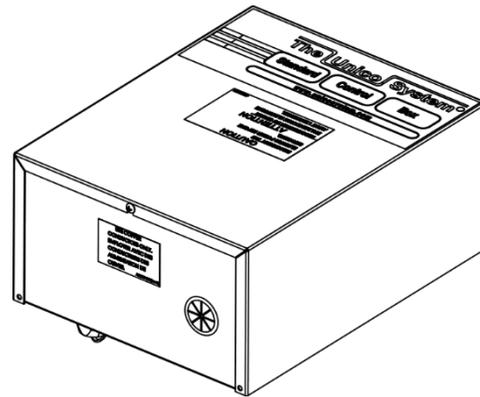


# Installation Instructions For the Single Speed Motor Control Box



**ST2 (version 2)**

## GENERAL INFORMATION

The information on the following pages is to provide the installer the necessary information to properly install the Unico Single Speed Motor Control Box (ST2). The ST2 control box is available as part of the blower assembly.

**Scope.** These instructions apply to the Unico Standard Control Box up to version 2.

**Table 1. Compatibility**

Ver.	Control Box P/N:	Blower Module	Mfr. Date
1	A00175-G02	M—BL1-ST2	Before June 2018
2	A00175-G03	M—BL2-ST2	After June 2018

**General Precautions and Safety Tips.** Do not attempt to install or startup unit without first reading the understanding the appropriate sections in *Bulletin 30-020* that is supplied with the blower module.

Before operating, be sure the unit is properly grounded.

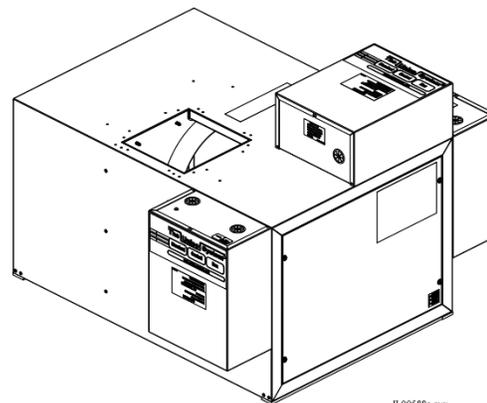
Installation should be in accordance with all local codes and regulation, including the codes and regulation from the National Fire Protection Association (NFPA), the National Electric Code (NEC), the International Mechanical Code (IMC) and the International Residential Code (IRC). In case of conflict, local codes take precedence.

The control box is a component of the Unico System air handlers which are safety certified to UL 1995 and listed with ETL.

## LOCATION AND MOUNTING

Before installing the control box, inspect thoroughly for any damages made during shipping. Notify carrier immediately if there is any damage.

The control box can be installed in one of two positions when in the horizontal configuration and one of three positions in the vertical configuration. Chose the position that allows for the best access.



**Figure 1. Control Box Mounting Locations**

**CAUTION**  
**The control box must be screwed to the air handler to provide proper ground for the motor.**

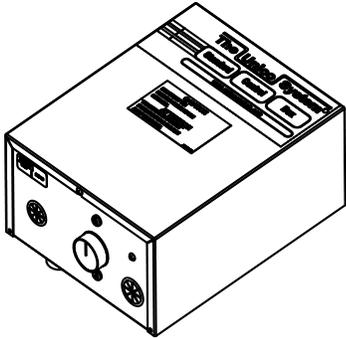
The large knock-out on the air handler must be removed to allow the motor cable connector to protrude into the air handler space.

**CONTROL BOX VERSIONS**

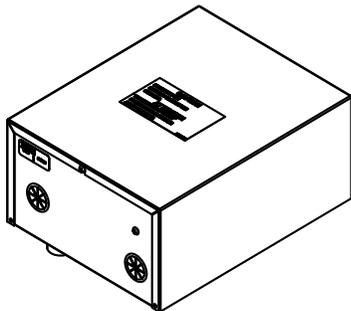
The ST2 version 2 control box replaces version 1 as of June 2018 (figure 2). The following describes the primary difference.

**Version 1 (BL1).** Includes a variable speed controller to adjust the motor for constant ventilation. If this feature is needed, then use the more efficient EC motor and control box.

**Version 2 (BL2).** Includes a field installed relay for proper heat pump operation, or for hydro-heating with a hot water coil.



A00175-G02 Control Box (MxxxxBL1-ST)



A00175-G03 Control Box (MxxxxBL2-ST)

1L000585a.cvx

**Figure 2. Unico Control Box Options**

**WIRING**

**WARNING!**  
**DISCONNECT ELECTRICAL SUPPLY BEFORE WIRING UNIT TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.**

All electrical wiring must comply with all local codes and ordinances. Blower module controls and components are bonded for grounding to meet safety standards UL Standard 1995 and CAN/CSA-C22.2 No. 236 and are listed by ETL. All 50 Hz units are CE marked and conform to the Low Voltage 73/23/EEC and EMC 89/336/EEC Directives.

**STEP 1. MOUNT CONTROL BOX.**

The control box must be mounted externally on the blower (figure 1). There are several possible locations: the top, the front, or the bottom of the blower module cabinet. The control box attaches by the base. Remove the knockouts on the cabinet for the motor cable and the frost switch wires to pass through. Then align the control box with the knockouts and attach the box to the cabinet with four sheet metal screws (included in the carton).

**STEP 2. SELECT PROPER CONDUCTOR SIZE**

Use a separate power supply with appropriate circuit protection and wire gauge per code. Electrical conductors size is based on wire type, wire length, temperature, and circuit protection capacity. The circuit protection, either fuse or circuit breaker, must be sized between the MCA and MOP as shown in table 2.

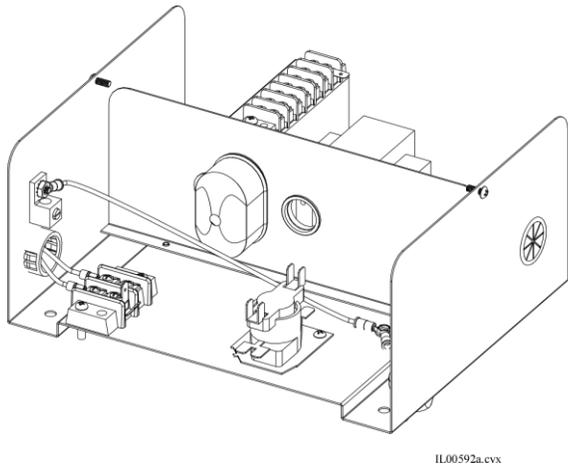
**Table 2. Blower Power Supply Specifications**

Model	M2430	M3036/3642/4860-
Power	1 Ø, 60 Hz, 208-230V	
FLA	3.0	6.2
MCA	3.8	7.8
MOP	15	15

FLA = Motor Full Load Amperage, amps  
 MCA = Minimum Circuit Ampacity, amps  
 MOP = Maximum Overcurrent Protection, amps

### STEP 3. POWER SUPPLY WIRING

Connect the power supply to terminals L1 and L2, sometimes marked L1 and N. The equipment ground must also be connected to grounding lug.



