# Low Ambient Control Kit

### Model: BAYLOAM105AA

### **WARNING:** HAZARDOUS VOLTAGE - DISCONNECT POWER BEFORE SERVICING

#### ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

**IMPORTANT** — This Document is **customer property** and is to remain with this unit. Please return to service information pack upon completion of work.

**NOTE:** Units operating in low ambient conditions require compressor crankcase heaters due to changes in head pressure. Refer to Table 1 for the appropriate crankcase heater accessory number. Install the heater before operating the low ambient control.

#### Table 1. Crankcase Heater Accessory Numbers

Table 1. Crankcase Heater Accessory Numbers		
For this Unit	Use this Heater	
4WC*3018, 2WC*3024-030,2WC*3048, 4YC*3018, 2YC*3024-030, 2YC*3042-048, 4TC*3018-024, 4WCY4024-030, 4TCY4024- 030, 4YCY4024-030, 4DCY4024-030 (230V)	BAYCCHT101AA (Reciprocating) (65 Watts)	
2WC*3036-042, 2WC*3060, 4WC*3036-060, 2YC*3036, 4YC*3036-060, 2YC*3060, 4TC*3030-060, 4YCY4036-060, 4WCY4036- 060, 4TCY4036-060, 4DCY4036-060, 4WCZ6036-060, 4YCZ6036-060, 4DCZ6036-060 (230V)	BAYCCHT102AA (Scroll) (60 Watts)	
4WC*3036-060, 4YC*3036-060, 4TC*3036-060, 4WCZ6036-060, 4YCZ6036-060 (460V)	BAYCCHT404BA (Scroll) (60 Watts)	

### **Identify Low Ambient Kit Contents**

Refer to Figure 1 on page 2 to identify the kit components.

### **Inspect Contents**

You must report damage and make claims to the transportation company immediately. Report missing parts to your supplier immediately and replace with authorized parts only.

### Install BAYLOAM Kit

1. Disconnect and verify that power is off.

### 2. Remove Access Panels

Remove these four (4) access panels (see Figure 2, page 2):

- Control/Heat box access panel
- Blower access panel
- Compressor access panel
- Coil access panel

### 3. Mount Control Module

The Control Module is to be mounted to the universal bracket (included in the kit) or the Compressor Startkit bracket, depending upon your unit's configuration.

Continue with the following section that applies to your configuration:

- 3a. 230 Volt 2/4WC\*\* with Compressor Start Kit, 460 Volt 2/4WC\*3060A4 & 460 Volt 4WCZ6 units. Go to page 3.
- 3b. 230 Volt Single Phase 2/4WC\*\* units WITH-OUT Start Kit, All 4TC\*\* units & 230/460 Volt Three Phase 2/4WC\*\* units except for 2/ 4WC\*3060A4 & 460 Volt 4WCZ6 units. Go to page 4.
- 3c. 230 Volt 2/4YC\*\* and 4DC\*\* units with Compressor Start Kit, 460 Volt 2/4YC\*3060A4, & 460 Volt 4YCZ6 units. Go to page 5.
- 3d. 230 Volt 2/4YC\*\* & 4DC\*\* Single Phase units WITHOUT Start Kit & 230/460 Volt Three Phase 2/4YC\*\* & 4DC\*\* units except 460 Volt 2/ 4YC\*3060A4, & 460 Volt 4YCZ6 units. Go to page 6.



### 3a. 2/4WC\*\* Units

#### 230 Volt 2/4WC\*\* with Compressor Start Kit & 460 Volt 2/4WC\*3060A4 & 460 Volt 4WCZ6 units

- 1. Remove the Control Module from the Universal Bracket (remove 2 machine screws).
- 2. Mount the Control Module to the Compressor Start Kit bracket using the two (2) machine screws. See Figure 3.
- 3. Continue with step 4. *Mounting the Liquid Line Sensor*, page 7.



### 3b. 2/4WC\*\* and 4TC\*\* Units

#### 230 Volt Single Phase 2/4WC\*\* units WITHOUT Start Kit, All 4TC\*\* units & 230/460 Volt Three Phase 2/4WC\*\* Units except for 2/4WC\*3060A4 & 460 Volt 4WCZ6 units

*Note:* Use the Universal Bracket shipped in the Low Ambient kit. Mount the Control Module to the Universal Bracket as needed so that the assembly matches the illustration below.

