



# 9AB4-12 Air-Cooled Remote Condenser

## Wiring Diagrams

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### ACCESSORIES

| COMPONENT                                                                                 | PART NO.                      | FIG. NO. |
|-------------------------------------------------------------------------------------------|-------------------------------|----------|
| Control Box                                                                               | 50BA-900---344                | 3        |
| Condensing Pressure Fan Control                                                           | 09AB-900-001<br>09AB-900-032* | 4        |
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\*The 09AB-900-032 package includes 3 09AB-900-001 kits.

### LEGEND AND NOTES FOR FIG. 1-6

| LEGEND                                                                              |                            |
|-------------------------------------------------------------------------------------|----------------------------|
| C                                                                                   | — Common                   |
| CAP                                                                                 | — Capacitor                |
| EQUIP GND                                                                           | — Equipment Ground         |
| FR                                                                                  | — Fan Motor Relay          |
| L                                                                                   | — Lead                     |
| NEC                                                                                 | — National Electrical Code |
| QT                                                                                  | — Quadruple Terminal       |
| W1                                                                                  | — Heat Stage 1             |
| W2                                                                                  | — Heat Stage 2             |
|  | Field Splice               |
|  | Terminal Block Connection  |
|  | Marked Terminal            |
|  | Unmarked Terminal          |
|  | Factory Wiring             |
|  | Field Wiring               |

#### NOTES:

- Wiring for field power supply must be rated at 60 C minimum. Use copper or copper-clad aluminum conductors only.
- Replacement of factory wires must be with 90 C (194 F) appliance wiring material or its equivalent.
- Factory wiring is in accordance with NEC. Field modifications or additions must be in compliance with all applicable codes.
- Fan motors are inherently thermally protected. No overloads required.

| UNIT  | VOLTS   | PHASE | HERTZ | FAN FLA* |
|-------|---------|-------|-------|----------|
| 9AB4  | 200/230 | 1     | 60    | 2.3 Amps |
| 9AB6  | 200/230 | 1     | 60    | 2.3 Amps |
| 9AB8  | 200/230 | 1     | 60    | 4.6 Amps |
| 9AB12 | 200/230 | 1     | 60    | 4.6 Amps |

\*FLA — Full Load Amps.

- Maximum base unit fuse size 15 amps.

### OPERATING SEQUENCE

#### ⚠ CAUTION

The 9AB unit uses single-pole contactors. Even when the fan is not running, power can still be applied to the fan motor. Open unit disconnect before servicing unit.

NOTE: The 9AB condensing unit may be used with different compressor and evaporator combinations. The variation in combinations may affect the sequence of operation.

When matched with 50BZ units, the 9AB sequence of operation is as follows:

On a call for cooling, the thermostat closes and energizes terminals Y1 and W1 on the 50BZ unit low voltage terminal strip. The fan motor contactor (FR) is energized with 24 v through terminals W1 and C. The fan will continue to run until the thermostat is satisfied. At that time, the thermostat will open W1, and the fan will stop immediately. On two-stage units, a thermostat call for second stage cooling energizes W2 and the second 9AB condenser unit.

When a 2-fan 9AB8 or 9AB12 unit is used on one refrigeration circuit of a 50BZ012,014 or 016 unit, then both condenser fans must be controlled from one contactor. This may be accomplished by using an accessory control box (part no. 50BA-900---344). For proper part load control, install a condensing pressure fan control (part no. 09AB-900---001) on one fan for each circuit.

If the condenser-fan motor overheats due to motor overload, or lack of cooling air, the internal fan protector will open the circuit internally in the motor, and the fan still stop. If a safety control in the unit opens, the 9AB condenser fan will not be affected and the fan will continue to run as long as the thermostat is closed.

If the condenser is equipped with the Motormaster low ambient kit, the condenser-fan motor speed is controlled in response to the saturated condensing temperature. For outdoor temperatures down to -20 F, the controller maintains the condensing temperature at 100 F. Winter Start control accessory used with Motormaster control will bypass the low-pressure switch for 3 minutes on compressor start-up to allow system pressures to stabilize. On 9AB8 and 12 units the second condenser fan should be equipped with accessory fan cycling head pressure control. This control opens the power to the second condenser fan at outdoor temperatures below 60 F. If evaporator defrost thermostat is used, it will open if frost begins to form on the evaporator coil. This will stop the compressor but the outdoor fan will continue to run.

