
USER'S GUIDE

BARD-LINK™ LC1000/LC1500 SOLID STATE DUAL UNIT LEAD/LAG CONTROLLER & TEC-EYE™ HAND-HELD DIAGNOSTIC TOOL



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual : 2100-621A
Supersedes: 2100-621
Date: 3-10-16

CAUTION

The Bard DC Free Cooling System has been pre-programmed with what is widely considered to be the best settings for efficiency and operation. Any changes to internal programming through the LC-Series Controller or the TEC-EYE™ not covered within this manual may cause the systems to operate improperly, cause internal damage to the HVAC units, cause the shelter to overheat, or other very serious consequences. Although complete controller programming architecture for both the LC-Controller and TEC-EYE™ has been provided, going outside the boundaries of what has been covered in this manual is not recommended.

NEED ASSISTANCE?

This document contains the most current product information as of this printing. For the most up-to-date product information, go to www.bardhvac.com where there are links to product specifications, installation instructions, replacement parts manuals and wiring diagrams. Should any assistance be required during the installation or servicing of this product, contact the Bard Technical Service Department at 419.636.0439.

BARD LINK™ CONTROLLER

FIGURE 1
Bard-Link™ Controller Display



ALARM KEY

Allows viewing of active alarms
Silences audible alarms
Resets active alarms

MENU KEY

Allows entry to Main Menu

ESCAPE KEY

Returns to previous menu level
Cancels a changed entry

UP KEY

Steps to next screen in the display menu
Changes (increases) the value of a modifiable field

ENTER KEY

Accepts current value of a modifiable field
Advances cursor

DOWN KEY

Steps back to previous screen in the display menu
Changes (decreases) the value of a modifiable field

BARD LINK™ CONTROLLER USER INTERFACE

The microprocessor control used in these wall mount air conditioners allows for complete control and monitoring through the use of the Bard Link™ LC1000 or LC1500 controller. These controllers utilize the latest in state-of-the-art technology including a large, easy-to-read backlit LCD graphic display.

The menu driven interface provides users the ability to scroll through three menu levels: Info, Control and Service. The menus permit the user to easily view, control and configure the unit.

The controller is completely programmed at the factory; therefore, most applications will require no field set-up. However, the default setpoints and their ranges are easily viewed and adjusted from the controller display. The program and operating parameters are permanently stored on FLASH-MEMORY in case of power failure. The controller is designed to manage temperature levels to a user-defined setpoint via control output signals to the wall-mount air conditioning system.

WEB CARD COMMUNICATION BOARD

A web card communications board allows remote access, via Ethernet, to all functions of the controller system. This is the same as if one was in the building where the controller system is physically installed.

CONTROLLER POWER-UP

Whenever power is first applied to the controller, there is a forty (40) second time delay prior to any function (other than display) becoming active.

CONTROLLER INTERFACE ACRONYMS

SAT – Supply air temperature
RAT – Return air temperature
OAT – Outdoor air temperature
OAH – Outdoor air humidity
Dew – Dewpoint temperature
Sp – Temperature setpoint
Space – Space temperature
U1 – Unit 1
U2 – Unit 2
F – Indoor blower status
D – DC free cooling damper position status
EM – Emergency ventilation mode
C1 – Compressor activate status/
Compressor stage 1 activate status
HT – Heater status
OA Dew Point – Calculated outdoor dew point
FC – DC free cooling status
RN – Component run time in minutes in last hour
ST – Number of start requests in last hour
Dp – DC free cooling damper

CONTROLLER INTERFACE MENU STRUCTURE

On/Off Unit
Setpoint
Clock/Scheduler
Input/Output
 Analog Inputs
 Digital Inputs
 Relay Outputs
 Analog Outputs
Alarm History
Technician
 Information
 BMS Configuration
 Service Settings
 Control Loops
 Probe Adjustment
 Manual Management
 Analog Inputs
 Digital Inputs
 Relay Outputs
 Analog Outputs
Factory
 Configuration
 I/O Configuration
 Factory Settings
 Initialization

In addition to the menu structure above, there are also Status and Alarm screens.

Press the MENU key from any screen to return to the Main Menu. Press the UP or DOWN keys to scroll through the available menus. When the desired menu is highlighted, press the ENTER key to access that menu. Press the ESCAPE key or MENU key to return to the STATUS screen from the Main Menu.

