# DC3000 Series
Solid State Lead/Lag Controller with DC Fan Control

The DC3002 is a 2-unit HVAC lead/lag controller, and the DC3003 is designed to control 3-units. For DC3003, the #3 HVAC unit is always last to operate, while the #1 and #2 units will switch for lead/lag operation. They will work with units with and without economizers, and are designed with the additional feature to control an auxiliary DC Fan system supplied by others. These controllers have an independent pilot duty control relay for purpose of controlling the load control relay (supplied by others) for the DC Fan package, and the user has a choice of designating the DC Fan to be used for emergency ventilation only, for free cooling only, or both.

There is also a purge cycle option available that permits the DC Fan package to function periodically to purge the building. The purge length can be from 1 to 10 minutes long in 1-minute increments, and the interval between purge cycles can by from 1 to 24 hours in 1-hour increments — both user selectable.

Both DC3002 and DC3003 have a full-featured alarm board with Form C (SPDT) dry contact alarm relays used, offering both NC and NO switching to meet the user's specific alarm protocol, providing complete flexibility to meets any user's requirements. All alarm actuations are individually indicated on the controller front panel, along with active stages of cooling or heating, and which unit is currently "lead". A digital display indicates building temperature and is also used for all of the programming functions.

Refer to DC3002 and DC3003 Installation Instruction #2100-484 (latest revision) for complete operation details.
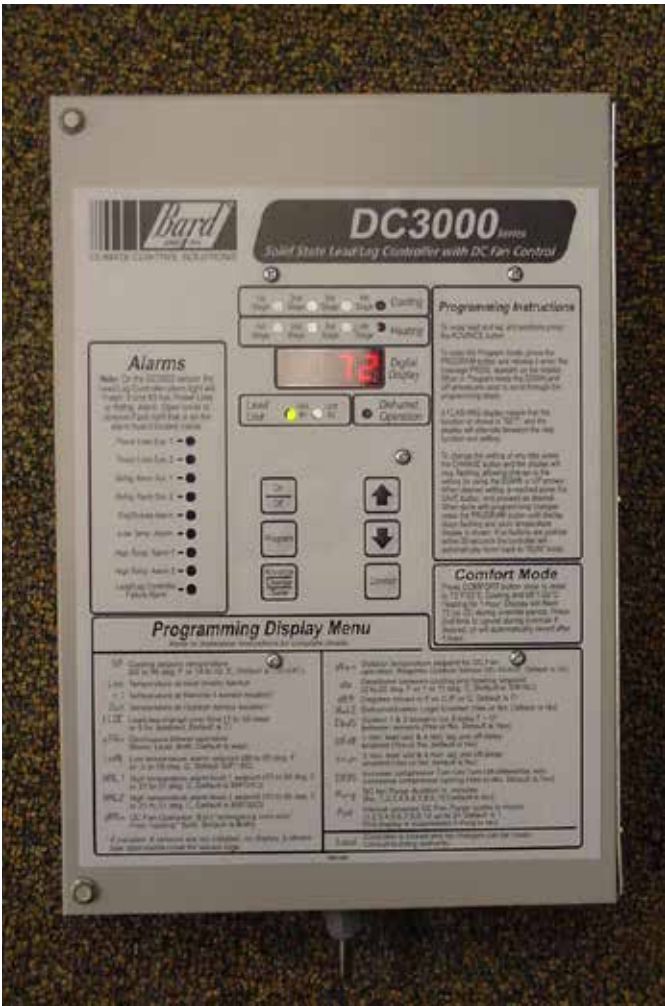
Key Design Features

Controller:
- Electronic (non-mercury) design
- Programmable
- Works with or without economizers
- Dehumidification control option
- Auxiliary DC fan control

Alarm Boards:
- Alarm circuits can be NO or NC logic

Ease of Installation:
- Powered by 24V from A/C units
- Phasing of 24V from units is not required
- Durable metal enclosure adequately sized for ease of conduit and wire installation

Certifications:
- Tested for FCC and CE requirements
- EN50082-2 Standard for Immunity
- EN55011 Standard for Emissions

Controller Models Available

DC3002	Complete controller system for 2-units
DC3003	Complete controller system for 3-units

Remote Sensors – Optional

8612-023A 35-foot sensor, used for both remote indoor and outdoor sensor.
Note: 1 of the 8612-023A sensors is required as outdoor sensor for non-economizer units if auxiliary DC Fan is to be used for free cooling.

