SERVICE INSTRUCTIONS WITH REPLACEMENT PARTS LIST

LC6000-100 CONTROLLER

Part of the Bard Free Cooling Unit System

NOTE: ***LC6000 Controller is required for operation when multiple MULTI-TEC® W***AP wall-mount units are used.***

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

Manual : 2100-669B
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CONTENTS

FIGURES AND TABLES

Free Cooling Unit System

The Bard Free Cooling Unit system is composed of MULTI-TEC wall-mounted air conditioners matched with an LC6000 supervisory controller or Bard th-Tune stand-alone controller. If only one wall-mounted air conditioner is being used, it can be matched with either the LC6000 supervisory controller or a th-Tune stand-alone controller. If more than one wall-mount unit is installed, the LC6000 controller must be matched with the air conditioning units. The wall-mount units are specifically engineered for telecom/motor control center rooms.

NOTE: *The LC6000 supervisory controller and MULTI-TEC wall-mount units are designed specifically to work together. The controller cannot run other brands of systems, nor can other controllers run the MULTI-TEC wall-mount units. They are a complete system, and must be used together.*

Controller

LC6000 controller and accessories included shown below.

LC6000 Series

LC6000 Series
Programmable Logic
Controller

TEC-EYE™ Hand-Held
Diagnostic Tool
Bard P/N 8301-059

Remote Temperature/
Humidity Sensor*
(with 35' shielded cable)
Bard P/N 8403-079

Communication
EMI Filters
Bard P/N 8301-055

* One remote temperature/humidity sensor and 35' of 5-wire shielded cable are included with the LC6000 controller. If the site in which the LC6000 controller will be used has more than one zone (maximum three zones per LC6000), additional remote temperature/humidity sensors (one sensor per zone) will need to be purchased and installed in the additional zones. One additional temperature-only sensor (Bard P/N 8301-058) may also be used in Zone 1 but will also need to be purchased separately. Temperature-only sensors require field-supplied 2-wire shielded cable.

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

These instructions should be carefully read before beginning the installation. Note particularly any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See **Additional Publications** on page 4 for information on codes and standards.

Shipping Damage

Upon receipt of equipment, the cartons 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.

Additional Publications

These publications can help when installing the furnace. They can usually be found at the local library or purchased directly from the publisher. Be sure to consult the current edition of each standard.

National Electrical Code .....ANSI/NFPA 70

Standard for the Installation of Air Conditioning and Ventilating Systems .....ANSI/NFPA 90A

Standard for Warm Air Heating and Air Conditioning Systems .....ANSI/NFPA 90B

Load Calculation for Residential Winter and Summer Air Conditioning ..... ACCA Manual J

Duct Design for Residential Winter and Summer Air Conditioning and Equipment Selection ..... ACCA Manual D

For more information, contact these publishers:

Air Conditioning Contractors of America (ACCA)
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370 Fax: (202) 234-4721

American National Standards Institute (ANSI)
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900 Fax: (212) 302-1286

American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE)
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400 Fax: (404) 321-5478

National Fire Protection Association (NFPA)
Batterymarch Park
P. O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555 Fax: (617) 984-7057

ANSI Z535.5 Definitions:

DANGER: Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury. The signal word "DANGER" is to be limited to the most extreme situations. DANGER [signs] should not be used for property damage hazards unless personal injury risk appropriate to these levels is also involved.

WARNING: Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury. WARNING [signs] should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.

CAUTION: Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION [signs] without a safety alert symbol may be used to alert against unsafe practices that can result in property damage only.

NOTICE: [this header is] preferred to address practices not related to personal injury. The safety alert symbol shall not be used with this signal word. As an alternative to "NOTICE" the word "CAUTION" without the safety alert symbol may be used to indicate a message not related to personal injury.

NOTE: *Screenshots shown in this manual reflect default settings (when applicable).*

Alarm Adjustment

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 for 3 seconds.

Low Temperature Alarm

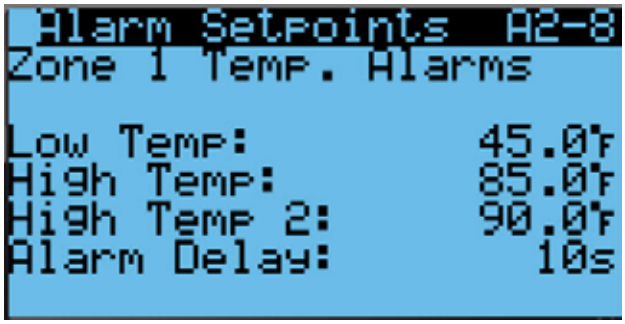
If the lowest temperature sensor value in a zone is below the low temperature setpoint, an alarm will be generated for that zone. Additionally, a relay output will be actuated from the LC controller to provide remote notification of the event.

NOTE: *This alarm is per zone. If each zone is meant to operate within the same alarm parameters, each zone will need to be set accordingly.*

To adjust the low temperature alarm setpoint:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Alarm Setpoints A2-8** (Zone 1), **Alarm Setpoints A3-8** (Zone 2) or **Alarm Setpoints A4-8** (Zone 3**)**.
6. Press ENTER key to scroll to the variable labeled **Low Temp** (see Figure 1).
7. Press UP or DOWN keys to adjust setpoint.

FIGURE 1
Adjust Alarm Setpoints

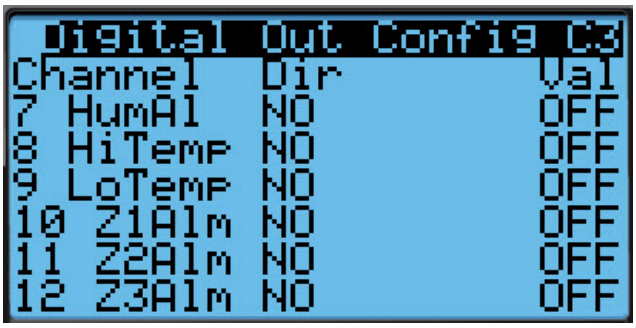


To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C3**.
5. Press ENTER key to scroll to the variable in the table that intersects **LoTemp** and **Dir** (see Figure 2)
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

FIGURE 2
Adjust Alarm Remote Notification Relay Output Direction



High Temperature Alarm

If the highest temperature sensor value in a zone is above the high temperature setpoint, an alarm will be generated for that zone. When this alarm is present, the standby units in this zone will become active.