### STEP 4. SELECT VOLTAGE

The transformer primary is 208 or 230V. The unit is pre-wired for 230V at the factory. For 208V power supply, the 208V transformer wire must be connected instead of the 230V wire.

**WARNING!**

**BE SURE TO INSULATE THE INUSED TRANSFORMER LEAD TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.**

The low voltage transformer is factory set for a primary voltage of 230V. If power supply is 208V, remove ORANGE lead from L2 terminal and connect RED lead to L2. Insulate the connector on the unused wire lead.

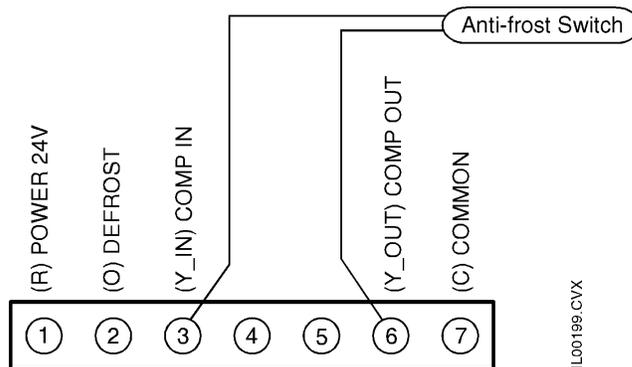
### STEP 5. Unit Internal Wiring

The ST2 control box (P/N: A00175-G03) operates a single speed blower motor.

The control box includes a 24-volt transformer, the blower relay, and terminal blocks. Space is provided for an additional relay (shipped loose) used as needed.

**AC or heat pump systems.** Refrigerant coils have a coil anti-frost sensor/switch that must be connected to the control box. The switch and its wires are already on the coil from the factory (located on the refrigerant coil accessible from the TXV access panel). Route the anti-frost switch lead wires through the interior of the modules to the control box.

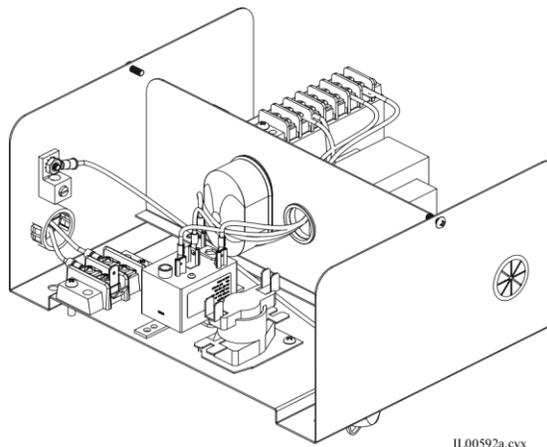
Connect the leads to terminals #3 and #6 of the low voltage terminal block (figure 3).



**Figure 3. Anti-frost switch**

**Heat pump systems.** Use the extra relay for heat pump systems to prevent the system from nuisance trips. The relay will jump across the anti-frost switch (AFS) to prevent it from shutting the system off during defrost.

Install the relay inside the control box (figure 4) and connect the brown wires to the low voltage terminal block (figure 5).



**Figure 4. Relay installation**

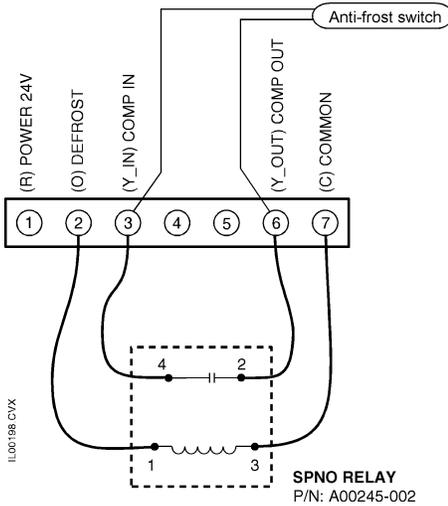


Figure 5. Heat pump frost switch bypass relay

**Hydro-heat systems.** For systems that use a hot water coil, install the additional relay. The relay is used to turn on the boiler or boiler pump (figure 6). Be sure to use a thermostat designed for electric furnaces so that the thermostat will turn on the fan using the G circuit.

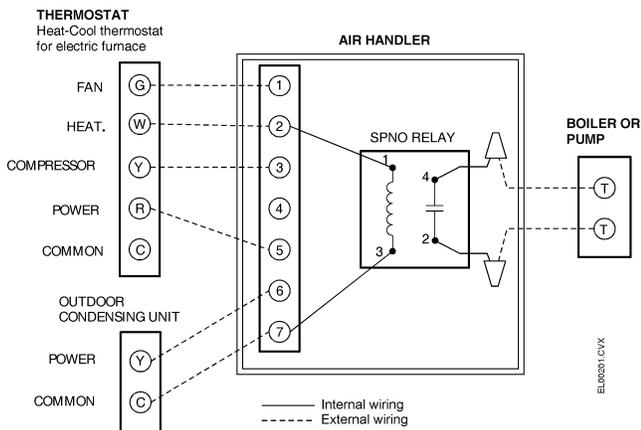


Figure 6. Cooling and Heating with hot water

**STEP 6. EXTERNAL CONTROL WIRING**

Next, connect the control wiring per figures 7 through 9. For units with electric duct heaters, refer to *Bulletin 30-34*. Match thermostat anticipator settings for combined amperage load of all components, including electric heater contactors, to prevent damage to thermostat. Refer to the full wiring schematics shown in Figures 10-17.

Use the following wiring diagrams to connect the external devices.