In addition, a field-supplied solenoid valve (located at indoor unit, see Fig. 9 for wiring) wired in parallel with the compressor contactor coil, shuts off the liquid line to prevent refrigerant from returning to the compressor during the off cycle. The solenoid valve is recommended for all installations and is mandatory if piping length is more than 75 ft (22.9 m), or if liquid line diameter exceeds 5/8-inch. If two liquid line solenoid valves are used (units over 7½ tons), add accessory relay-transformer package 38AE-900-001.

## FIELD-INSTALLED ACCESSORIES

**Control Box (50BA-900---344)** — The 9AB units are not furnished with a relay or contactor to start the fan. One may be furnished in the indoor unit. A field-supplied relay or contactor installed in the 9AB control box or the accessory control box may be used. The accessory control box is a water tight box with two contactors which is mounted on the side of the 9AB condenser. This box uses 24 volt ac power from the indoor unit to control the 9AB unit. See Fig. 3 for typical wiring with a 9AB 8 or 12 (wiring is similar for 9AB 4 or 6, but only one contactor is used). The accessory control box can also be used to control two 9AB units used with one 50BZ unit.

**Winter Start (38AE-900-021)** — If units matched with 9AB condenser are equipped with a 27 psig low-pressure switch (i.e., 50BZ units), a 3-minute low-pressure switch bypass is recommended for operation below 50 F. See Fig. 8 for winter start control wiring.

**Evaporator Defrost Thermostat (50BB-900---001)** — The evaporator defrost thermostat is recommended for use with Winter Start control. Thermostat is installed on the evaporator coil. See Fig. 9 for proper wiring of defrost thermostat.

**Condensing Pressure Fan Control (09AB-900-001,032)** — This thermostat control is used with unit sizes 8 and 12 with two condenser fans. The control allows operation to 50 F by stopping the second condenser fan when the ambient temperature is below 60 F. Size 8 and 12 units with Motormaster® control must have the control installed. See Fig. 4 for proper wiring.

**Motormaster Control (39LT-900-301)** — The accessory low-ambient Motormaster control kit contains a fan speed control device activated by a temperature sensor. The accessory controls condenser-fan motor speed in response to the saturated condensing temperature. For outdoor temperatures down to -20 F, it maintains the condensing temperature at  $100 \pm 10$  F. The Motormaster control consists of a solid-state circuit on a printed circuit board encased in aluminum. The control must be fastened to a panel in the unit, and the sensor assembly (Fig. 7) mounted to a return bend on the unit condenser coil. Parts necessary for mounting control and sensor are included in the kit.

### Motormaster Pre-Installation Considerations

**VERIFY POWER WIRING** — Power wiring must comply with NEC (National Electrical Code) and all local requirements. Confirm that supply voltage meets minimum voltage specified on the unit's rating plate and that it matches the voltage rating of the low-ambient kit.

**WINTER START** — If the indoor unit has a low-pressure switch, the unit should be modified for winter start control before installing the Motormaster control.

**CONDENSING PRESSURE FAN CONTROL** — The 9AB8 and 12 size units require accessory condensing pressure fan control installed on the second condenser fan when Motormaster control is applied to the first condenser fan.

**WIND BAFFLES** — The 9AB units are furnished with a wind baffle for the discharge. A similar baffle on the inlet is required with Motormaster control installation to prevent wind crosscurrents from causing abnormal operation as the fan is modulated. Fabricate and install inlet baffles per dimensions in Fig. 10.

**Motormaster Control Installation** — After completing the pre-installation checks, proceed as follows:

### ⚠ WARNING

**DISCONNECT UNIT POWER** — To prevent electric shock, open and tag all disconnects before modifying the condenser.

1. Mount Control Assembly.
  - a. See Fig. 5 for the mounting location of the Motormaster low-ambient control on the side of the unit.
  - b. Using the template supplied in accessory installation instructions, drill pilot holes for mounting the low-ambient control. Use extreme caution to avoid drilling into any of the condenser tubes or return bends.
  - c. Fasten control to unit with 4 No. 10 sheet metal screws and star lockwashers (provided in kit).

NOTE: Lockwashers are required to ensure electrical ground with condenser unit.

2. Mount Sensor Assembly.

### ⚠ CAUTION

The sensor assembly is fragile. Handle with care.