Feature Selection Guide	DC3002	DC3003
Number of HVAC units controlled	2	3
2-unit lead/lag control (DC3003, Unit #3 is always last)	Yes	Yes
Cooling stages (See Note 3)	4	5
Heating stages (configured for A/C with electric heat)	2	3
Temperature control type	Electronic	Electronic
Display (4 character .375" high LCD)	Digital	Digital
Stage "On" LED for Cooling and Heating	Yes	Yes
Lead unit LED	Yes	Yes
Advance (switch) lead unit feature	Yes	Yes
One button comfort (72F for 1-hour) feature	Yes	Yes
Local sensor (standard with controller)	Yes	Yes
Remote indoor sensor option (See Notes 1 and 2)	Yes	Yes
Remote outdoor sensor option (See Note 4)	Yes	Yes
Controller locking feature (prevents unauthorized changes)	Yes	Yes
Smoke/fire lockout circuit (shutdown of controller & A/C)	Yes	Yes
Generator run feature (inhibits lag A/C unit operation)	Yes	Yes
Humidity control feature (requires optional humidity controller input)	Yes	Yes
Selectable continuous fan control, lead-both-none (See Note 5)	Yes	Yes
Both fans On @ 5F delta T between 2 sensors (selectable)	Yes	Yes
Control strategy to limit excessive compressor cycling	Yes	Yes
-24V or -48V backup power connection for emergency alarms	Yes	Yes
Power loss alarm relay and LED for all units	Yes	Yes
HP/LP refrigerant lockout alarm relay and LED for all units	Yes	Yes
Smoke/fire alarm relay and LED	Yes	Yes
Low temperature alarm relay and LED	Yes	Yes
High temperature #1 alarm relay and LED	Yes	Yes
High temperature #2 alarm relay and LED	Yes	Yes
2nd stage cooling alarm relay	Yes	Yes
Controller failure alarm relay and LED	Yes	Yes
Economizer relay (emergency vent strategy) for all units	Yes	Yes
Auxiliary DC Fan pilot duty control relay (load control relay by others)	Yes	Yes
Option to use Auxiliary DC Fan for emergency ventilation	Yes	Yes
Option to use Auxiliary DC Fan for free cooling	Yes	Yes
Option to use Auxiliary DC Fan for purge cycle	Yes	Yes

Note 1: Optional remote 35-foot space temperature sensors available, Bard PN 8612-023A. Controller automatically detects any connected sensors.
Note 2: Multiple Sensor Control Strategy:
  A. If only the standard local sensor is used, it will govern space temperature control along with low and high temperature alarm monitoring.
  B. If 1 remote sensor is installed and connected, the temperature readout display and the building temperature are controlled to an average of connected sensors.
     If there is more than 10F difference between the two sensors, the actual control will be governed by the hottest sensor for cooling and the coldest sensor for heating.
Note 3: Also for use with A/C units that have either 2-stage compressors or units with 2 compressors.
Note 4: Required for non-economizer application if DC Fan is to be used for free cooling.
Note 5: For DC3003, the HVAC #3 blower operates on demand only.