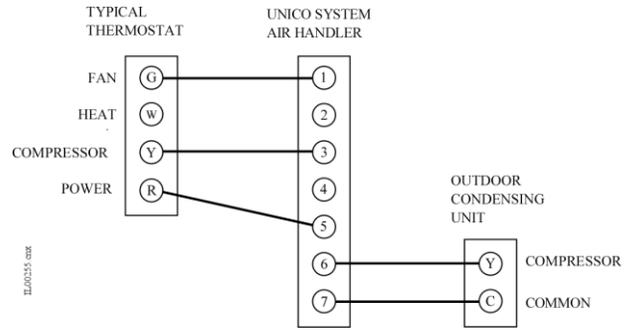


Figure 7. Cooling-only

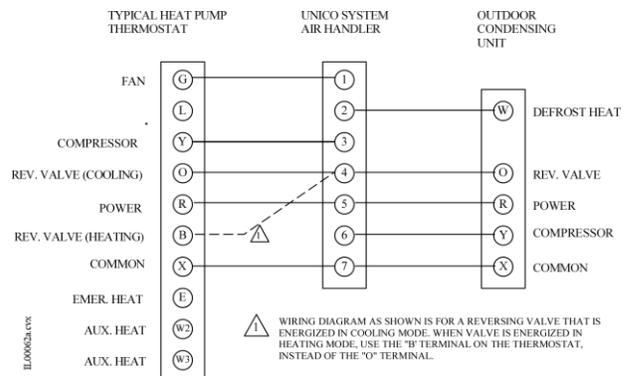


Figure 8. Heat pump without electric heat

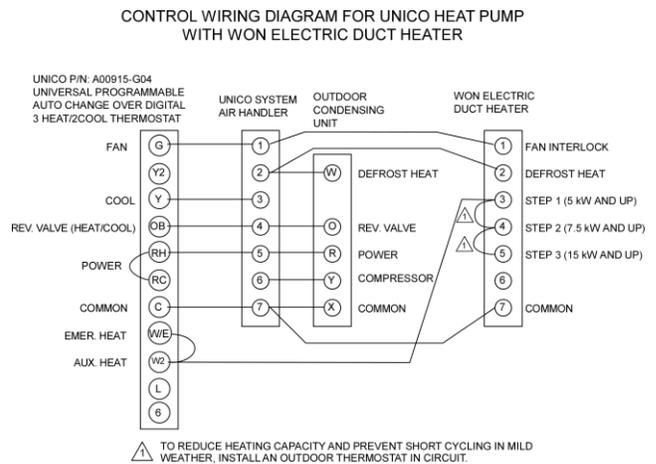


Figure 9. AC or heat pump with electric heat

**VENTILATION SPEED (VERSION 1 ONLY)**

The A00175-G02 control box (BL1) is obsolete. The BL2 (A00175-G03) control box is used in direct replacement of the control box used on the BL1 module. The -G02 control box is very similar to the -G03 control box except that it has three relays and one variable speed controller.

The controller is set at the factory to provide constant ventilation anytime the speed switch is turned in the ON position. To turn on or off this feature at the thermostat refer to the supplementary wiring diagrams for instructions (Figures 9-12).

The A00175-G02 (for replacements only) control box is factory configured to energize the fan at full speed whenever there is a call for heat or cool, or when the fan switch is set to ON.

The unit can be set for constant ventilation at the air handler whenever the fan switch is in the AUTO position and there is no call for heat or cool. There is a variable speed switch on control box which can be adjusted for the desired speed. The variable speed control is set to the OFF setting at the factory. To enable this feature, we recommend setting it to the lowest speed (fully clockwise).

In this configuration, the ventilation speed can only be adjusted or turned off or on using this switch. This can be inconvenient if the unit is not easily accessible. To allow the user to turn the ventilation speed mode on or off at the thermostat using the FAN switch, the factory wiring can be modified as shown in figures 9-12, depending on the configuration. To accomplish this, two wires inside the control box must be moved as described on the wiring schematics.

**MEASURING AIRFLOW**

To determine the airflow when using the single speed motors, remove the control box cover and measure the current with an amp meter and compare to Motor Amperage table below.

**Table 3. Motor Amperage**

Model	Hz	CFM	L/s	Amperage	
				208V	230V
U1218	60	200	94	1.21	1.22
		300	142	1.45	1.36
		400	189	1.74	1.65
2430	60	200	94	1.73	1.73
		300	142	2.00	1.97
		400	189	2.34	2.34
3036	60	700	330	3.00	2.287
		800	378	3.37	3.20
		900	425	3.75	3.51
		1000	472	4.25	3.83
3642	60	700	330	3.00	3.00
		800	378	3.37	3.30
		900	425	3.75	3.51
		1000	472	4.13	3.83
4860	60	800	378	3.13	3.06
		1000	472	3.63	3.46
		1200	566	4.25	3.96
		1250	590	4.41	4.09

**STARTUP****! IMPORTANT !**

**The most important step when installing the Unico System is making sure it has the correct airflow. Be sure to record the amperage and voltage of the Standard Blowers in order to verify the airflow through the unit. Also, measure the airflow at each outlet to verify the airflow in each room. Both methods are described later in this section.**

**Sequence of Operation.** The sequence of operation depends greatly on the options installed and type of control thermostat used. Most thermostats have a fan AUTO-ON switch. When the fan switch is set to ON, the “G” circuit is closed and the blower relay is energized. The indoor blower starts after about a 20 second delay. The following paragraphs describe the sequence of operation when the fan is set to AUTO. If the fan switch is set to ON, the sequence is the same except the “G” circuit is always closed and the indoor fan is always operating.

**Cooling Cycle (A/C or Heat Pump).** When the thermostat calls for cooling, the “Y” and the “G” circuits are closed, and a 24 V signal is sent to the compressor contactor in the outdoor unit and fan relay in the indoor unit. After about 20 seconds, the indoor blower starts. At the same time, the compressor and outdoor fan also start. Depending on the control circuitry in the outdoor unit, there may be a time delay before the outdoor unit starts. If the system was just turned off, the time delay could be as much as five minutes. The cooling system is now operating.

For heat pump thermostats setting the switch to ‘cooling’ immediately closes the “O” circuit, which is used to energize the reversing valve solenoid if required by the heat pump. Otherwise, the “B” circuit, which closes when switched in heating, is used to energize the reversing valve solenoid. (Refer to the heat pump manufacturer’s instructions to see which mode the solenoid needs to be energized – whether in heating or cooling.). When the thermostat is satisfied, the 24 V signals are opened, and the outdoor unit stops. The indoor blower continues to operate for about 40 seconds, then stops. The system is now off.

**Heating Cycle (Heat Pump).** Setting the thermostat to HEATING will automatically switch the reversing valve solenoid. This setting closes the “B” circuit which sends a 24V signal to energize the solenoid if required by the heat pump. Otherwise the “B” circuit is not used, and the solenoid is not energized during heating.

When the thermostat calls for heating, the “Y” and “G” circuits are closed, sending a 24 V signal to the compressor contactor in the outdoor unit and the fan relay in the indoor unit. This starts the indoor blower and the outdoor compressor. There is a time delay of about 20 seconds for the indoor unit. The heating system is now operating in stage one.

If the first stage does not satisfy the thermostat, the second stage thermostat calls for more heat. This closes the “W2” contacts and energizes the sequencer for electric heat (if installed). When the second stage thermostat is satisfied, the “W2” circuit is broken, and the sequencer is de-energized. The electric heating system is now off.

When the first stage thermostat is satisfied, the 24 V signals are opened, and the outdoor unit stops. The indoor blower continues to operate for about 40 seconds, then stops. The system is now off.