- Mount the Control Module and Universal Bracket assembly bracket to the back of the control box with two (2) sheetmetal screws inserted horizontally. Also, mount the Universal Bracket to the bottom of the control box with one (1) sheetmetal screw inserted vertically. See Figure 4.
- 2. Continue with step 4, *Mounting the Liquid Line Sensor*, page 7.



### 3c. 2/4YC\*\* and 4DC\*\* Units

# 230 Volt 2/4YC\*\* and 4DC\*\* units with Compressor Start Kit, 460 volt 2/4YC\*3060A4, & 460 volt 4YCZ6 units

- 1. Remove the Control Module from the Universal Bracket (2 machine screws).
- 2. Then, align the two holes in the ControlModule with the two clearance holes in the Start Kit bracket.
- 3. Mount the Control module to the Start Kit bracket with the two (2) machine metal screws you removed from the Universal Bracket. See Figure 5.

Continue with step 4, Mounting the Liquid Line Sensor, page 7.



3d. 2/4YC\*\* and 4DC\*\* Units 230 Volt 2/4YC\*\* & 4DC\*\* Single Phase units WITHOUT Start Kit & 230/460 Volt Three Phase 2/ 4YC\*\* & 4DC\*\* units except 460 Volt 2/ 4YC\*3060A4, & 460 Volt 4YCZ6 units

Note: Use the Universal Bracket shipped in the Low Ambient kit. Mount the Control Module to the Universal Bracket as needed so that the assembly matches the illustration below.

- Mount the Control Module and Universal Bracket assembly to the bottom of the control box with two (2) sheetmetal screws. One is inserted horizontally from inside the control box into the universal bracket, and one is inserted vertically. See Figure 6.
- 2. Continue with step 4, *Mount the Liquid Line* Sensor, page 7.



### 4. Mount the Liquid Line Temperature Sensor

In this step you mount the liquid line sensor to the liquid line. See Figure 7.

1. Attach the liquid line temperature sensor to the liquid line above the TXV as follows.

a.) Apply thermal compound (provided in kit) to an area on the liquid line where you are mounting the sensor. See Figure 7.

b.) Use the clamp (provided in kit) and attach the sensor to the liquid line. See Figure 7.

c.) Wrap the sensor with insulating tape (provided in kit).

2. Route the sensor wires through the compressor area, past the blower and into the Control Box. See Figure 9, page 8.

Continue with step 5. Route the Sensor Leads.



### 5. Mount the Outdoor Temperature Sensor

In this step you attach the outdoor sensor to the outside of the outdoor coil. See Figure 9, page 8.

- 1. On the outdoor fan grill, remove eight (8) plastic screw caps covering the fan screws. Then, remove the eight (8) screws that secure the outdoor fan grill to the top of the unit. See Figure 8. Remove the fan assembly and place it on top of the unit with the fan blades facing up.
- 2. Remove the back outdoor coil louvered panel to access the outer surface of the outdoor coil:

a.) Remove the three (3) screws across the top of the panel.

b.) Lift or slide the panel up enough to unhook it from the slots in the unit.

3. Insert the retainer into the outside surface of the spine-fin coil about half way up the outside surface of the coil. Attach the outdoor air sensor to the clip on the outdoor air sensor retainer dart. See Figure 8 below and Figure 9, page 8.



Continue with step 6. Route the Sensor Leads.

### 6. Route the Sensor Leads

In this step you route the outdoor sensor leads to the Control Box.

- 1. Route the outdoor temperature sensor lead wires down to the intermediate top and then under the outdoor coil. See Figure 9, page 8. You may need to lift the coil slightly to slide the sensor lead wires under the coil.
- 2. Route the outdoor temperature sensor leads down into the compressor compartment through the one (1") hole. See Figure 9. Using a wire tie from the kit, tie the leads to the existing wiring at the point where the leads go through the sheet metal opening. Ensure that the leads DO NOT lie across the sharp sheet metal edges of the openings.
- 3. Continue to route the sensor leads through the compressor compartment, through the partition, and into the Blower compartment. From the Blower compartment, continue to route the leads into the Control Box. Use wire ties to secure the leads to the existing wires. This ensures that any wiring is kept away from the blower and sharp sheet metal.
- 4. In the Control Box, route the sensor leads to the Control Module. You make the connections later.
- Reinstall the outdoor fan assembly with the eight
  (8) screws and screw caps you removed in the Mount the Liquid Line Temperature Sensor section.
- 6. To make your connections, continue with step 7 *Connect Module Wires*, page 9.