NOTE: *This alarm is per zone. If each zone is meant to operate within the same alarm parameters, each zone will need to be set accordingly.*

To adjust the high temperature alarm setpoint:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.

5. Press UP or DOWN keys to scroll to **Alarm Setpoints A2-8** (Zone 1), **Alarm Setpoints A3-8** (Zone 2) or **Alarm Setpoints A4-8** (Zone 3**)**.
6. Press ENTER key to scroll to the variable labeled **High Temp** (see Figure 1).
7. Press UP or DOWN keys to adjust setpoint.

High Temperature 2 Alarm

If the highest temperature sensor value in a zone is above the high temperature 2 setpoint, an alarm will be generated for that zone. When this alarm is present, the units will emergency cool in this zone. Additionally, a relay output will be actuated from the LC to provide remote notification of the event.

NOTE: *This alarm is per zone. If each zone is meant to operate within the same alarm parameters, each zone will need to be set accordingly.*

To adjust the high temperature 2 alarm setpoint:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Alarm Setpoints A2-8** (Zone 1), **Alarm Setpoints A3-8** (Zone 2) or **Alarm Setpoints A4-8** (Zone 3**)**.
6. Press ENTER key to scroll to the variable labeled **High Temp 2** (see Figure 1).
7. Press UP or DOWN keys to adjust setpoint.

To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C3**.
5. Press ENTER key to scroll to the variable in the table that intersects **HiTemp** and **Dir** (see Figure 2).
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

Smoke Alarm

If the LC gets an input from a smoke detector, an alarm will be generated and all units will be shut down. Additionally, a relay output will be actuated from the LC to provide remote notification of the event.

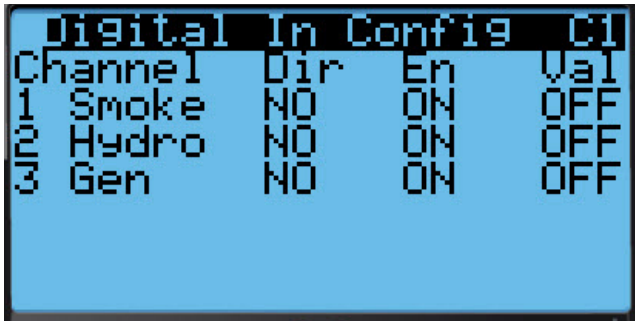
The smoke alarm input can be configured to accept either normally open or normally closed inputs. The controller is defaulted to normally open and a jumper is placed across the terminals of the input. When this jumper is removed, the alarm will become active.

To change the direction of the smoke input:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital In Config C1**.
5. Press ENTER key to scroll to the variable in the table that intersects **Smoke** and **Dir** (see Figure 3).
6. Press UP or DOWN key to change direction.

By changing this value, the input will operate in reverse. When the direction is set to NC, the alarm will be present when the jumper is present or when the device closes the contacts to this input.

FIGURE 3
Adjust Smoke, Generator or Hydrogen Alarm Input Direction



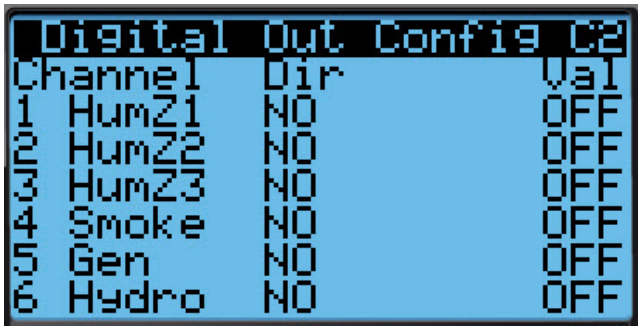
To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C2**.
5. Press ENTER key to scroll to the variable in the table that intersects **Smoke** and **Dir** (see Figure 4).

6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

FIGURE 4
Adjust Alarm Remote Notification Relay Output Direction



Generator Alarm

If the LC detects a generator running event (through a digital input), an alarm will be generated. Additionally, a relay output will be actuated from the LC to provide remote notification of the event. The end user will be able to configure which units are permitted to run during this event. Default will be to not allow any units to run.

The generator alarm input can be configured to accept either normally open or normally closed inputs. The controller is defaulted to normally open and a jumper is placed across the terminals of the input. When this jumper is removed, the alarm will become active.

To change the direction of the generator input:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital In Config C1**.
5. Press ENTER key to scroll to the variable in the table that intersects **Gen** and **Dir** (see Figure 3).
6. Press UP or DOWN key to change direction.

By changing this value, the input will operate in reverse. When the direction is set to NC, the alarm will be present when the jumper is present or when the device closes the contacts to this input.

To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C2**.
5. Press ENTER key to scroll to the variable in the table that intersects **Gen** and **Dir** (see Figure 4).
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

Hydrogen Alarm

If the LC detects a hydrogen event (through a digital input), an alarm will be generated and the wall units will all be put into emergency ventilation by the LC. Additionally, a relay output will be actuated from the LC to provide remote notification of the event. The end user will be able to configure which zones ventilate during this event.

The hydrogen alarm input can be configured to accept either normally open or normally closed inputs. The controller is defaulted to normally open and a jumper is placed across the terminals of the input. When this jumper is removed, the alarm will become active.

To change the direction of the hydrogen input:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital In Config C1**.
5. Press ENTER key to scroll to the variable in the table that intersects **Hydro** and **Dir** (see Figure 3).
6. Press UP or DOWN key to change direction.