- a. See Fig. 5 to determine where to locate sensor on coil return bend. Recommended location is indicated by shaded return bend. As shown in Fig. 7, fasten sensor to return bend with the supplied screw, plate washers, and nut. See Table 1 for sensor temperature vs. resistance values.
- b. Remove the coil cover from the unit. Run a piece of flexible conduit from the bottom of Motormaster control to a hole drilled in the coil cover. Route sensor wire from Motormaster control through conduit to specified sensor location.
- c. Coil and secure excess wire inside the unit near the sensor or next to the low ambient control; provide additional protection against abrasion or movement of the wire if necessary.

**Table 1 — Sensor (Thermistor) Temperature vs Resistance**

| TEMPERATURE |    | NOMINAL RESISTANCE<br>(Ohms) |
|-------------|----|------------------------------|
| F           | C  |                              |
| 60          | 16 | 7750                         |
| 70          | 21 | 5900                         |
| 77          | 25 | 5000                         |
| 80          | 27 | 4650                         |
| 90          | 32 | 3650                         |
| 100         | 38 | 2875                         |
| 110         | 43 | 2275                         |
| 120         | 49 | 1850                         |

3. Install Control Power Wiring.

Wire the Motormaster control to the unit power circuit as shown in Fig. 6. Wire Motormaster control in series with fan motor. Power wiring must comply with all local and national requirements.

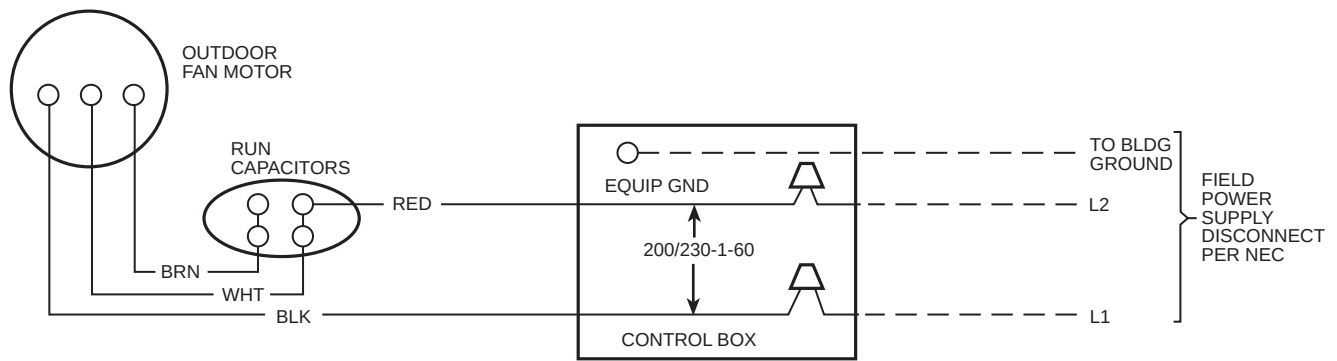
#### 4. Verify Operation.

Turn on the unit power and set the thermostat below the ambient room temperature. If the unit is equipped with a Time Guard® II circuit (50BZ), wait at least 5 minutes. After the compressor starts, the fan speed is modulated according to the condensing temperature and then maintained until the set point is achieved. If fan motor does not start, verify the following conditions and correct as necessary:

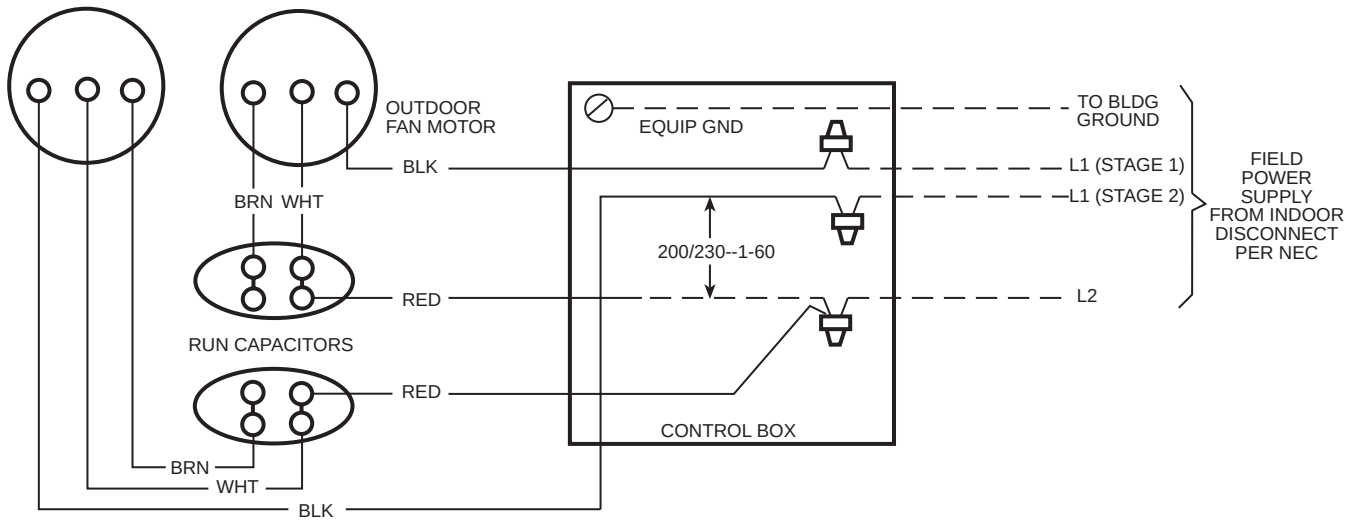
- Condensing unit power is on.
- Power is present at fan motor relay contacts.
- Sensor wire connections inside the low-ambient control are tight. If the preceding conditions are met and fan

motor still does not start, perform corrective procedures or replace components as follows:

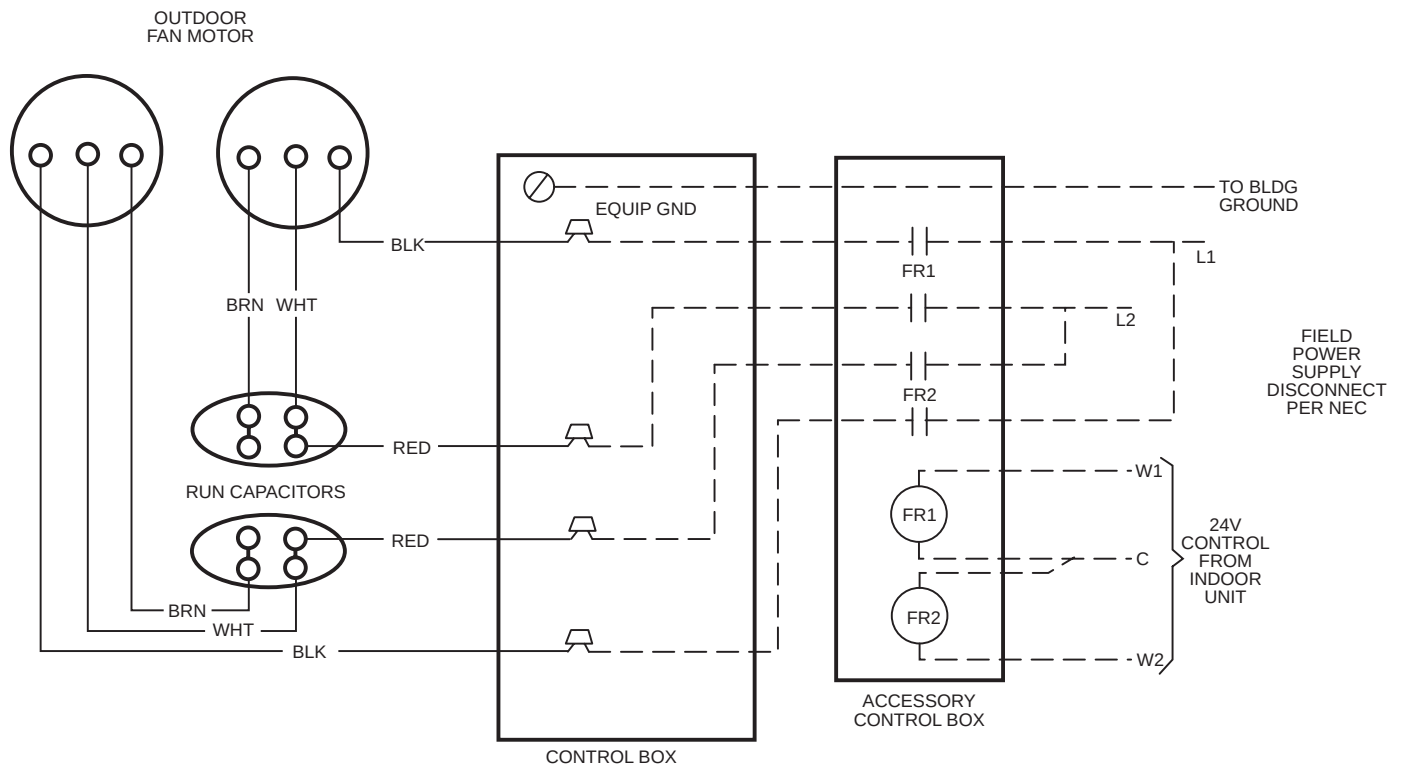
- Jumper the power wires (BLK-to-BLK) in the Motor-master control. If the motor does not run, check motor wiring and run capacitor. Replace capacitor and motor if necessary. If the motor runs, ensure the fan motor is wired in series with the control. Refer to Fig. 6.
- If the fan motor runs when connected to the single-phase voltage supply but does not run when connected in series with the Motormaster control, AND the return bend where the sensor is mounted is warm, short the sensor leads (BLU-to-RED). If the motor runs, replace the sensor. If the motor does not run, replace the control and sensor assembly.