### 7. Connect Control Module Wires

There are five (5) Control Module wiring configurations. Depending on your configuration continue with the section that applies.

- **7a.** 2/4YC\*\* and 4TC\*\* Single Phase 230 Volt Cooling and Gas/Electric Models. Go to page 9.
- **7b.** 2/4WC\*\* & 4DC\*\* Single Phase 230 Volt Heat Pump Models. Go to page 10.
- 7c. 2/4YC\*\* and 4TC\*\* Three Phase 230 & 460 Volt Cooling and Gas/Electric Models. Go to page 11.
- 7d. 2/4WC\*\* & 4DC\*\* Three Phase 230 Volt Heat Pump Models. Go to page 12.
- 7e. 2/4WC\*\* Three Phase 460 Volt Heat Pump Models. Go to page 13.

# 7a. 2/4YC\*\* and 4TC\*\* Single Phase 230 Volt Cooling and Gas/Electric Models. See Figure 10.

Disconnect the **black** fan motor lead from the contactor (this wire is attached to contactor terminal "L2", with a quick connect terminal). Cut the terminal off of this wire and strip the end about 1/2 inch. Select one of the black wires from the SSR relay on the Control Module, cut the terminal off and strip the end about 1/2 inch. Connect these two (the black fan motor lead to the black SSR lead) with a wire nut supplied.

Connect the other **black** wire from the solid state relay (SSR) to the contactor terminal "L2" (from where the fan motor lead was disconnected).

#### Connect Low voltage wires (BYO):

- 1. Connect the 3-pin BYO low voltage wire harness (supplied in kit) to J5 on the Control Module (3-pin male connector). See Figure 11. Note: to ease the insertion of the connector housing on to the J5 header, place the connector on the tips of the three header pins. Angle the connector upward toward the header latch while pushing connector over the header pins.
- 2. Connect the **yellow** lead wire of the harness to a <sup>1</sup>/<sub>4</sub> " male tab on the right hand side of the main contactor (low voltage contactor coil terminal).
- 3. Connect the **blue** lead wire of the harness to the wire nut junction of the blue wire (use new wire nuts from kit).
- 4. Connect the **orange** wire to the wire nut junction of the yellow wire (use new wire nuts from kit).
- 5. Connect the Liquid Line Sensor to J2 on the Control Module. See Figure 11 on page 10.
- 6. Connect the Outdoor Temperature Sensor (Ambient Sensor) to J3 on the Control Module. See Figure 11 on page 10.
- 7. Reinstall louvers and panels. Continue with step 8. System Setup, Page 14.



#### 7b. 2/4WC\*\* & 4DC\*\* Single Phase 230 Volt Heat Pump Models. See Figure 12.

Disconnect and remove the black lead from the Defrost Board relay to the "L2" terminal of the contactor (the black wire is attached to the "COM" terminal of the relay). Firmly hold relay when removing wire. Connect one of the black leads from the (SSR) on the Control Module to the position on the unit contactor "L2" (where the previous wire was removed). Connect the other black lead on the (SSR) on the Contoller Module to the "COM" terminal on the Defrost Board.

### Connect Low voltage wires (BYO):

- 1. Connect the 3-pin BYO low voltage wire harness (supplied in kit) to J5 on the Control Module (3-pin male connector). See Figure 11. *Note:* to ease the insertion of the connector housing on to the J5 header, place the connector on the tips of the three header pins. Angle the connector upward toward the header latch while pushing connector over the header pins.
- Connect the **yellow** lead wire of the harness to a ¼ " male tab on the right hand side of the main contactor (low voltage contactor coil terminal). See Figure 12.