NOTE: Normal operating setpoints have been locked and cannot be changed permanently, except by remote access. Any changes made to normal operational setpoints will be held for only 60 minutes. The following programming for typical application items can be accessed/changed locally and will not revert back after 60 minutes.

Comfort Mode

1. Press and release the ENTER key for comfort mode to change the Cooling Setpoint to 72°F for a period of 1 hour.
2. Setpoints will return to the programmed settings automatically after 1 hour.
3. The status screen will display COMFORT MODE while in override mode.
4. Pressing the ENTER key during the 1-hour period will deactivate COMFORT MODE.

Status Screen

The STATUS screen is the default start-up screen and also the return screen after 5 minutes of no activity. The screen can be accessed any time by pressing the ESCAPE button repeatedly.

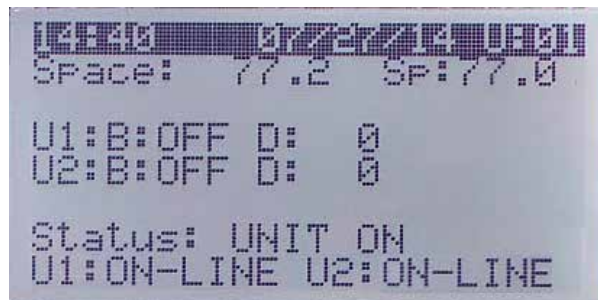
The main screen of the STATUS screen displays the current date, time, space temperature and temperature setpoint. The same screen will also show the current system operating status for Unit 1 (U1) and Unit 2 (U2).

The screen will display "B" for blower with "ON" or "OFF" and "D" for damper followed by the percentage that the damper is open. If the compressor is running, it will be noted by "C1".

Using the UP/DOWN keys, the user can scroll through a host of other information:

- SAT/RAT/OAT/OAH and dewpoints at either unit
- Last hour averages information
- Last hour tracking information

FIGURE 2
Controller Status Display



For the following items, press the MENU key to access programming.

Run Test

Execute a run test on each unit to verify the equipment is functioning correctly.

1. Go to Technician menu, press ENTER key.
2. Press Up or DOWN keys to get to Service Settings menu, press ENTER key.
3. Press Up or DOWN keys to get to Control Loops menu, press ENTER key.
4. Cursor will be flashing in upper left corner of screen. Press ENTER key to scroll to U1 Run Test.
5. Press UP key to change 'No' on screen to "Yes". Unit 1 will begin the run test.
6. After the Unit 1 run test ends, press ENTER key to scroll to U2 Run Test.
7. Press UP key to change 'No' on screen to "Yes". Unit 2 will begin the run test.

Run Test Approximate Timings (in Minutes)

Blower	On: 0:00
Damper	Open: 0:00 – 2:40
	Closed: 2:41 – 4:57
Compressor	On: 4:58
	Off: 6:00
Heat	On: 6:01
	Off: 7:10
Blower	Off: 8:19

Adjusting Date and Time

1. Go to Clock/Scheduler menu, press ENTER key.
2. Move the cursor to the selected choice by pressing the ENTER key.
3. Press UP or DOWN keys to change the date and/or time. The day will automatically change when the date has been altered.

Setting Continuous Blower

1. Go to Setpoint menu, press ENTER key.
2. Go to Blower Settings screen, move the cursor to the selected choice by pressing the ENTER key.
3. Press UP or DOWN keys to change the desired value:
Lead: Lead unit blower only
Both: Both units continuous

Advancing Lead/Lag Positions

1. Go to Clock/Scheduler menu, press ENTER key.
2. Go to Unit Rotation screen.
3. To switch lead unit: Move the cursor to the selected choice by pressing the ENTER key. Press UP or DOWN keys to change the desired value. Unit rotation will change from 1 to 2 or 2 to 1.

Changing to Celsius

1. Go to Factory menu, press ENTER key.
2. Go to Configuration menu. Move the cursor to Temperature Unit by pressing the ENTER key. Press UP or DOWN keys to change to °C. This will be a global change within the units on the structure; the temperature value will be displayed in °C for all locations within the display.

Calibrating Sensors

1. Go to Technician menu, press ENTER key.
2. Go to Service Settings menu, press ENTER key.
3. Go to Probe Adjustment, press ENTER key.
4. Move the cursor to enter the offset to the temperature value.