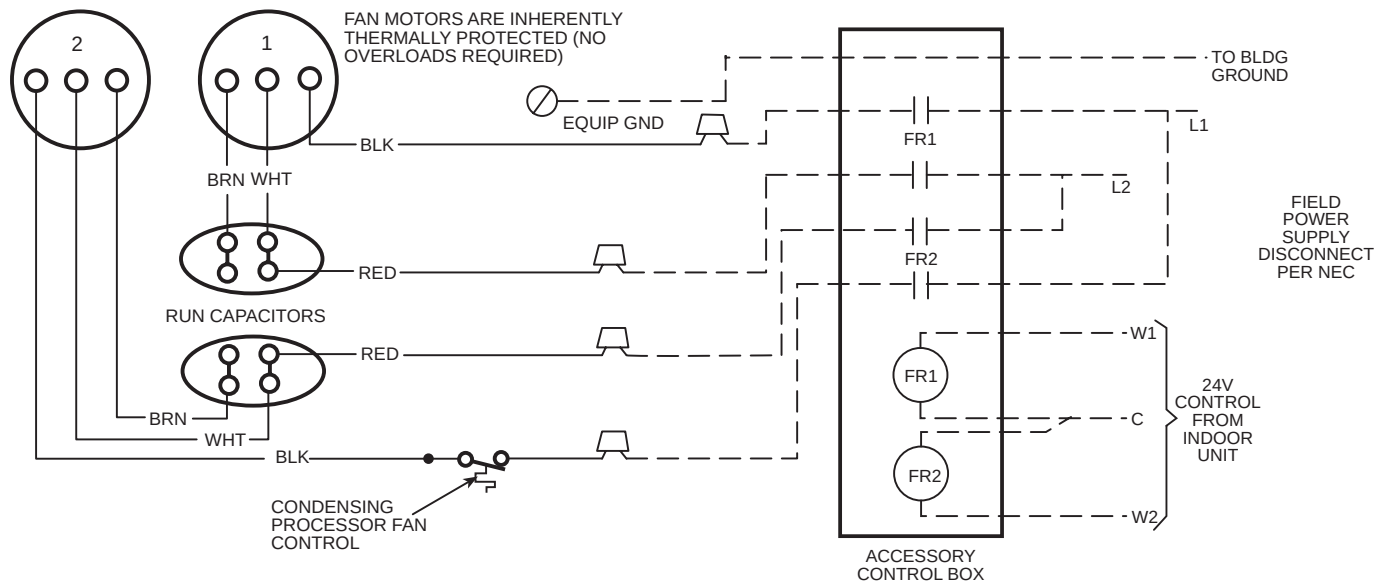
**Fig. 1 — Schematic Diagram, Units 9AB4, 6**