**Heating Cycle (Electric Heat-Only).** When the thermostat calls for heating, the “W” and “G” circuits are closed. The W circuit completes the 24V signal to the sequencer in the electric duct heater, which cycles on the electric heating elements. The G circuit completes the 24V signal to the fan relay in the indoor unit, which starts the indoor blower after a time delay of about 20 seconds. The heating system is now operating.

When the thermostat is satisfied, the 24 V signals are opened, and the indoor blower stops after about 40 seconds. At the same time the sequencer cuts the power to the electric elements. The system is now off.

**Note: Use a thermostat designed for electric heat. A normal heating-cooling thermostat will not close the “G” circuit on heating.**

Wiring Diagrams

M---BL2-ST1 (Version 2)

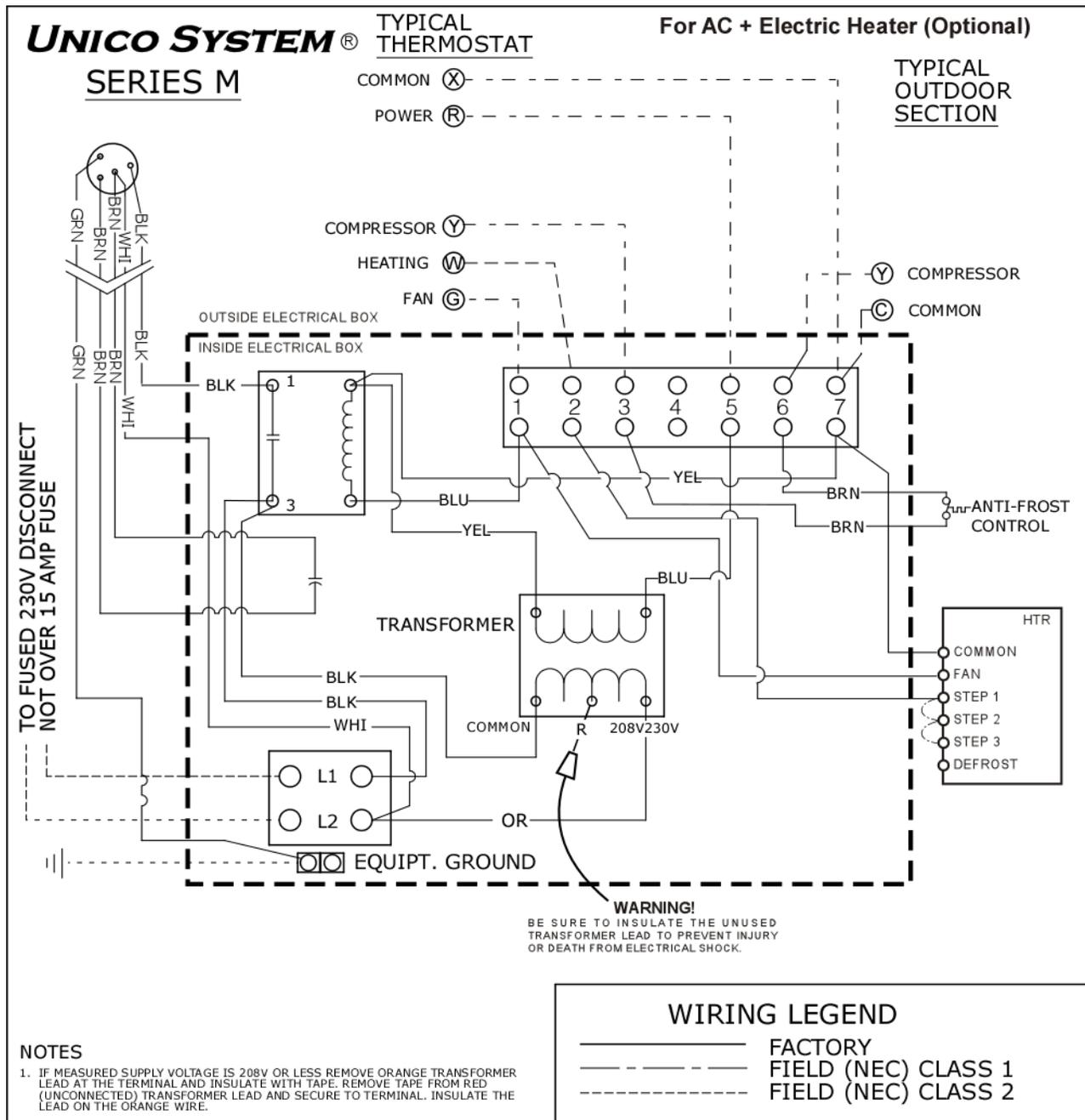
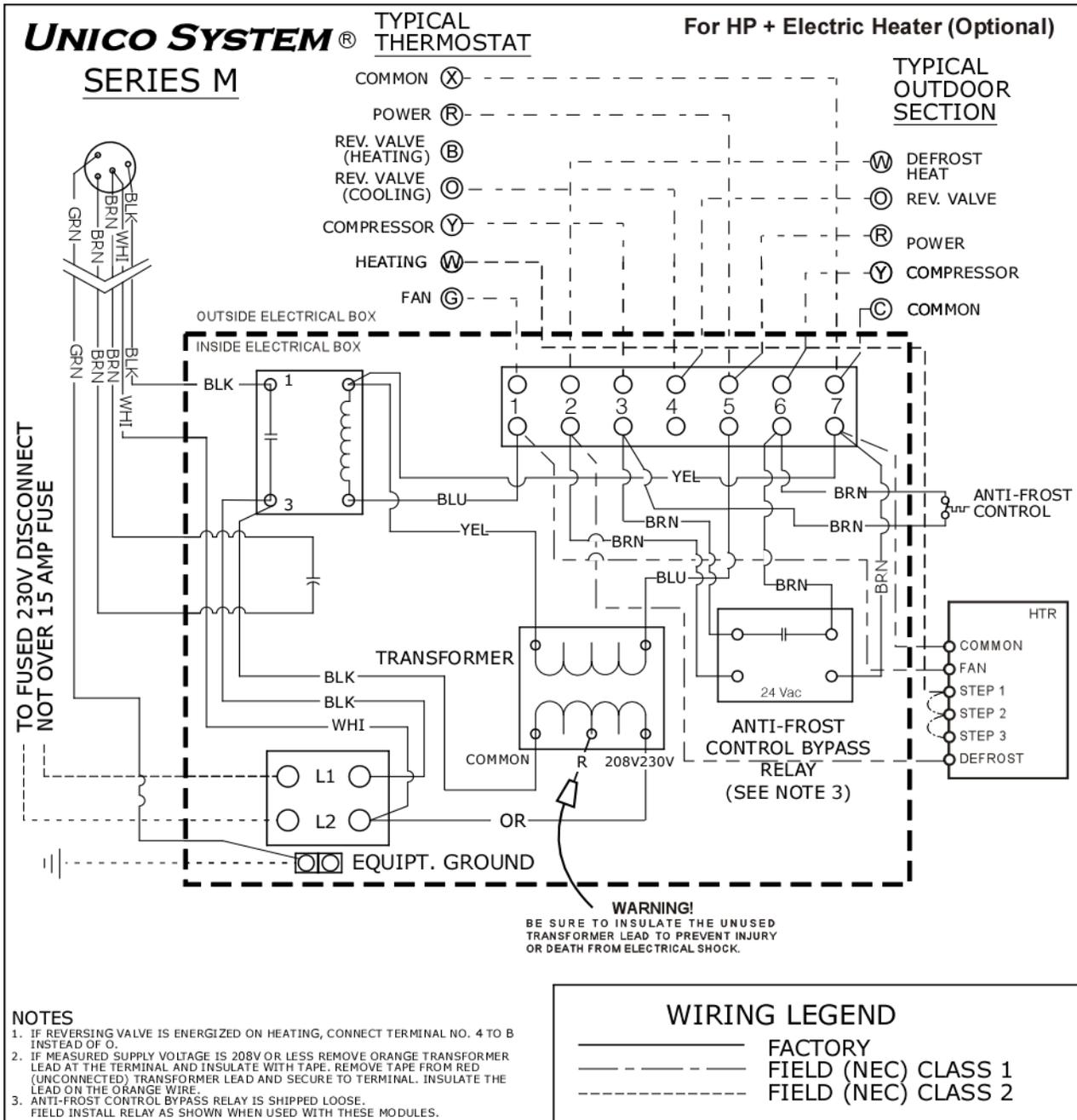