Example: The sensor reading displays on the screen as 80°F and the actual measured value

using a calibrated sensor is 77°F. Enter an offset of -3.0°F to display the temperature correctly. An offset of -9.9°F to +9.9°F can be entered.

Resetting Controller Model/Serial Numbers

1. Go to Factory menu, press ENTER key.
2. Go to Factory Settings screen, press ENTER key.
3. Press the ENTER key to move the cursor to the Serial Number selection. Press and hold UP or DOWN keys to get to the desired value and then press ENTER key. Repeat for the rest of the digits/characters: Press and hold UP or DOWN keys to get to the desired value and then press ENTER key to key in next digits/characters.
4. Model number is entered by the factory. In the case it is accidentally changed, the field technicians will need to enter the model number. Follow Step 3 above to enter the model number in the same fashion that the serial number was entered.

Configuring Additional Remote Indoor Temperature Sensors

Follow the steps below to configure additional remote indoor temperature sensors. The default remote sensor supplied by Bard is identified as B01, the first additional sensor added is B02 and the second additional sensor is B03.

1. Go to Technician menu, press ENTER key.
2. Go to Service Settings menu, press ENTER key.
3. Go to Control Settings, press ENTER key.
4. Use the ENTER key to select Remote Sensors. The number displayed is the quantity of additional remote indoor temperature sensors installed. The default setting is 0 meaning only the remote sensor supplied by Bard with the controller is installed.
5. Press the UP or DOWN keys to enter quantity of additional remote sensors installed—1 or 2.
6. Move the cursor to Control using the ENTER key to pick AVERAGE (default) or HIGHEST for the sensors to control and maintain space temperature.

Disabling One Unit/Control and Making the Controller Work with Only One Unit

1. Go to Setpoint menu, press ENTER key.
2. Press UP or DOWN keys to go to the screen where it displays Number of Units and press ENTER key.
3. Change the value of Number of Units by pressing the DOWN key once to change to One (1), then press ENTER key.

An outdoor unit may now be powered down for an indefinite period of time for repairs or maintenance. The controller will operate on one unit only.

Acknowledging/Clearing Alarms

Alarm conditions activate a red LED indicator that backlights the ALARM function key. As an option, an alarm condition may also be enunciated by an audible alarm signal. An alarm is acknowledged by pressing the ALARM key. This calls up alarm display screen(s) that provide a text message detailing the alarm condition(s). After an alarm condition is corrected, the alarm can be cleared by pressing the ALARM key.

Simulating Alarms (Smoke, Hydrogen, Generator Alarms)

NOTE: Both the smoke and Bard-supplied hydrogen detectors have manual test buttons on the face of the devices which may be easier to manipulate.

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Digital Inputs, press ENTER key.
4. Press the ENTER key to move the cursor to Smoke Manual DI 1 and press ENTER key.
5. Press UP or DOWN keys to change the value from "Open" to "Closed"; alarm activates.
6. Reverse procedure to terminate test.
7. Repeat steps for hydrogen and generator using programming lines Hydrogen DI and Generator Run DI 3.

Simulating Alarms (High/Low Temp, HVAC 1/2 Fail, Lag Alarms)

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Relay Outputs, press ENTER key.
4. Press the ENTER key to move the cursor to High Temp Relay 4 and press ENTER key.
5. Press UP or DOWN keys to change the value from "On" to "Off"; alarm activates.
6. Reverse procedure to terminate test.
7. Repeat steps using programming lines for low temp, HVAC fail and lag unit alarms.

Changing NC Contacts to NO Contacts

For lag unit on, high temp alarm, low temp alarm, HVAC 1 fail alarm and HVAC 2 fail alarm:

1. Go to Factory menu, press ENTER key.
2. Go to I/O Configuration, press ENTER key.
3. Go to Relay Outputs, press ENTER key.
4. Press UP or DOWN keys to scroll to the desired relay output.
5. Press the ENTER key to move the cursor to Direction; press the UP key to change the contact direction to NO (from default NC). Verify the status of this relay contact change to Off.
6. When cursor is flashing at top left, press UP or DOWN keys to make changes to other relay outputs if required.