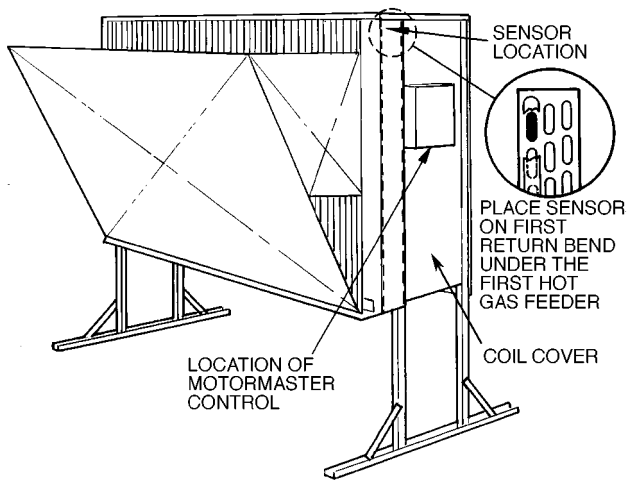
**Fig. 2 — Schematic Diagram, Units 9AB8, 12**



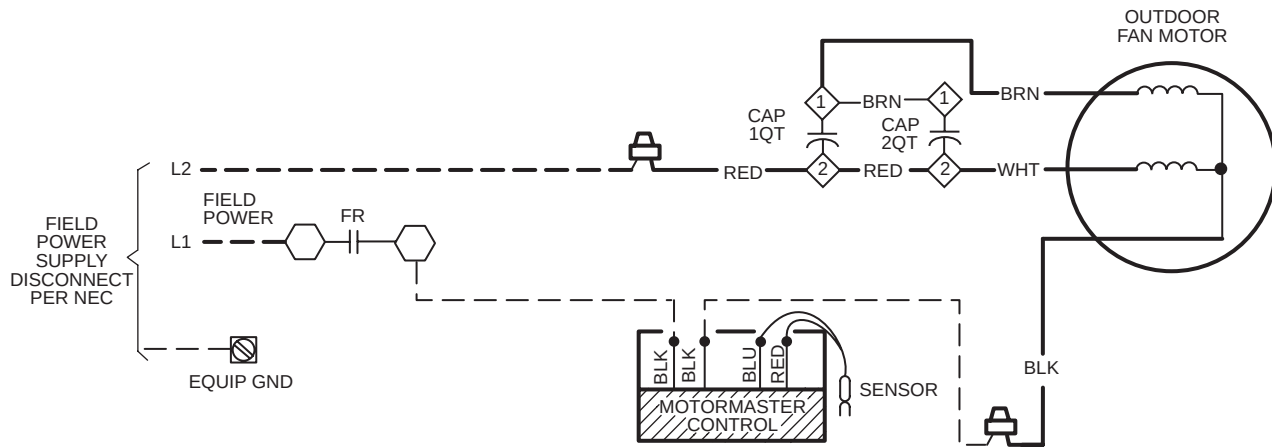
**Fig. 3 — Field Wiring with Accessory Control Box**



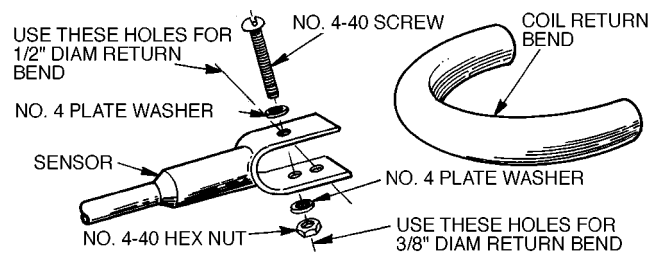
**Fig. 4 — Wiring Diagram; Accessory Condensing Pressure Fan Control, Units 9AB8 and 12**



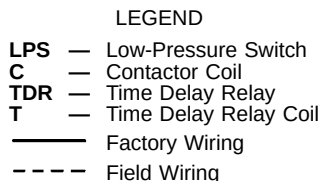
**Fig. 5 — Motormaster® Control Location and Sensor Location**



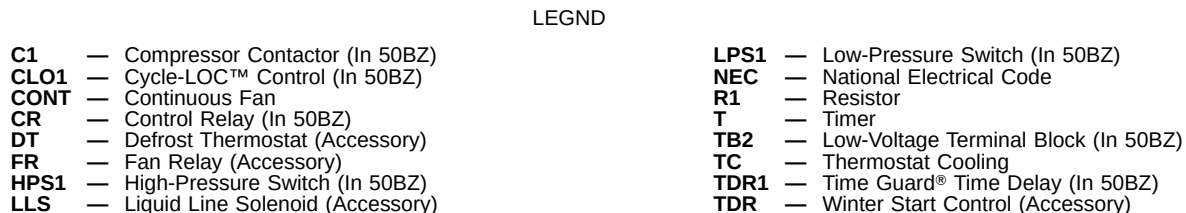
**Fig. 6 — Motormaster Control Wiring Diagram**