Figure 10. A00175-G03 (Ver. 2) Control Box Wiring Schematic for AC and Electric Heat (Optional)



EL00195a.cvx

Figure 11 . A00175-G03 (Ver. 2) Control Box Wiring schematic for HP and Electric Heat (Optional)

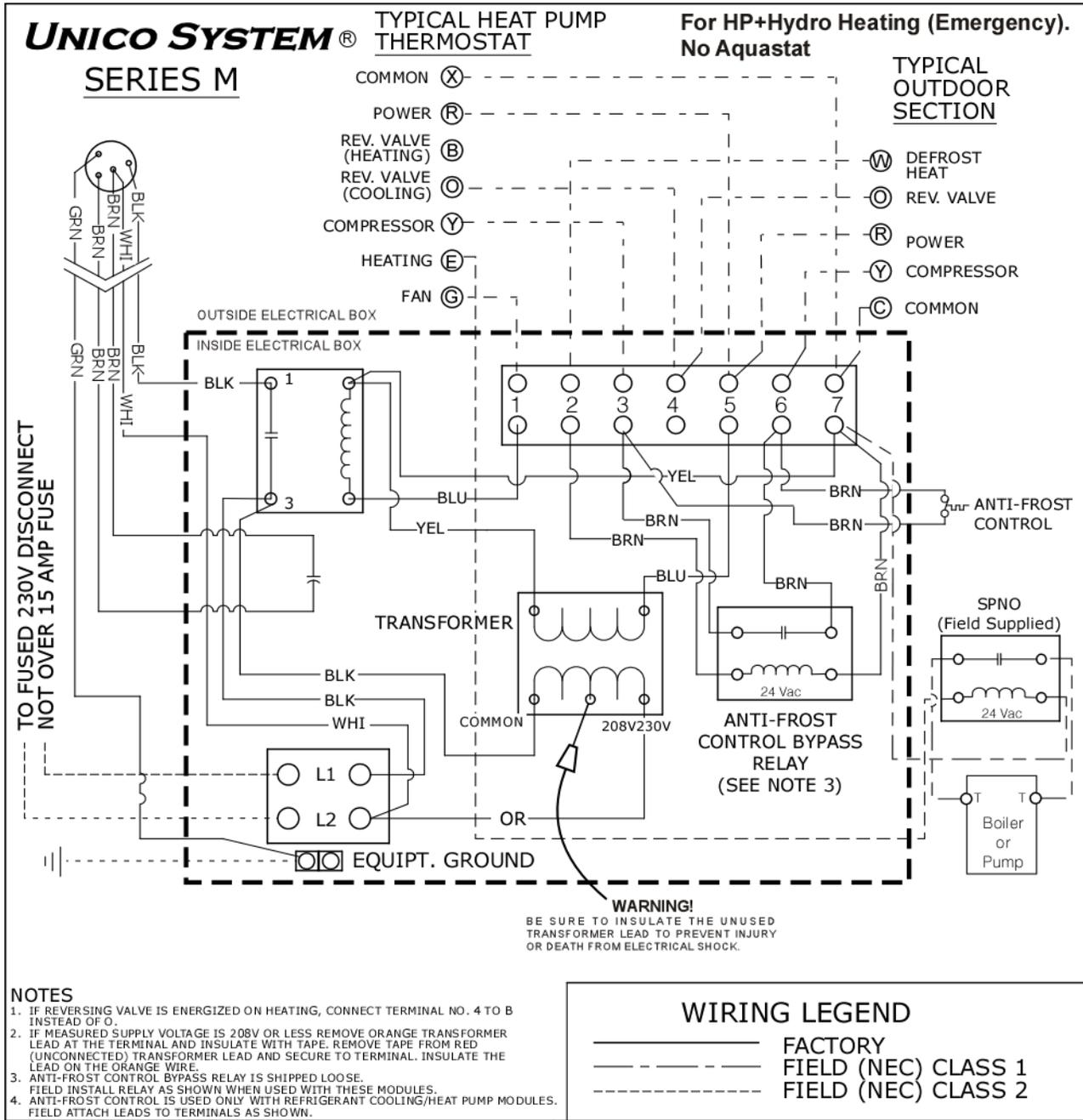
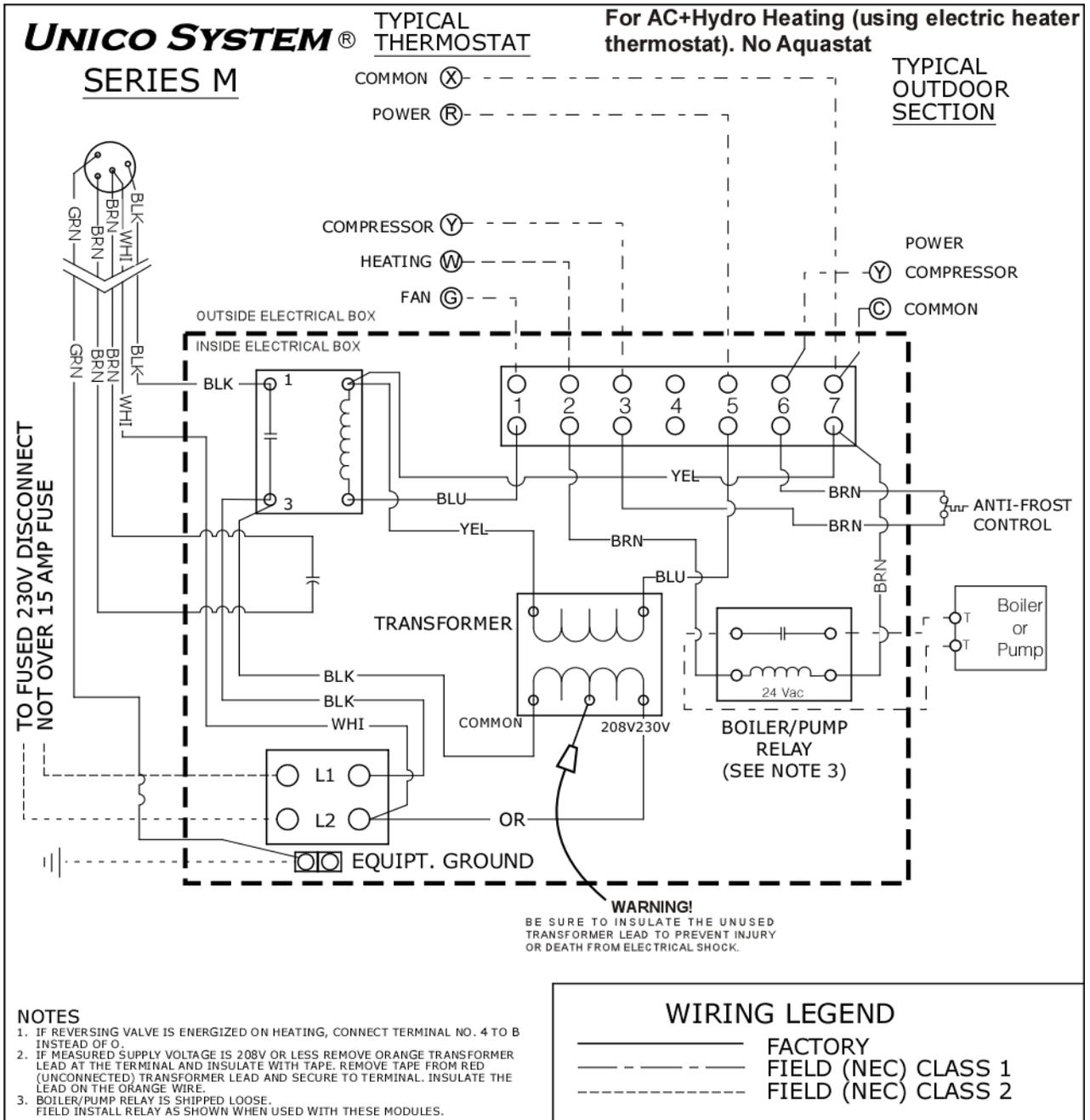