TABLE 1
Controller Programmable Features and Default Settings

Description	Range	Default Setpoint	Units
Temperature at local remote (main) sensor	--	--	--
Temperature Setpoint*	65 - 90	77	°F
Heating Setpoint*	52 - 75	60	°F
Temperature High Limit - Level 1*	70 - 120	85	°F
Temperature High Limit - Level 2*	70 - 120	90	°F
Temperature Low Limit	28 - 65	35	°F
Cooling Stage Differential*	1 - 5	5	°F
Heating Stage Differential*	1 - 5	2	°F
Comfort Mode Setpoint*	65 - 80	72	°F
Comfort Mode Operation Time*	30 - 90	60	Minutes
DC Freecooling Setpoint	--	55	°F
Lead-Lag Changeover Time (Rotation)	1 - 30 days, or 0 for disabled	1	Day(s)
Temperature Units	°F/°C	°F	--

* Normal operating setpoints have been locked and cannot be changed permanently, except by remote access. Any changes made to normal operational setpoints will be held for only 60 minutes.

FIGURE 3
TEC-EYE™ Display



ALARM KEY

Allows viewing of active alarms
Silences audible alarms
Resets active alarms

MENU KEY

Allows entry to Main Menu

ESCAPE KEY

Returns to previous menu level
Cancels a changed entry

UP KEY

Steps to next screen in the display menu
Changes (increases) the value of a modifiable field

ENTER KEY

Accepts current value of a modifiable field
Advances cursor

DOWN KEY

Steps back to previous screen in the display menu
Changes (decreases) the value of a modifiable field

TEC-EYE™ HAND-HELD DIAGNOSTIC TOOL

The microprocessor control used in this wall mount air conditioning system allows for complete control and monitoring through the use of the provided TEC-EYE™ hand-held monitor. This comprehensive service tool utilizes the latest in state-of-the-art technology including a large, easy-to-read backlit LCD graphic display.

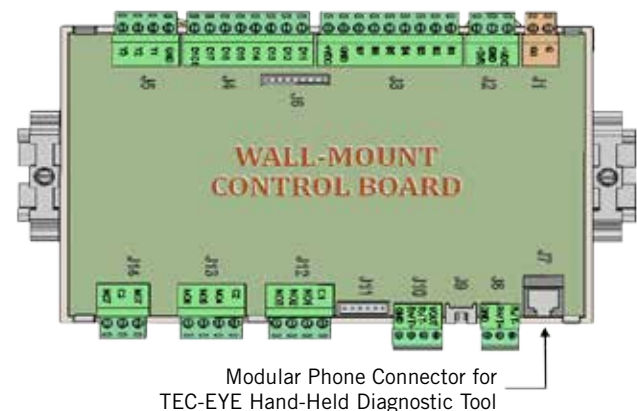
The menu driven interface provides users the ability to scroll through three menu levels: Info, Control and Service. The menus permit the user to easily view, control and configure the unit.

The controller is completely programmed at the factory; therefore, most applications will require no field set-up. However, the default setpoints and their ranges are easily viewed and adjusted from the TEC-EYE™ display. The program and operating parameters are permanently stored on FLASH-MEMORY in case of power failure. The controller is designed to manage temperature levels to a user-defined setpoint via control output signals to the wall mount air conditioning system.

The TEC-EYE™ connects to the wall-mount unit control board via an RJ11 modular phone connector as shown in Figure 4.

The TEC-EYE™ hand-held diagnostic tool should be stored somewhere inside the shelter, preferably close to the Bard-Link™ PLC controller. The TEC-EYE™ has integrated magnets on the back of the tool, so it can be attached to the front, sides, bottom, or top of the PLC control box.

FIGURE 4
TEC-EYE™ Connection to Unit Control



TEC-EYE™ Menu Structure

- On/Off Unit
- Setpoint
- Clock/Scheduler
- Input/Output
 - Analog Inputs
 - Digital Inputs
 - Relay Outputs
 - Analog Outputs
- Alarm History
- Technician
 - Information
 - Working Hours
 - Service Settings
 - Control Loops
 - Probe Adjustment
 - Manual Management
 - Analog Inputs
 - Digital Inputs
 - Relay Outputs
 - Analog Outputs
- Factory
 - Configuration
 - I/O Configuration
 - Factory Settings

In addition to the menu structure above, there are also Status and Alarm screens.