By changing this value, the input will operate in reverse. When the direction is set to NC, the alarm will be present when the jumper is present or when the device closes the contacts to this input.

To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.

3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C2**.
5. Press ENTER key to scroll to the variable in the table that intersects **Hydro** and **Dir** (see Figure 4).
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

Zone Unit Alarm

If any of the units communicate a high pressure or low pressure alarm to the LC, the LC will actuate a relay output to provide remote notification of the event. A relay output will be actuated from the LC to provide remote notification of the event for each zone.

To change the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C3**.
5. Press ENTER key to scroll to the variable in the table that intersects **Z1Alm** and **Dir**, **Z2Alm** and **Dir**, or **Z3Alm** and **Dir** (see Figure 2 on page 5).
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

The zone alarms can be configured to actuate based on 15 alarms communicated from each wall unit. These items can be selected for each zone.

To select which wall unit alarms actuate zone alarms:

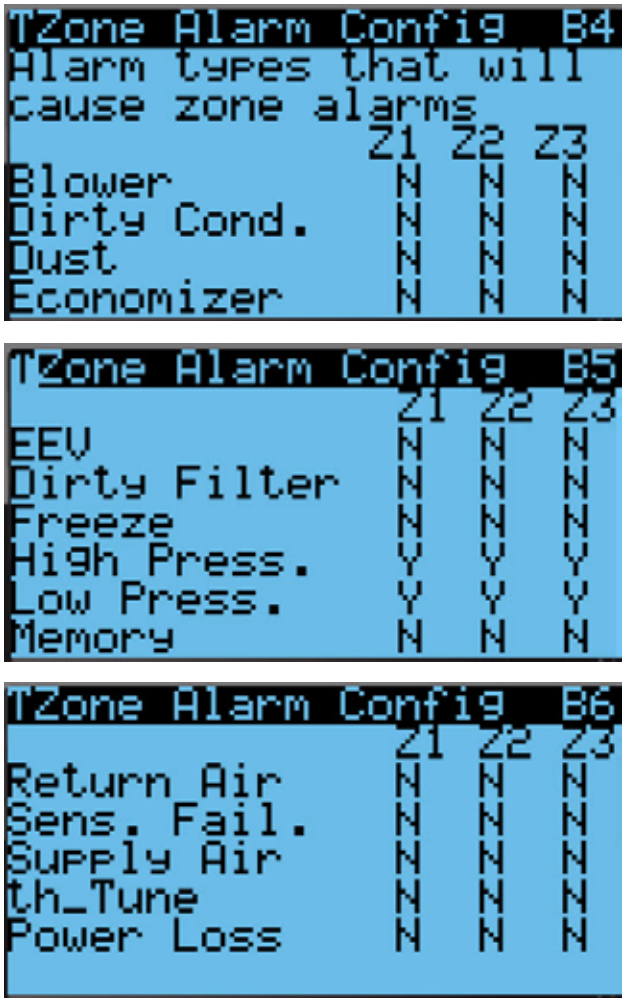
1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter TECHNICIAN password 1313.
3. Press UP or DOWN keys to scroll to **Adv Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone Alarm Config B4**, **Zone Alarm Config B5** and **Zone Alarm Config B6**. The 15 alarms are divided between these three screens.
5. Press ENTER key to scroll to the variable in the table that intersects with each alarm and zone number (see Figure 5).
6. Press UP or DOWN key to change value (N or Y). If a value of Y is entered, the wall unit alarm will trigger the zone alarm relay output. If a value of N is entered, the wall unit alarm will not trigger the zone alarm relay output.

NOTE: *By default, only 'no temperature sensors' and high and low pressure actuate the alarms.*

NOTE: *Power Loss group is also affected by communication loss.*

NOTE: *If no temperature sensors are detected by the controller for a given zone, that zone alarm output will be actuated. This is nonconfigurable.*

FIGURE 5
Adjust Zone Alarm Configuration



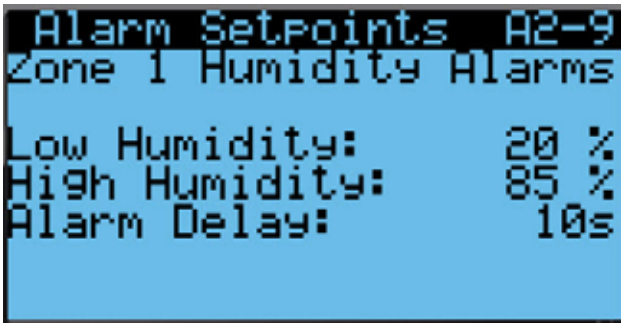
Humidity Alarm

When the LC detects a high indoor humidity or low indoor humidity event in a selected zone (through an analog input from a remote sensor), an alarm will be generated. Additionally, a relay output will be actuated from the LC to provide remote notification of the event. The end user can configure the alarm to be actuated when the measurement is high, low or both high and low.

To adjust the humidity alarm setpoints:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Alarm Setpoints A2-9** (Zone 1), **Alarm Setpoints A3-9** (Zone 2) or **Alarm Setpoints A4-9** (Zone 3**)**.
6. Press ENTER key to scroll to **Low Humidity**, **High Humidity** or **Alarm Delay** (delay in seconds from the time the alarm is sensed until the alarm is displayed). See Figure 6.
7. Press UP and DOWN keys to adjust setpoints or delay.

FIGURE 6
Adjust Humidity Alarm Setpoints



To adjust the direction of the remote notification relay output:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Digital Out Config C3**.
5. Press ENTER key to scroll to the variable in the table that intersects **HumAI** and **Dir** (see Figure 2 on page 5).
6. Press UP or DOWN key to change direction.

When the direction is set to NO, the relay output will be closed when the alarm is active and open when not active. When the direction is set to NC, the relay output will be open when alarm is active and closed when not active.