Specifications/Features for Basic Controller

DC3000 Basic Controller

- Input power: 18 to 32VAC, 60/50Hz, power is supplied from A/C #1 and/or A/C #2 (or A/C #3 for DC3003)
- Isolation circuitry: no line or low voltage phasing required
- Backup power: connection for -24VDC or -48VDC (-20 to -56V) allows DC Fan Control and maintains microprocessor operation, front panel indication, and alarm relay operation during commercial power outages
- Digital display: 4-character LCD
- Temperature display: F or C
- HVAC outputs: Form A (NO) relays (1A @ 24VAC)
- Cooling control stages: 2 for each A/C unit (4 total), DC3003 has 5 stages total with Unit 3 located on DC3003 alarm board
- Heating control stages: 1 for each A/C unit
- Dehumidification circuit: requires optional humidity controller as input signal
- Locking feature, allows controller to be "locked" so no unauthorized changes to programming can be made
- Operating temperature range: 0 to 120F (-18 to 49C)
- Storage temperature range: -20 to 140F (-29 to 60C)
- Temperature accuracy: +/- 1F from 60-85F (16-30C)   +/- 1% outside 60-85F
- Lead/lag changeover time: 0 to 30 days
- Timing accuracy: +/- 1%
- Inter-stage time delay: 10 seconds between stages
- Inter-stage differential: 2F (1C) for all modes
- On-Off differential: 2F (1C) is standard, 4F (3C) when "excessive cycling" mode is enabled
- Cooling set point range: 65 to 90F (18 to 32C)
- Comfort setting-Cooling 72F, Heating 68F, for 1 hour
- Dead band (difference between cooling and heating set points): 2F to 20F (1C to 10C)
- Fire/smoke interface: standard NC circuit jumper, remove for connection to building system control, shuts down both A/C units
- Generator run feature, inhibits lag A/C unit from operating if generator is operating (to limit amperage)
- Memory: EEPROM for set point and changeable parameters (maintains settings on power loss)
- Indoor space temperature sensors: 1 local is standard, will accept 1 optional 25-foot remote sensors. When two sensors are used temperatures are averaged for basic control
- Outdoor space temperature sensors: required only in non-economizer application and desire to use Auxiliary DC Fan for free cooling
- LEDs for basic controller: Lead unit, Active Cooling stages, Active Heating stages, Dehumidification operation
- Six (6) Push-button controls: On/Off switch-Change lead unit-Increase and Decrease set points-Program/Save-Comfort
- Controller Enclosure: 20-gauge pre-painted steel, 9.25"W x 13.50"H x 3.00"D, hinged cover, thirteen (13) .875" diameter electrical knockouts

Specifications/Features for Alarm Boards

DC3002 Alarm Board (Inputs/Outputs)

- Refrigerant alarm from A/C #1, input
- Refrigerant alarm from A/C #2, input
- Cooling operation signal from A/C #1, input
- Cooling operation signal from A/C #2, input
- Power loss alarm A/C #1, Form C (SPDT) output
- Power loss alarm A/C #2, Form C (SPDT) output
- Smoke/fire alarm, Form C (SPDT) output
- Low temperature alarm, Form C (SPDT) output
- 1st stage (H1) high temperature alarm, Form C (SPDT) output
- 2nd stage (H2) high temperature alarm, Form C (SPDT) output
- Refrigerant system lockout A/C #1, Form C (SPDT) output
- Refrigerant system lockout A/C #2, Form C (SPDT) output
- 2nd stage cooling alarm, Form C (SPDT) output
- Controller system failure alarm, Form C (SPDT) output
- Emergency ventilation economizer outputs, Form A (SPNO) for both A/C #1 and A/C #2
  - Emergency ventilation option for either air conditioner with refrigerant alarm @ H1 high temp alarm set point
  - Emergency ventilation option for both air conditioners @ H2 high temp alarm set point
- Auxiliary DC Fan control relay, Form C (SPDT) output

Alarm relays can be wired for NO (close on alarm) or NC (open on alarm) strategy.

Alarm relays can be used individually if there are enough available building alarm points, or can be arranged into smaller groups or even a single group so that all alarm capabilities can be utilized.

When multiple alarms are grouped together and issued as a single alarm, there will be no off-site indication of which specific problem may have occurred, only that one of the alarms in the group has been triggered. The individual alarm problem will be displayed on the LED display on face of the controller.

DC3003 Alarm Board (Inputs/Outputs)

- All alarm inputs/outputs same as base version above, plus:
- HVAC outputs for HVAC #3, Form A (NO) relays (1A @ 24VAC)
- Refrigerant alarm from A/C #3, input
- Power loss alarm A/C #3, Form C (SPDT) output
- Refrigerant system lockout A/C #3, Form C (SPDT) output
- Emergency ventilation economizer output A/C #3
  - Same sequence as for DC3002
- Also located on DC3003 alarm board are LED's for A/C #3, 1st and 2nd stage cooling, power loss and refrigerant lockout

Note: All alarm/output relays are dry contacts rated 1A @ 24VAC, 1A @ 30VDC, 0.5A @ 150VDC