TEC-EYE™ Acronyms

SAT – Supply air temperature
RAT – Return air temperature
OAT – Outdoor air temperature
OAH – Outdoor air humidity
Sp – Temperature setpoint
Space – Space temperature
U1 – Unit 1
U2 – Unit 2
F – Indoor blower status
D – DC free cooling damper position status
EM – Emergency ventilation mode
C1 – Compressor activate status
HT – Heater status
OA Dew Point – Calculated outdoor dew point
FC – DC free cooling status
RN – Component run time in minutes in last hour
ST – Number of start requests in last hour

Press the MENU key to access the Main Menu screen. Press the UP or DOWN keys to scroll through the available menus. When the desired menu is highlighted, press the ENTER key to access that menu. Press the ESCAPE key or MENU key to return to the STATUS screen from the Main Menu.

NOTE: Normal operating setpoints have been locked and cannot be changed permanently, except by remote access. Any changes made to normal operational setpoints will be held for only 60 minutes. The following programming for typical application items can be accessed/changed locally and will not revert back after 60 minutes.

Status Screen

The STATUS screen is the default start-up screen and also the return screen after 5 minutes of no activity. The screen can be accessed any time by pressing the ESCAPE button repeatedly.

The STATUS screen displays the current date, time, return air temperature, supply air temperature, outdoor air temperature, outdoor humidity and dewpoint conditions. It also indicates the current system operating status for Unit 1 (U1) or Unit 2 (U2). The screen displays whether the blower is off or on and what percentage the damper is open.

FIGURE 5
TEC-EYE™ Status Display



For the following items, press the MENU key to access programming.

Executing a Run Test

Execute a run test on each unit to verify the equipment is functioning correctly.

1. Go to Technician menu, press ENTER key.
2. Press UP or DOWN keys to get to Service Settings menu, press ENTER key.
3. Press UP or DOWN keys to get to Control Loops menu, press ENTER key.
4. Cursor will be flashing in upper left corner of screen. Press DOWN key to scroll through screens to Run Test.
5. Press ENTER key to scroll to Enable. Press UP or DOWN keys to change No to Yes. Unit will begin the run test.

Run Test Approximate Timings (in Minutes)

Blower	On: 0:00
Damper	Open: 0:00 – 2:40
	Closed: 2:41 – 4:57
Compressor	On: 4:58
	Off: 6:00
Heat	On: 6:01
	Off: 7:10
Blower	Off: 8:19

Identifying a Unit Address

1. Go to On/Off Unit menu.
2. Screen will display individual address of wall-mount unit.

Manual Override Outputs

Blower

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Relay Outputs, press the DOWN key to get to Blower Relay Output. Move the cursor to the selected choice by pressing the ENTER key. Press UP or DOWN keys to change the Manual Relay and Manual Position to “ON.”
4. Press ESCAPE key, go to Analog Outputs.
5. Go to Blower Motor Analog Output, press Enter key to move the cursor to Mode. Change to Hand by pressing the UP key. Press ENTER key. Next change the Manual Value to test blower speed voltage for the unit model and press ENTER key. Refer to the unit blower speed voltages provided in Table 2; do not exceed the maximum speed voltage (VDC) for the unit model.

DC Free Cooling Damper

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Analog Outputs, press ENTER key.
4. Press DOWN key to scroll screens to Analog Output 2 Damper.
5. Press ENTER key to scroll to Mode line. Press DOWN key to change Auto to Hand.
6. Press ENTER key to scroll to Manual Value line; Press UP or DOWN keys to change the manual value to a desired value (maximum is 10VDC) to perform damper test.
7. Verify damper operation.

Compressor

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Relay Output, press ENTER key.
4. Go to Relay Output Cooling Stage. Press UP or DOWN keys to change Manual Relay to “ON”; press ENTER key. Press UP or DOWN keys to change manual position to “ON” and press ENTER key.
5. Verify compressor is running.