NOTE: *Screenshots shown in this manual reflect default settings (when applicable).*

Temperature Control

Indoor Temperature Averaging

The LC has the ability to average all of the zone temperature sensors connected to the LC and the return air temperature sensors connected to the wall-mount unit, use only the zone temperature sensors, or use the LC sensors and any unit which has its blower run continuously. This can be set differently for each zone. This value will then be used as a **zone indoor temperature** for the LC and wall-mount unit control functions.

There are three possible sensor averaging selections:

- LC Only

  This configuration only averages the zone temperature sensors connected to the LC and enabled within the specific zone.

- Blower On

  This configuration averages any temperature sensors connected to the LC and enabled and the return air temperature sensor of any wall-mount unit running in continuous blower within the specific zone.

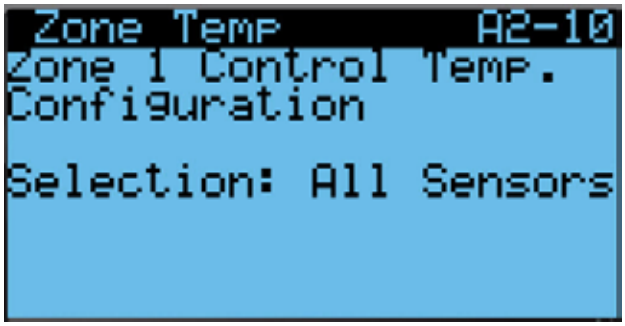
- All Sensors

  This configuration averages the zone temperature sensors connected to the LC and enabled and all the return air temperature sensors of all wall-mount units within the specific zone.

To change the indoor temperature averaging type:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Zone Temp A2-10** (Zone 1), **Zone Temp A3-10** (Zone 2) or **Zone Temp A4-10** (Zone 3**)**.
6. Press ENTER key to scroll to **Selection** (see Figure 7).
7. Press UP and DOWN keys to adjust.

FIGURE 7
Change Indoor Temperature Averaging Type



Comfort Mode

If comfort mode is activated, all of the zone setpoints will be set to 72°F for cooling and 70°F (Comfort Setoint -2) for heating. This setpoint will be active for 60 minutes.

To enable comfort mode:

1. Press UP or DOWN key while on the Status screen to select **Setpoints** ( ) from the Quick Menu options; press ENTER key.
2. Press ENTER key to scroll to **Comfort Mode**.
3. Press UP or DOWN keys to change the duration of comfort mode.
4. Press ENTER key to scroll to **Comfort Setpoint**.
5. Press UP and DOWN keys to change the cooling setpoint for comfort mode.
6. Press ENTER key to scroll to **Comfort Enable**.
7. Press UP or DOWN key to change value from OFF to ON; press ENTER key.

The system is now in comfort mode and will cool to the comfort setpoint for the duration previously set.

Staging

Each zone is capable of three different staging methods.

FIFO (First in First Out)

The unit that is turned on first will be the first one turned off.

LIFO (Last in First Out)

The unit that is turned on last will be the first on turned off.

Demand Staging

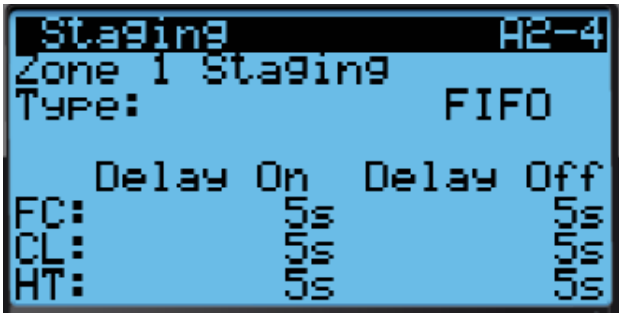
While in cooling operation, the unit with the highest return temperature will be brought on first. The unit with the lowest return temperature will be turned off first. While in heating mode, the unit with the lowest

return air temperature will be brought on first and the unit with the highest return temperature will be turned off first.

To change the staging method type:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Staging A2-4** (Zone 1), **A3-4** (Zone 2) or **A4-4** (Zone 3**)**.
6. Press ENTER key to scroll to the variable labeled **Type** (see Figure 1).
7. Press UP or DOWN keys to adjust.

FIGURE 8
Adjust Staging Settings



Staging Delay

A delay on and off can be set for economizer, cooling and heating independently for each zone. This will limit how fast the units can be staged on or off.

To adjust the on and off delay times:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Staging A2-4** (Zone 1), **Staging A3-4** (Zone 2) or **Staging A4-4** (Zone 3**)**.
6. Press ENTER key to scroll to the variable in the table that intersects **FC**, **CL** or **HT** and **Delay On** or **Delay Off** (see Figure 8).
7. Press UP or DOWN keys to adjust.

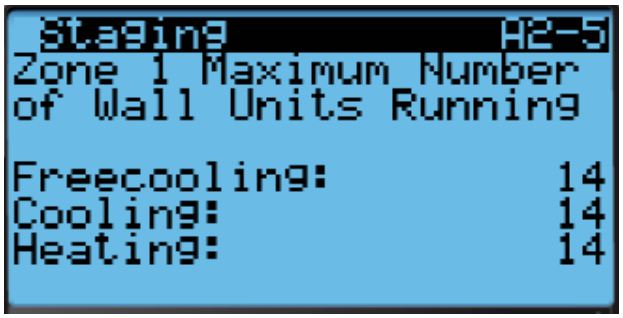
Maximum Number of Units Running

The maximum number of units that will be staged on can be configured for each zone. The number is defaulted at the total number of units capable so that they are fully utilized by default. This is configurable for economizer, cooling and heating independently.

To adjust the on and off delay times:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Staging A2-5** (Zone 1), **Staging A3-5** (Zone 2) or **Staging A4-5** (Zone 3**)**.
6. Press ENTER key to scroll to the variable for **Freecooling, Cooling** or **Heating** (see Figure 9).
7. Press UP or DOWN keys to adjust number of units.