- 3. Connect the **blue** lead wire of the harness to the wire nut junction of the blue wire (use new wire nuts in kit).
- 4. Connect the **orange** wire to the wire nut junction of the orange wire (use new wire nuts from kit).
- 5. Connect the Liquid Line Sensor to J2 on the Control Module. See Figure 11.
- 6. Connect the Outdoor Temperature Sensor (Ambient Sensor) to J3 on the Control Module.
- 7. Reinstall louvers and panels. Continue with step 8. *System Setup, page 14.*



Figure 11. Control Module Switches, Connectors, and LEDs



# 7c 2/4YC\*\* and 4TC\*\* Three Phase 230 Volt Cooling and Gas/Electric Models. See Figure 13.

Disconnect the **black** fan motor lead from the contactor (this wire is attached to contactor terminal "T2", with a quick connect terminal). Cut the terminal off of this wire and strip the end about 1/2 inch. Select one of the black wires from the SSR relay on the Control Module, cut the terminal off and strip the end about 1/2 inch. Connect these two (the black fan motor lead to the black SSR lead) with a wire nut supplied.

Connect the other **black** wire from the SSR to the contactor terminal "T2" (from where the fan motor lead was disconnected).

#### Connect Low voltage wires (BYO):

- 1. Connect the 3-pin BYO low voltage wire harness (supplied in kit) to J5 on the Control Module(3-pin male connector). See Figure 14 on page 12. Note: to ease the insertion of the connector housing on to the J5 header, place the connector on the tips of the three header pins. Angle the connector upward toward the header latch while pushing connector over the header pins.
- 2. Connect the **yellow** lead wire of the harness to a

Figure 13.

- 3. Connect the **blue** lead wire of the harness to the wire nut junction of the blue wire (use new wire nuts from kit).
- 4. Connect the **orange** wire to the wire nut junction of the yellow wire (use new wire nuts from kit).
- 5. Connect the Liquid Line Sensor to J2 on the Control Module.See Figure 14 on page 12.
- 6. Connect the Outdoor Temperature Sensor (Ambient Sensor) to J3 on the Control Module.
- 7. Reinstall louvers and panels. Continue with step 8. System Setup, Page 14.



# 7d. 2/4WC\*\* & 4DC\*\* Three Phase 230 Volt Heat Pump and Dual Fuel Models. See Figure 15.

Disconnect and remove the black lead from the Defrost Board relay to the "T2" terminal of the contactor (the black wire is attached to the "COM" terminal of the relay). Firmly hold relay when removing wire. Connect one of the black leads from the (SSR) on the Control Module to the position on the unit contactor "T2" (where the previous wire was removed). Connect the other black lead on the (SSR) on the Control Module to the "COM" terminal on the Defrost Board.

### Connect Low voltage wires (BYO):

- 1. Connect the 3-pin BYO low voltage wire harness (supplied in kit) to J5 on the Control Module (3-pin male connector). See Figure 14. *Note:* to ease the insertion of the connector housing on to the J5 header, place the connector on the tips of the three header pins. Angle the connector upward toward the header latch while pushing connector over the header pins.
- Connect the **yellow** lead wire of the harness to a ¼" male tab on the right hand side of the main contactor (low voltage contactor coil terminal). See Figure 15.

- 3. Connect the **blue** lead wire of the harness to the wire nut junction of the blue wire (use new wire nuts in kit).
- 4. Connect the **orange** wire to the wire nut junction of the orange wire (use new wire nuts from kit).
- 5. Connect the Liquid Line Sensor to J2 on the Control Module. See Figure 14.
- 6. Connect the Outdoor Temperature Sensor (Ambient Sensor) to J3 on the Control Module.
- 7. Reinstall louvers and panels. Continue with step 8. *System Setup, page 14.*





# 7e. 2/4WC\*\* Three Phase 460 Volt Heat Pump Models (see Figure 16)

Disconnect and remove the black lead from the fan relay (terminal #1) to the unit contactor "T2". Connect one black lead from the SSR on the Control Module to the #1 terminal of the fan relay. Connect the other black lead to the unit contactor "T2" terminal.

#### Connect Low voltage wires (BYO):

- 1. Connect the 3-pin BYO low voltage wire harness (supplied in kit) to J5 on the Control Module (3-pin male connector). See Figure 14. NOTE: to ease the insertion of the connector housing on to the J5 header, place the connector on the tips of the three header pins. Angle the connector upward toward the header latch while pushing connector over the header pins.
- 2. Connect the **yellow** lead wire of the harness to a <sup>1</sup>/<sub>4</sub> " male tab on the right hand side of the main

contactor (low voltage contactor coil terminal). See Figure 16.

