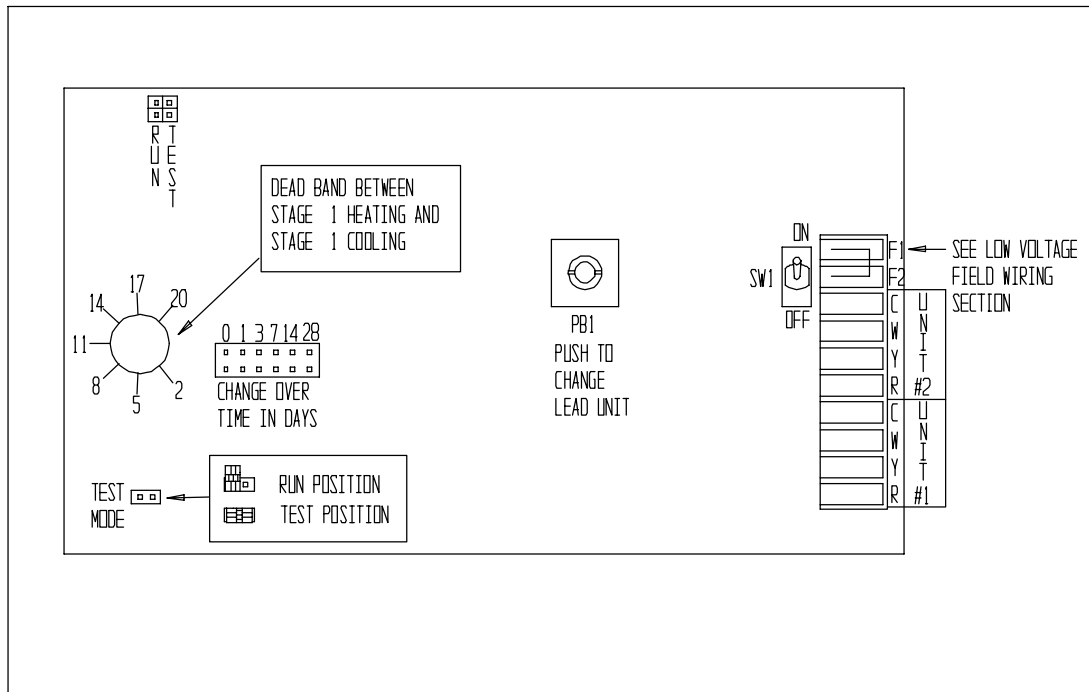
For example, if the changeover time jumper is set to 7 days the lead and lag units would switch in 7 seconds. Jumper must be vertical on one (1) pin only for proper operation.

**FIGURE 1**

**FRONT  
VIEW**

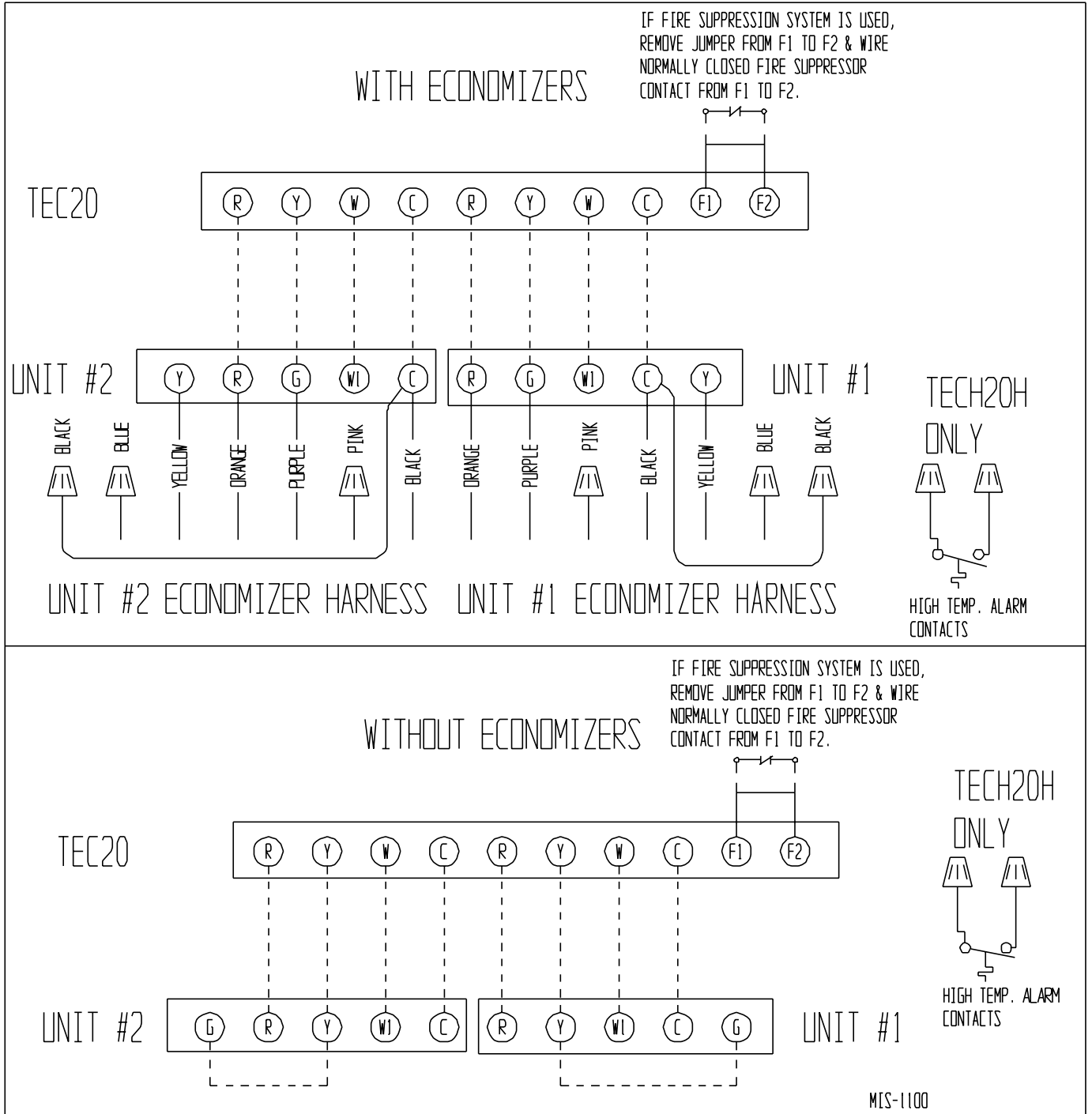


**BACK  
VIEW**



MIS-1101

FIGURE 2



MIS-1100