FIGURE 9
Staging Maximum Number of Units Running



Rotation

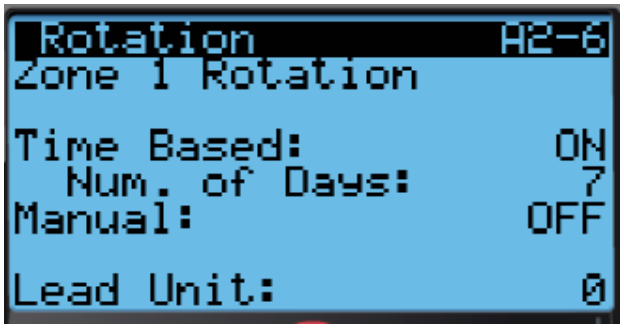
The units in each zone can be rotated based on a configurable number of days. The time is defaulted to 7 days. In addition to time-based, a manual rotation can be triggered for troubleshooting.

To change the rotation variables:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Rotation A2-6** (Zone 1), **Rotation A3-6** (Zone 2) or **Rotation A4-6** (Zone 3**)**.

6. Press ENTER key to scroll to **Time Based** (see Figure 10).
7. Press UP or DOWN key to change ON to OFF.
8. Press ENTER key to scroll to **Num. of Days**.
9. Press UP or DOWN keys to adjust the number of days.
10. Press ENTER key to scroll to **Manual**.
11. Press UP or DOWN key to change OFF to ON.

FIGURE 10
Rotation



Demand

The system will compare the zone temperature (determined by zone averaging selection) to the zone cooling and heating setpoint. A demand will be calculated to determine how many units are required.

For cooling, the zone temperature will be compared to the cooling setpoint. The controller will calculate a demand based on how far above the setpoint and how long it has been above the setpoint. The demand value (0-100%) will then be split and applied to freecooling and cooling separately shown as two demands both ranged 0-100% applied to all of the available cooling methods for that zone. For example, if the demand is at 50% and there are 10 available stages of cooling in that zone, there would be 5 stages active (50% x 10 = 5). The system will prioritize freecooling stages over compressor stages. Adding to the example, if 5 of the 10 stages for cooling are economizer, 5 units would be running economizer and no compressors running. The demand is calculated for the cooling application. However, for display purposes, the demand is split so that the user can see demand separately for freecooling and compressor.

For heating, the zone temperature will be compared to the heating setpoint. The controller will calculate a demand based on how far below the setpoint and how long it has been below the setpoint. The demand value 0-100% will the be applied to all of the available stages of heating in that zone. For example, if the demand is at 50% and there are 5 available stages of heating in that zone, there would be 2 stages active (50% x 5 = 2.5 and a half of a stage cannot be turned on).

Humidity Control

The LC can be configured to control up to three humidifiers with relay outputs and up to 14 units equipped with dehumidification. The indoor humidity level for each zone is compared to the dehumidification setpoint and humidification setpoint for each zone.

Dehumidification

The supervisory controller will monitor the indoor relative humidity of each zone and compare the value to three setpoints for each zone. The three setpoints will be described as *dehumidification off*, *passive dehumidification* and *active dehumidification*. The default value for these setpoints will be 60%RH, 70%RH and 80%RH, respectively.

When the humidity level inside the shelter falls to the dehumidification off setpoint, the system will stop attempting to dehumidify the space.

When the humidity level rises to the passive dehumidification setpoint, all units with economizers will disable the use of economizers for cooling calls. This will act as passive dehumidification by forcing the use of compressor for space cooling. Availability for passive dehumidification will be determined by model number. All units with economizers will be considered.

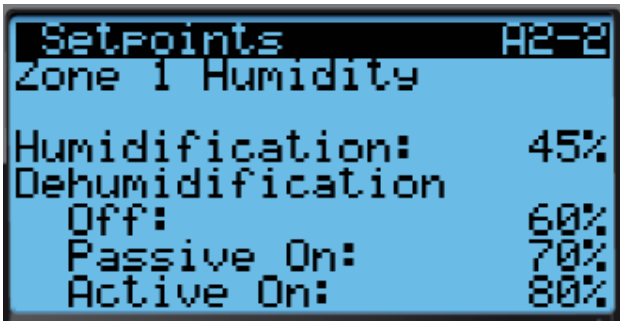
When the humidity level rises to the active dehumidification setpoint, the controller will activate staged dehumidification. The controller will then calculate a dehumidification demand based on how far above the setpoint and how long the RH level has been above the setpoint. The demand will then utilize all of the units with active dehumidification capabilities to reduce the indoor humidity level. The units will be staged on based on the existing cooling rotation for the units in the zone up to an optional maximum number of units running value. Availability for active dehumidification will be determined by model number. Units with concurrent electric reheat or mechanical dehumidification will be considered. ***NOTE:*** *Only one type of dehumidification unit will be considered depending upon configuration of the supervisory controller.* Unit capability is determined by the model number.

To change the dehumidification setpoints:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Setpoints A2-2** (Zone 1), **Setpoints A3-2** (Zone 2) or **Setpoints A4-2** (Zone 3).

6. Press ENTER key to scroll to **Dehumidification Off**, **Passive On** or **Active On** (see Figure 11).
7. Press UP and DOWN keys to change dehumidification setpoints to desired values.

FIGURE 11
Humidity Control Setpoints



In addition to the setpoint configuration for dehumidification, each zone must be configured for the type of active dehumidification.

To change the dehumidification type:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Setpoints A2-11** (Zone 1), **Setpoints A3-11** (Zone 2) or **Setpoints A4-11** (Zone 3**)**.
6. Press ENTER key to scroll to **Type** (see Figure 12).
7. Press UP and DOWN keys to change to desired value. Dehumidification type choices are **None**, **Electric Reheat**, **Mechanical Reheat** or **Cycling Reheat**. The units in the zone being configured will need to have the capability of the setting being selected.