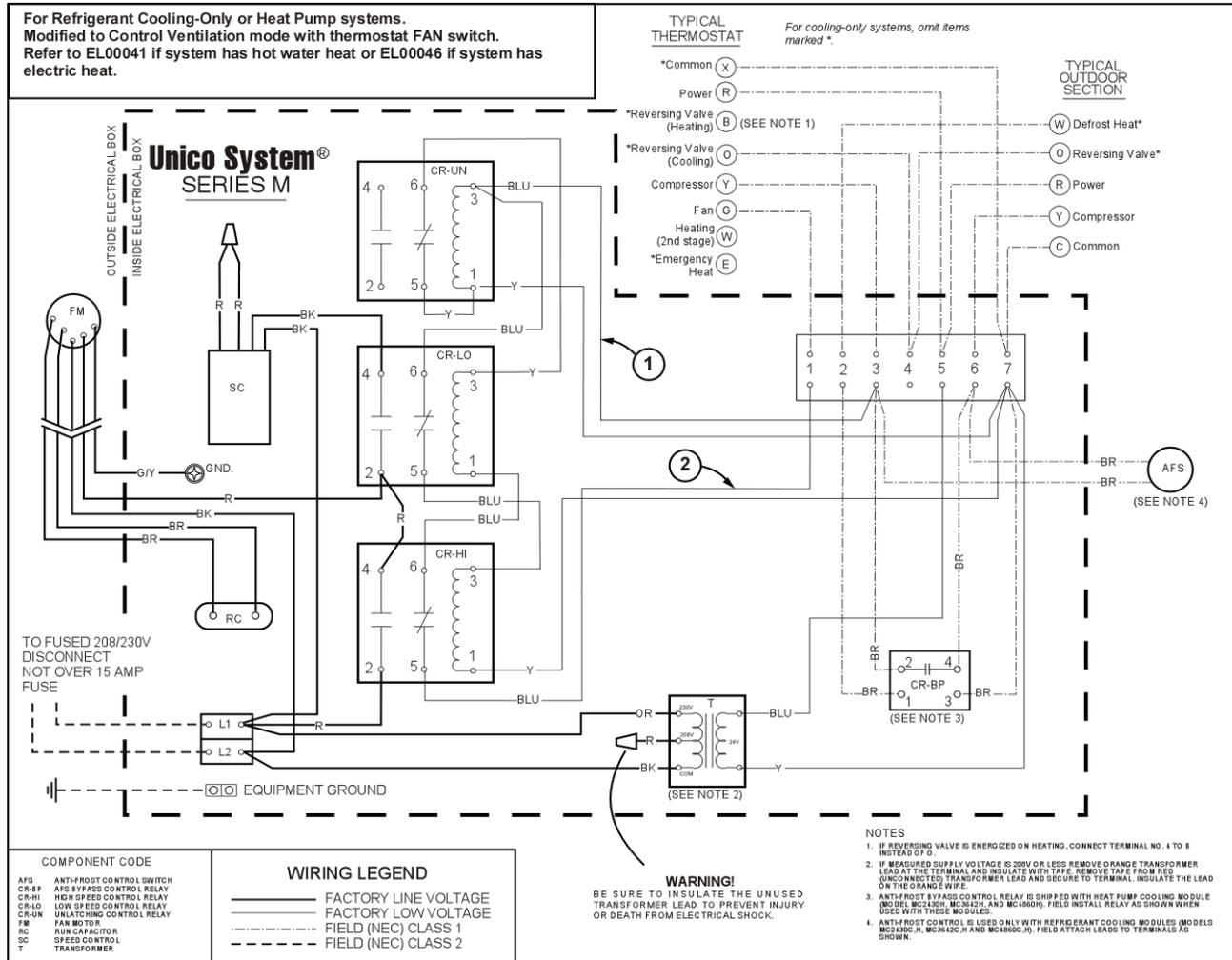
Figure 12 . A00175-G03 (Ver. 2) Control Box Wiring schematic for HP and Hydro Heating (Emergency) without Aquastat.