**Fig. 7 — Sensor Mounting Detail**

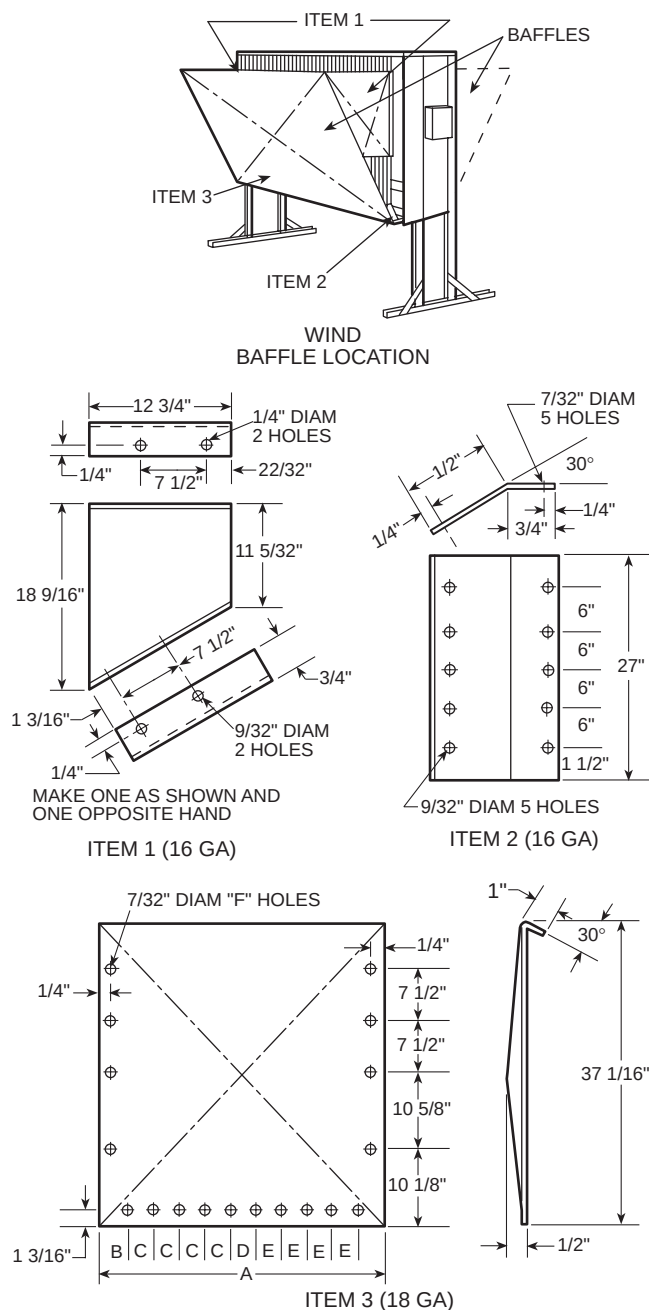


**Fig. 8 — Wiring for Winter Start Control  
(Indoor Unit Wiring Modification)**



†Resistor may be internal to CLO on some models.

**Fig. 9 — Wiring for 9AB Unit with 50BZ Using Winter Start, Evaporator Defrost Thermostat, Control Box, and Liquid Line Solenoid Valve**



DIMENSIONS (in.)

| UNIT SIZE | A      | B       | C | D      | E | F  |
|-----------|--------|---------|---|--------|---|----|
| 9AB4      | 29 1/8 | 29 1/16 | 6 | —      | — | 13 |
| 9AB6      | 38 1/2 | 7 1/4   | 6 | —      | — | 13 |
| 9AB8      | 57     | 2 1/4   | 6 | 4 1/2  | 6 | 18 |
| 9AB12     | 75 1/2 | 6 7/8   | 6 | 13 3/4 | 6 | 18 |

NOTE: All 9AB units are shipped with one wind deflector assembly for the discharge air side of unit. When the 32LT Motormaster control is installed, field fabricate another identical wind deflector assembly and install on air inlet side of unit.

**Fig. 10 — Wind Baffle Details**