FIGURE 12
Dehumidification Types

Humidification

If the humidity level is below 45% RH (Humidification Setpoint), the LC will enable humidification for that zone. Once the humidity level rises to 55% RH (Humidification Setpoint plus 10% RH), the humidification for that zone will be disabled.

NOTE: *Humidifiers supplied by others.*

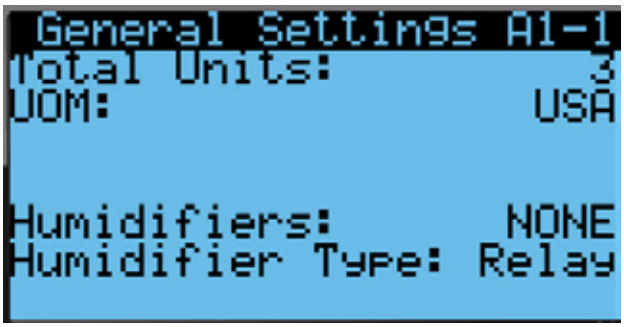
To change the humidification setpoint:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Setpoints A2-2** (Zone 1), **Setpoints A3-2** (Zone 2) or **Setpoints A4-2** (Zone 3**)**.
6. Press ENTER key to scroll to **Humidification** (see Figure 11).
7. Press UP and DOWN keys to change humidification setpoint to desired value.

Enabling Humidifier

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **General**; press ENTER key.
5. Press ENTER key to scroll to **Humidifiers** (see Figure 13).
6. Press UP or DOWN keys to change value to **NONE**, **Zone 1**, **Z1 & Z2** or **Z1, Z2, & Z3**.
7. Press ENTER to scroll to **Humidifier Type**.
8. Press UP or DOWN keys to change value to **Relay** from **Comm**.

FIGURE 13
Enabling Humidifier



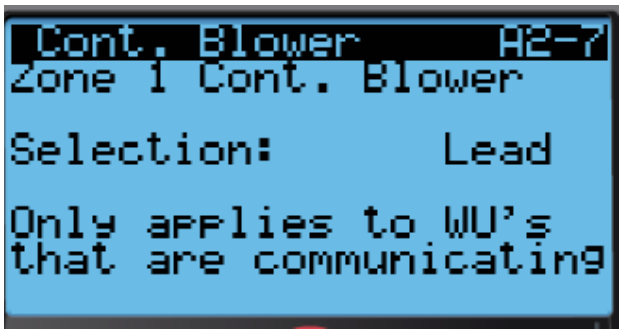
Fan Control

The LC has the capability to change the continuous fan status of all the units in a zone. The user is able to select between none, lead and all. When “none” is selected, all unit blowers will only be enabled on a call for heating or cooling. When “lead” is selected, only the lead unit will be have its blower active. When “all” is selected, the blower on all units (active and standby) will be enabled all the time.

To change the continuous fan status of each zone:

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP or DOWN keys to scroll to **Cont. Blower A2-7** (Zone 1), **Cont. Blower A3-7** (Zone 2) or **Cont. Blower A4-7** (Zone 3**)**.
6. Press ENTER key to scroll to **Selection** (see Figure 14).
7. Press UP and DOWN keys to change to desired choice.

FIGURE 14
Continuous Blower



LC6000 Menus/Screens

Main Menu

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.

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 LC6000 Status screen displays the current date, time, unit displayed, zone and unit status.

Quick Menu

The Quick Menu is available on the Status screen. Use UP or DOWN keys while on the Status screen to scroll between the three Quick Menu options; press ENTER key.

Data Log 

The data log displays the record number, time of alarm event, date of alarm event, description of alarm event and whether the entry is the beginning or end of event. The data log will have as many screens as events occurred.

Info 

Info displays wall unit status for each wall-mount unit connected to controller, last hour tracking (shelter), last hour tracking (for each wall-mount unit connected, last hour averages (zone temperatures, OA temperature and OA humidity) and additional LC6000 information.

Setpoints 

Setpoints allows setting and enabling of comfort mode.

Menu Screens and Password Levels

A System Config

General: User (2000)

Zone 1: User (2000)

Zone 2: User (2000)

Zone 3: User (2000)

B Adv Sys Config: Technician (1313)

C I-O Config: Technician (1313)

D On/Off: User (2000)

E Alarm Logs: User (2000)

F Settings

Date/Time: Technician (1313)

Language: User (2000)

Network Config: Technician (1313)

Serial Ports: Technician (1313)

Initialization

Clear Logs: User (2000)

System Default: Engineer (9254)

Restart: User (2000)

Parameter Config: Engineer (9254)

Alarm Export: User (2000)

G Logout: Used to log out of the current password level. Entering back into the menu requires password.

TABLE 1
LC6000 Passwords (Defaults)

User	2000
Technician	1313
Engineer	9254
Use UP or DOWN keys and ENTER key to enter password	

TABLE 2
LC6000 Status Messages

Message	Description
On	The system is on
Off by Alarm	The system has a major fault and is disabled
Off by BMS	The system has been disabled by network supervisor
Off by Keypad	The system has been turned off by local user
Emergency Cooling	The system has detected a high temperature alarm and one or more zones are emergency cooling
Emergency Vent	The system has detected hydrogen and one or more zones are in emergency ventilation

Additional Programming

Changing to Celsius

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Unit Setup (A1-1)**.
5. Press ENTER key to scroll to **UOM**.
6. Press UP and DOWN keys to change value to **SI**.

Calibrating Sensors

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **I/O Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to sensor to be adjusted.
5. Press ENTER key to scroll to **Offset**.
6. Press UP or DOWN keys to add or subtract to the sensor offset value.
7. Press ENTER key to save.

Clearing Alarm Logs

1. Press MENU key to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Settings**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Initialization**; press ENTER key.
5. Press ENTER key to scroll to **Delete Alarm Logs?** (see Figure 15).
6. Press UP Or DOWN key to change value to **YES**; press ENTER key.