EL00197a.cvx

Figure 13 . A00175-G03 (Ver. 2) ST2 Control Box Wiring schematic AC and Hydro Heating (using electric heater thermostat) without Aquastat.

M----BL1-ST2 (Version 1)

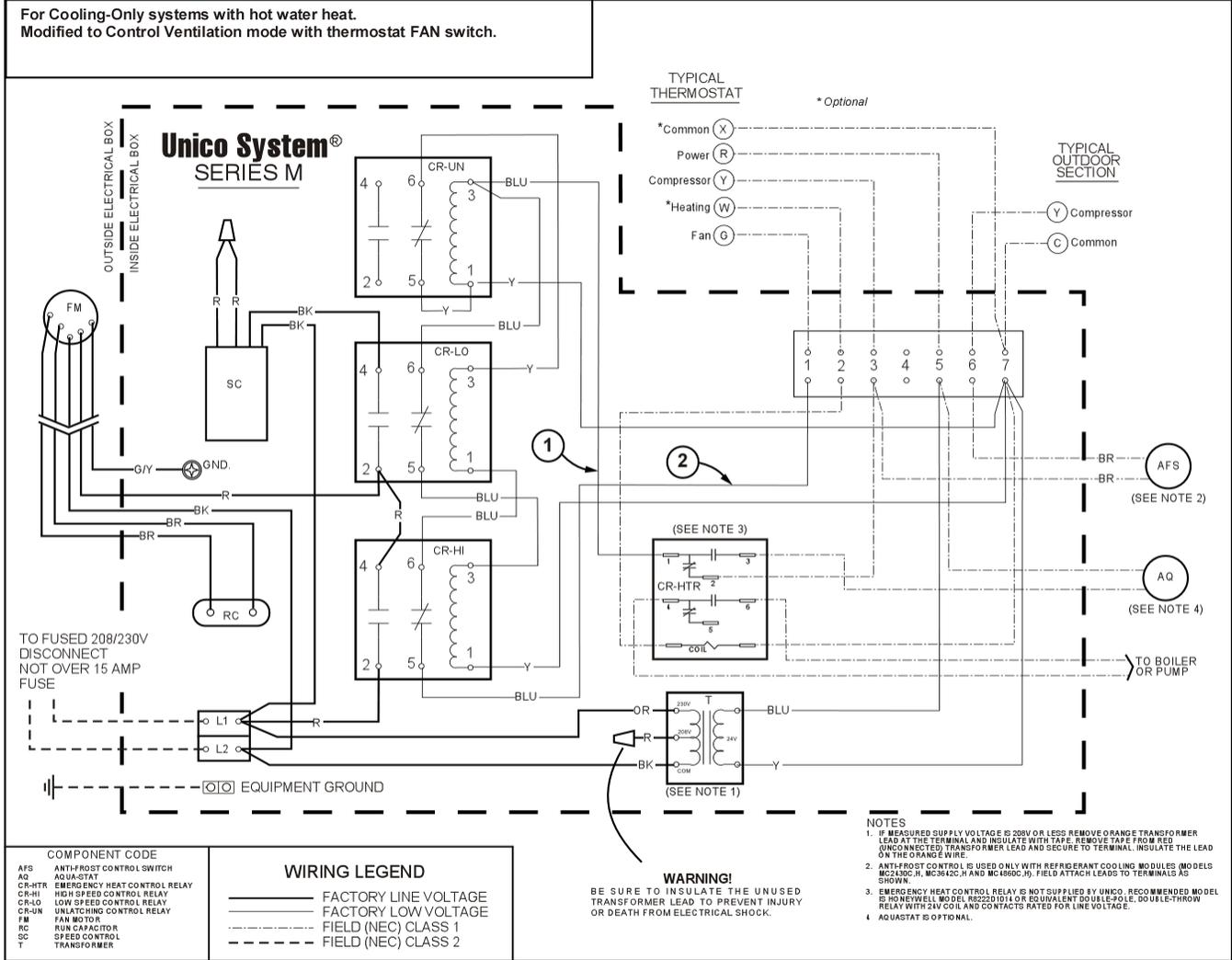


① This wire is connected to terminal 1 of low voltage terminal box at the factory. Remove and connect to terminal 3 as shown.

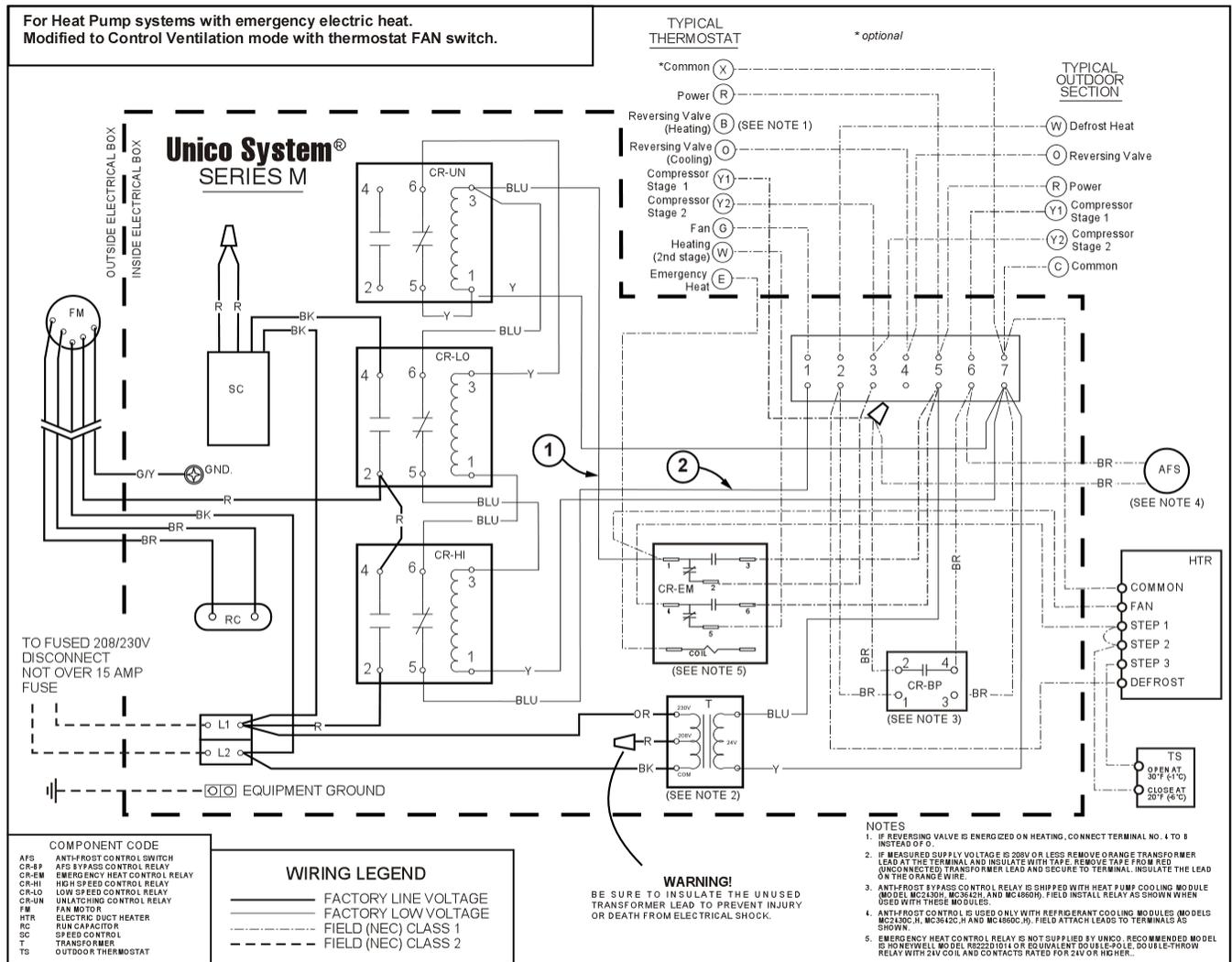
② This wire is connected to terminal 5 of low voltage terminal box at the factory. Remove and connect to terminal 1 as shown.