General Programming Overview

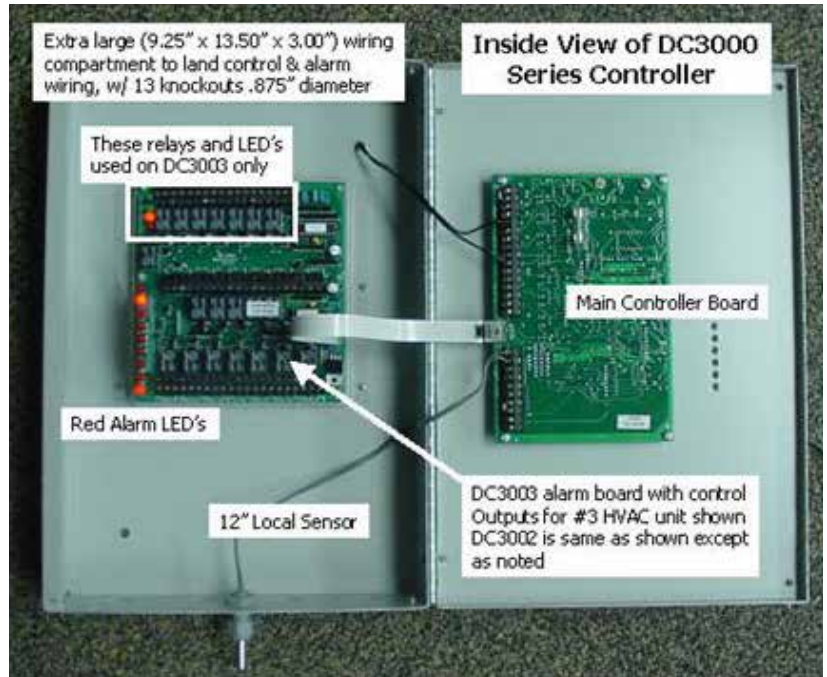## DC3000 Controller Buttons and Function

On/Off Button
1. Press and release the On/Off button to turn On controller, 4-character display will illuminate and Lead unit LED will light.
2. Press and release the On/Off button to turn Off controller. Controller will go dark and A/C units will stop.

Comfort Button
1. Press and release the Comfort button to change the Cooling Set Point to 72F and the Heating Set Point to 68F for a period of 1 hour.
2. Set Points will return to the programmed settings automatically after 1 hour.
3. Pressing the Comfort button during the 1 hour period will deactivate the Set Point change.
4. The temperature display will flash the current temperature while in override mode.

Program Button
1. Press the Program button and release it when the message "Prog" appears on the display.
2. Refer to Programming Instructions and follow these commands to change from Default settings.

Extra large (9.25" x 13.50" x 3.00") wiring compartment to land control & alarm wiring, w/ 13 knockouts .875" diameter

These relays and LED's used on DC3003 only

Red Alarm LED's

12" Local Sensor

Inside View of DC3000 Series Controller

Main Controller Board

DC3003 alarm board with control Outputs for #3 HVAC unit shown DC3002 is same as shown except as noted