FIGURE 15
Clearing LC6000 Alarm Logs

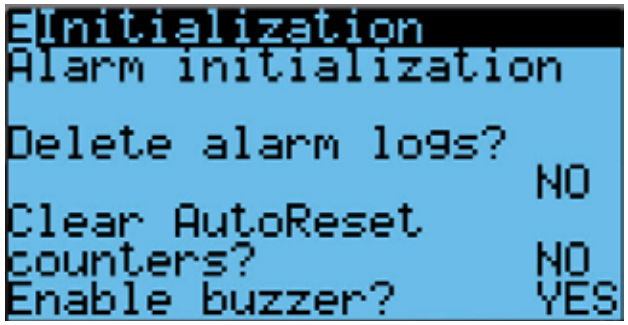
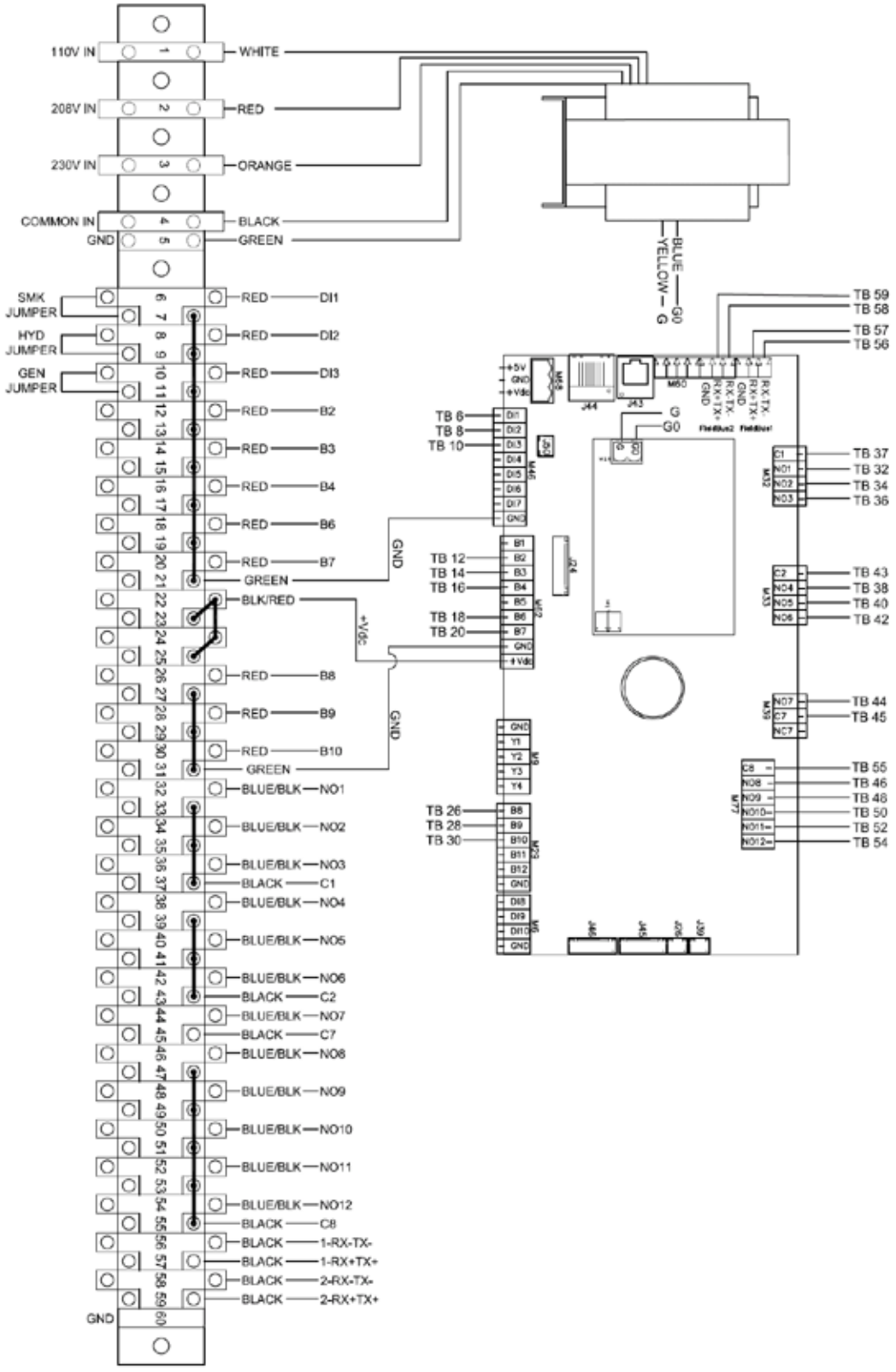