- 3. Connect the **blue** lead wire of the harness to the wire nut junction of the blue wire (use new wire nuts in kit).
- 4. Connect the **orange** wire to the wire nut junction of the orange wire (use new wire nuts from kit). See Figure 16.
- 5. Connect the Liquid Line Sensor to J2 on the Control Module. See Figure 14.
- 6. Connect the Outdoor Temperature Sensor (Ambient Sensor) to J3 on the Control Module.
- 7. Reinstall louvers and panels. Continue with step 8. *System Setup*, page 14.



### 8. System Setup

The Control Module contains a momentary test switch (S1) and a 4-position installer selectable dip switch (S2). Both components are located in the lower right hand corner of the Control Module. See Figure 11 on page 10.

### 8a. Test Switch (S1)

The test switch provides a means of verifying that the fan motor is under the control of the Low Ambient Control Module. A "Y" signal must be present in order to test the control. Depressing the test switch causes the fan to alternately cycle on (for 3 seconds) and off (for 3 seconds) for a total time of 12 seconds. The on / off fan operation may be observed by watching the fan once the test function has been invoked or by monitoring the head pressure using a gauge set. The LED on the solid state relay should light when voltage is being applied to the fan motor. Once the 12-second test period is complete the control resumes normal control operation.

### 8b. Dip Switches (S2)

The Control Module will control a liquid temperature set point as determined by the dip switch settings. The dip switch is used: 1. To select either Automatic mode or Manual

 To select either Automatic mode of Manual Mode operation (S2 dip switch 4 setting).
 To select the liquid temperature set point (S2 dip switch 1, 2 and 3 settings).

Automatic Mode (S2 dip switch 4 in "Off" position) - The Control Module determines the approach temperature based upon the liquid and ambient temperature readings. The approach *temperature* = liquid temperature – ambient temperature. The approach temperature is calculated only when the ambient temperature is in the range of 65 to 75 deg F and the outdoor fan is on continuously. If the Control Module has not yet acquired an approach temperature, S2 dip switch 1, 2 and 3 settings are used for determining the liquid temperature set point the same as in Manual Mode. If the Control Module has acquired an *approach temperature*, then the liquid temperature set point is determined as follows:

#### Liquid Temperature Set Point = *Approach Temperature* + 70 deg F

Manual Mode (S2 dip switch 4 in "On" position) -The S2 dip switch 1,2,3 settings are read by the Control Module and used to determine the liquid temperature set point when:

1) Y is first applied,

2) After initial startup mode completion, during the system control mode and no sooner than six

minutes after Y is applied.

The liquid temperature set point will not change during system start-up.

The dip switches should be set prior to initial application of the Y signal to the Control Module.

The dip switches should be set for each specific HVAC system based upon the following instructions:

#### 8c. Determine liquid temperature set point

Reference appropriate high side charging chart for liquid pressure for cooling units and head pressure for heat pump units.

Locate the high side pressure for 70 deg F outdoor temperature at the expected indoor wet bulb temperature in Table 2. Correct the high side pressure according to the specific unit being used. For Heat pumps subtract 7 psi, for cooling only units subtract 0 (zero) psi. Using the refrigerant properties chart, find the saturation temperature for the calculated liquid pressure. Subtract the anticipated sub-cooling temperature (typically 12 degrees) from the saturation temperature to obtain an estimate of the liquid temperature. Set S2 dip switch 1, 2 and 3 settings to the nearest liquid temperature set point in the table below.

S2 Dip Switch 4: Off - Automatic Mode (recommended setting) On - Manual Mode

LIQUID TEMP SET POINT°F	DIP SWITCH 1	DIP SWITCH 2	DIP SWITCH 3
70 °F	OFF	OFF	OFF
76 °F	OFF	OFF	ON
82 °F	OFF	ON	OFF
88 °F	OFF	ON	ON
94 °F	ON	OFF	OFF
100 °F	ON	OFF	ON
106 °F	ON	ON	OFF
112 °F	ON	ON	ON

#### Table 2. Liquid Temperature Set Point

#### 8d. LEDs

The Control Module contains two LEDs, one green and one red surface mount. See Figure 11 on page 10. The green LED is a status indicator labeled Lite Port on the Control Module and flashes at a  $\frac{1}{2}$  second on (plus fast blink at the end for lite port data) and  $\frac{1}{2}$  second off rate in the cooling mode. In the heating mode the green

LED is full on with a blink/flicker OFF (LitePort data transmission) every second.