EL00040.cvx

**Figure 14. A00175-G02 (Ver 1.) Control Box Wiring Schematic for Cooling-Only or Heat-Pump without Supplemental Heat (modified to control ventilation speed mode at thermostat)**



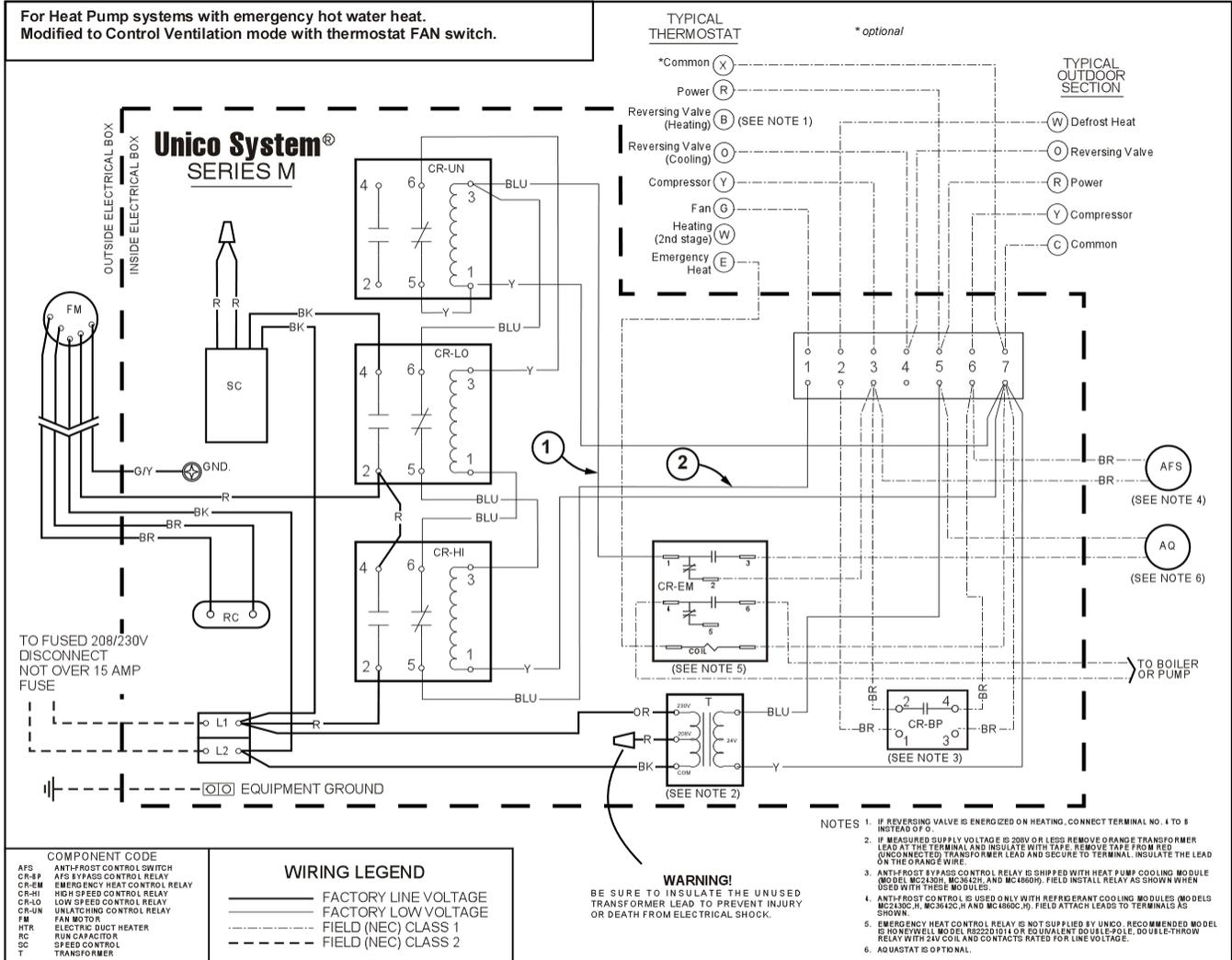
**Figure 15. A00175-G02 (Ver. 1) Control Box Wiring Schematic Refrigerant Cooling with Hot Water Heat**



① This wire is connected to terminal 1 of low voltage terminal box at the factory. Remove and connect to Emergency Heat Relay as shown.

② This wire is connected to terminal 5 of low voltage terminal box at the factory. Remove and connect to terminal 1 as shown.

**Figure 16. A00175-G02 (Ver. 1) Control Box Wiring Schematic Heat-Pump with Supplemental Electric Duct Heater (second stage)**



① This wire is connected to terminal 1 of low voltage terminal box at the factory. Remove and connect to Emergency Heat Relay as shown.

② This wire is connected to terminal 5 of low voltage terminal box at the factory. Remove and connect to terminal 1 as shown.

EL00047.cvz

**Figure 17. A00175-G02 (Ver 1.) ST2 Control Box Wiring Schematic Heat-Pump with Supplemental Hot Water Heat (second stage)**

Certified to UL Standard 1995  
Conforms to CAN/CSA Standard C22.2 NO. 236



Unico products comply with the European regulations that guarantee product safety.