Advance/Change/Save Button
1. Press and release the Advance button to swap lead and lag unit positions.
2. When in Program mode the Down and Up buttons are used to scroll through the programming steps.
3. A flashing display means that the particular function of that programming step is "set", and the display will alternate between the step function and the setting.
4. To change the setting press the Change button and the display will stop flashing, allowing change to the setting.
5. Use Down or Up arrows to change setting as desired, and press the Save button and proceed as desired.
6. When done with programming changes press the Program button until display stops flashing and room temperature is shown.
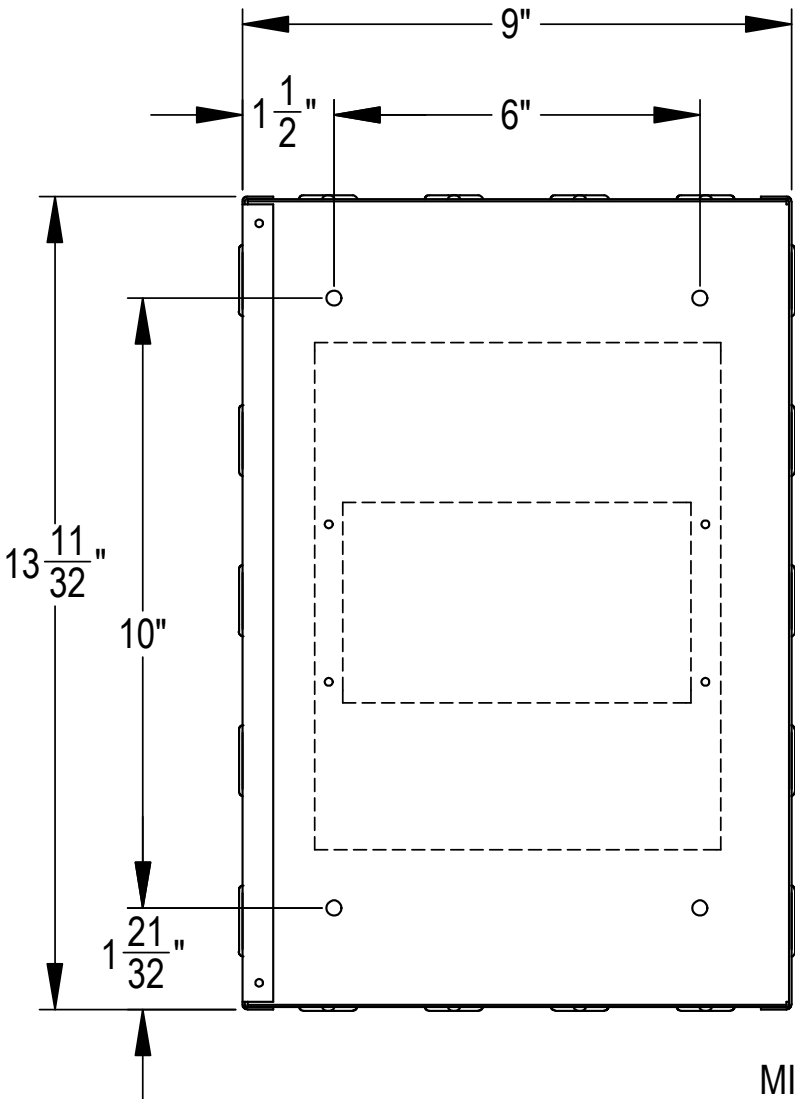
Up and Down Buttons
These buttons are used to change the settings in conjunction with the Advance/Change/Save button when in programming mode.

Controller Programmable Features and Default Settings

Feature Description	Range/Choice	Default
Cooling Set Point	65F to 90F (18C to 32C)	75F (24C)
Dead Band (difference between Cooling and Heating Set Points)	2F to 20F (1C to 10C)	10F (5C)
Lead/Lag Changeover Time	0 to 30 Days	7
Humidistat Logic Enable (Requires optional humidity controller)	Yes/No	No
Continuous Blower Operation	None/Lead/Both	Lead
Continuous Blower (Both Units) on 5F Delta T (Requires 1 remote sensor)	Yes/No	Yes
Minimum Compressor Off-Delay (3-minutes Lead, 4-minutes Lag)	Yes/No	No
Minimum Compressor Runtime Option (3-minutes)	Yes/No	No
Change Compressor Turn On/Turn Off w/ Excessive Cycling Rate	Yes/No	Yes
Standard On/Off differential is 2F (1C), When Excessive Cycling is Yes the differential is 4F (3C)		
Low Temperature Alarm Set Point	28F to 65F (-2C to 18C)	50F (10C)
High Temperature Alarm #1 Set Point	70F to 120F (21C to 49C)	85F (29C)
High Temperature Alarm #2 Set Point	70F to 120F (21C to 49C)	90F (32C)
Also DC Fan Set Point for Emergency Ventilation		
DC Fan Operation (Emergency Vent only, Free Cool only, both)	EdcF, Free, Both	Both
DC Fan On Set Point for Non-Economizer Units (• Requires Outdoor Sensor)	50-55-60	55
DC Fan Used for Building Purge Cycle (Minutes)	No,1,2,3,4,5,6,7,8,9,10	No
DC Fan Purge Cycle, Interval between Cycles (Hours)	1,2,3,4,5 Up to 24	1

Mounting Hole Layout

MIS-3760