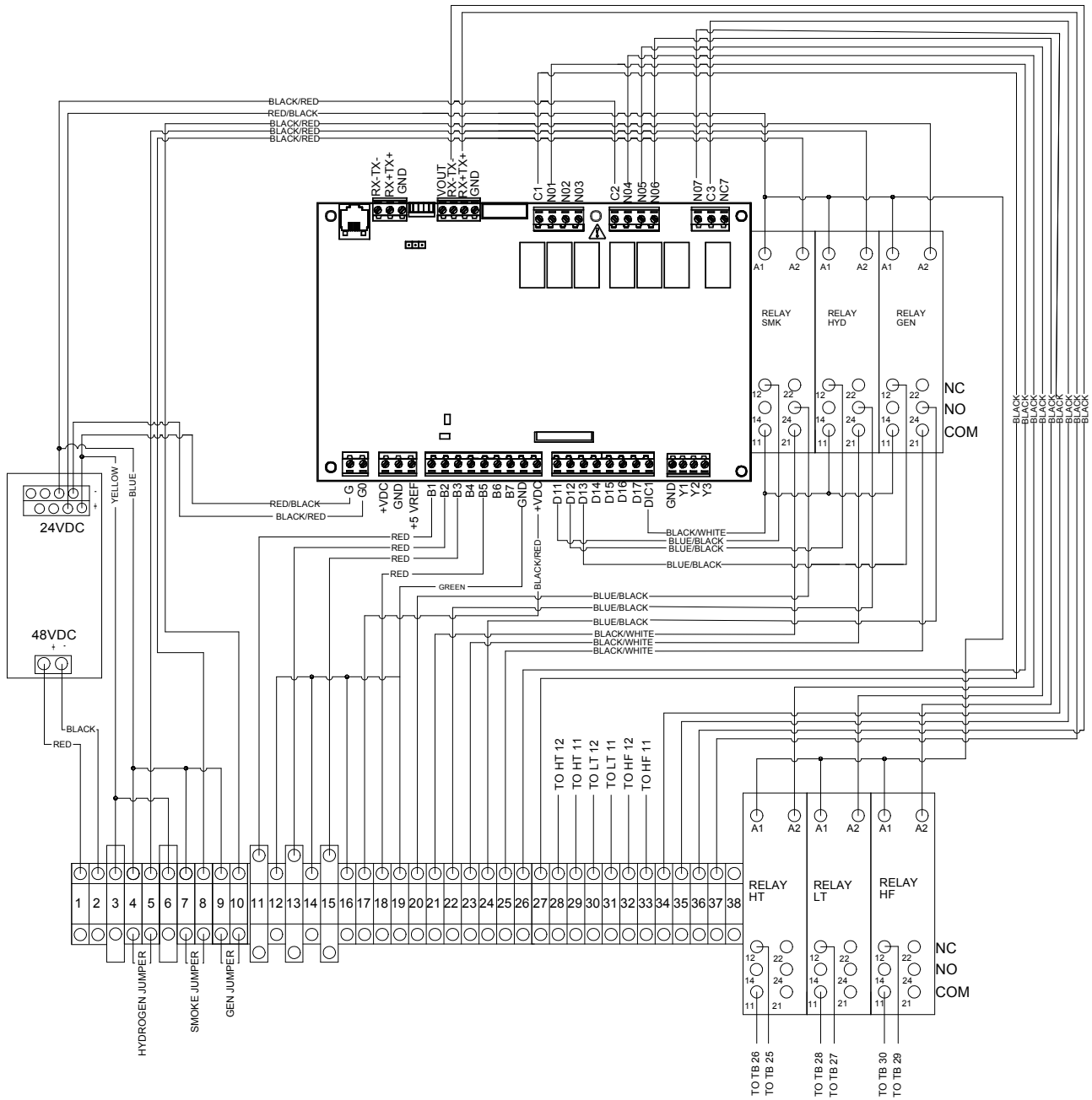
Heat

1. Go to Technician menu, press ENTER key.
2. Go to Manual Management, press ENTER key.
3. Go to Relay Output, press ENTER key.
4. Go to Relay Output Heating, press ENTER key.
5. Press UP or DOWN keys to change Manual Relay and Manual Position to “ON” and press ENTER key.
6. Verify heater “ON” status.

TABLE 2
Blower Speed Voltage Chart

Model	Blower Only	Free Cooling Mode (CFM/VDC Speed Voltage)	Free Cooling Mode Below 40°F (CFM/VDC Speed Voltage)	Cooling (CFM/VDC Speed Voltage)	Electric Heat
D36A/D36L	Same as Free Cooling Mode	1800/7.0	800/2.8	1100/3.8	1800/7.0
D42A/D42L			950/3.1	1250/4.7	
D48A/D48L			1100/3.8	1600/6.3	
D60A/D60L			1100/3.8	1600/6.3	

FIGURE 6
LC1000/LC1500 Wiring Diagram



MIS-3632A