The red LED is a small surface mount component located near the end of the large capacitor. The red LED is labeled ALERT on the Control Module. The red LED indicator is normally off. If the red LED is on or flashing then a fault is indicated according to the following:

If the cause of a fault is cleared or repaired then the red LED fault indication will clear with the removal and reapplication of 24 VAC power (Y) to the control.

#### Table 3. Control Module Red LED Status

Red LED Status	Results
Flashing: 1/10 Second ON 1/10 Second Off	Liquid Sensor Fault
Flashing: ½ Second ON ½ Second Off	Ambient Sensor Fault
ON continuously	I2C EEPROM Fault board failure. Not field repairable.

#### Control Module SSR LED.

The solid state relay (SSR) on the Control Module also contains a green LED indicator. This LED indicates when the solid state relay is energized by the control. If the control is cycling the fan then this LED will be on/off accordingly.

### 9. Attach the Information label

Attach the Information Label to the Control Box cover. This label identifies the fan motor cycling during low ambient operation.

### 10. System Check-Out

### 10a. 2/4YC \*\* and 4TC\*\* Units only

- Verify that the Control Module is installed and wired per the instructions contained within this installer's guide (J5-Blue connected to "B", J5-Yellow connected to "Y", J5-Orange connected to "Y", Liquid sensor installed and connected, ambient sensor installed and connected).
- If uncertain about S2 dip switch 1,2,3,4 settings, leave in the factory preset position.
- Apply power to the unit. Apply "Y" control signal.
- Verify the green LED is flashing at ½ second ON ½ second OFF rate.
- Verify no red LED faults are present.
- The fan should run continuously for a minimum of 10 seconds after "Y" is applied. After 10 seconds the control may begin to cycle the fan if the ambient outdoor temperature is 70 degrees or below. If the fan is cycling and the outdoor temperature is below 70 degrees, the control is

working. If after 10 seconds of "Y" application the fan is on continuously, the TEST Switch (S1) may be used to verify the Control Module has control over the fan. Momentarily depress the TEST Switch (S1) on the Control Module. The fan should then cycle 3 seconds on then 3 seconds off for 12 seconds.

**Note:** If the green LED on the Control Module is full on with a blink/flicker OFF every second make certain the orange wire from the Control Module is connected to "Y" per these instructions.

#### 10b. 2/4WC\*\* and 4DC\*\* Units Only

- Verify that the kit is installed and wired per the instructions contained within this installer's guide. (J5-Blue connected to "B", J5-Yellow connected to "Y", J5-Orange connected to "O", Liquid sensor installed and connected, Ambient sensor installed and connected).
- If uncertain about dip switch settings (S2-1,2,3,4), leave in the factory preset position.
- Apply power to the unit. Apply "Y" and "O" control signal.
- Verify the green LED is flashing at ½ second ON ½ second OFF rate.
- Verify no red LED faults are present.
- The fan should run continuously for a minimum of 10 seconds after "Y" and "O" have been applied. After 10 seconds the control may begin to cycle the fan if the ambient outdoor temperature is 70 deg or below. If the fan is cycling and the outdoor temperature is below 70 deg, the control is working. If after 10 seconds of "Y" application the fan is on continuously, the TEST Switch (S1) may be used to verify the Control Module has control over the fan. Momentarily depress the TEST Switch (S1) on the Control Module. The fan should then cycle 3 seconds on then 3 seconds off for 12 seconds.

**NOTE**: If the green LED is full on with a blink/ flicker OFF every second make certain the orange wire from the Control Module is connected to "O" per these instructions and the "O" signal is present.

The Control Module will leave the fan ON continuously during heating mode, that is No "O" signal present. The green LED is full on with a blink/ flicker off every second in the heating mode.

**Trane** 6200 Troup Highway Tyler, TX 75707-9010

The manufacturer has a policy of continuous product and product data improvement. It reserves the right to change design and specification without notice.