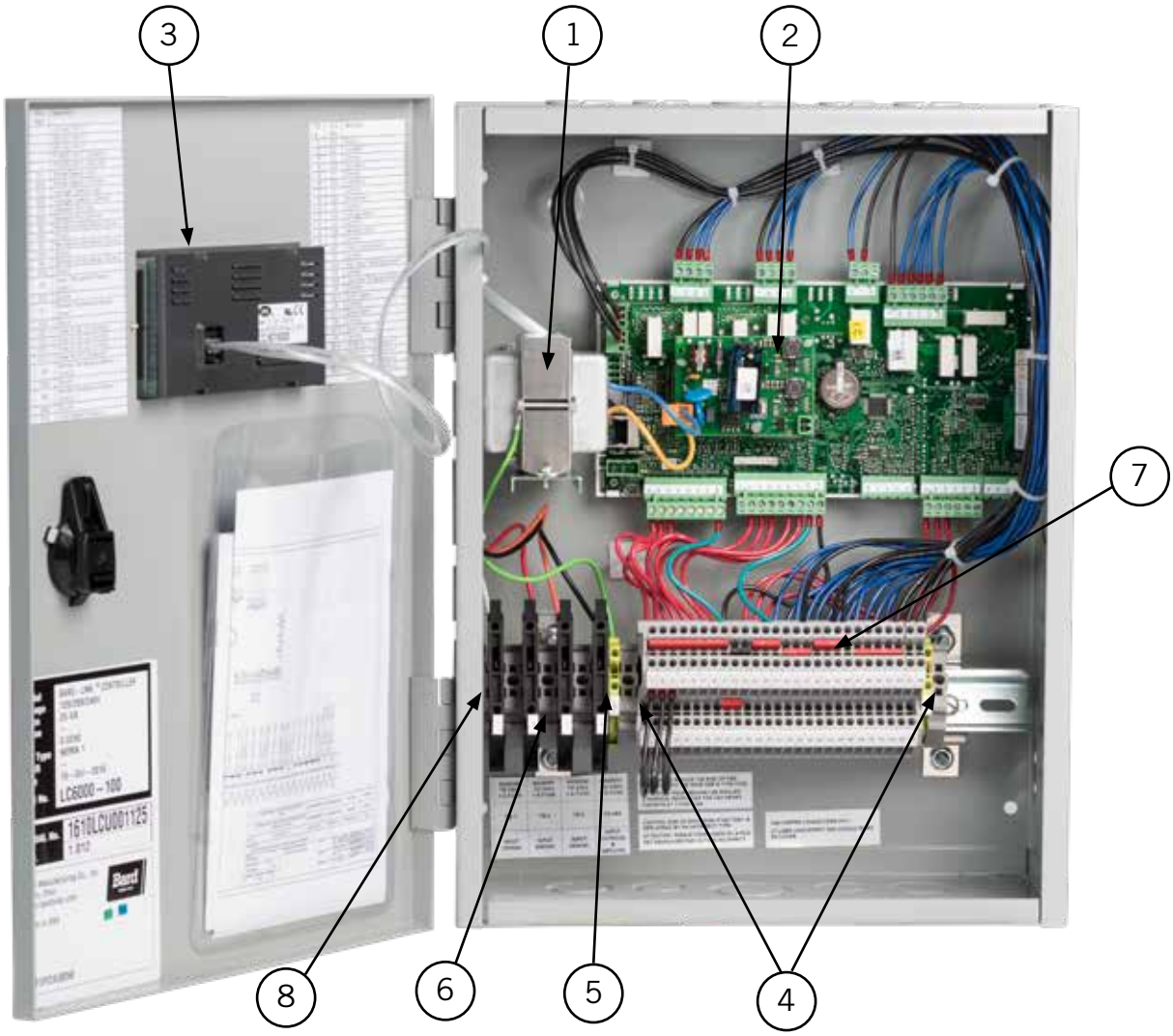
TABLE 3
Terminal Block Index

TB#	Wire Mark	Description
1	-	115 VAC Input
2	-	208 VAC Input
3	-	240 VAC Input
4	-	Power Input Common
5	-	Power Input Ground
6	DI1	Smoke Detector Input
7	GND	Smoke Detector Common
8	DI2	Hydrogen Detector Input
9	GND	Hydrogen Detector Common
10	DI3	Generator Run Input
11	GND	Generator Run Common
12	B2	Indoor Remote Humidity Sensor (Zone 1)
13	GND	Ground
14	B3	Indoor Remote Humidity Sensor (Zone 2)
15	GND	Ground
16	B4	Indoor Remote Humidity Sensor (Zone 3)
17	GND	Ground
18	B6	Indoor Temperature Sensor (Zone 1)
19	GND	Ground
20	B7	Indoor Remote Temperature Sensor (Zone 1)
21	GND	Ground
22	VDC+	Power for B2 (Z1 Humidity)
23	VDC+	Power for B3 (Z2 Humidity)
24	VDC+	Power for B4 (Z3 Humidity)
25	VDC+	Power for B10 (Pressure)
26	B8	Indoor Remote Temperature Sensor (Zone 2)
27	GND	Ground
28	B9	Indoor Remote Temperature Sensor (Zone 3)
29	GND	Ground

TB#	Wire Mark	Description
30	B10	Indoor Space Pressure
31	GND	Ground
32	NO1	Humidifier 1
33	C1	Common
34	NO2	Humidifier 2
35	C1	Common
36	NO3	Humidifier 3
37	C1	Common
38	NO4	Smoke Alarm
39	C2	Common
40	NO5	Hydrogen Alarm
41	C2	Common
42	NO6	Generator Alarm
43	C2	Common
44	NO7	Indoor Humidity Alarm
45	C7	Common
46	NO8	High Indoor Temperature Alarm
47	C8	Common
48	NO9	Low Indoor Temperature Alarm
49	C8	Common
50	NO10	Zone 1 Unit Alarm
51	C8	Common
52	NO11	Zone 2 Unit Alarm
53	C8	Common
54	NO12	Zone 3 Unit Alarm
55	C8	Common
56	FB1R-	RS485 RX- / TX- (Fieldbus 1)
57	FB1R+	RS485 RX+ / TX- (Fieldbus 1)
58	FB2R-	RS485 RX- / TX- (Fieldbus 2)
59	FB2R+	RS485 RX+ / TX- (Fieldbus 2)
60	-	Ground

FIGURE 16
LC6000 Wiring Diagram





Dwg. No.	Part Number	Description	LC6000
1	8407-069	Transformer	X
2	8301-076-001	Micro PC – Medium, Programmed for LC6000	X
3	8301-053	pGDEvolution Panel Display	X
4	8607-052	Grounded Terminal Block	2
5	8614-059	1.0 Amp Fuse	4
6	8607-039	Fused Terminal Block	4
7	8607-057	Terminal Block Double Level	54
8	8611-144	End Clamp (for Din Rail)	6
NS	8301-055	EMI Ferrite Filter	2
NS	8301-058	Remote Temperature Sensor ①	X
NS	8403-079	Remote Temperature/Humidity Sensor	X
NS	8301-059	TEC-EYE (Service Tool), 5' Telephone Cable	X
NS	3000-1587	5' Telephone Cable	X

NS – Not Shown ① – Optional