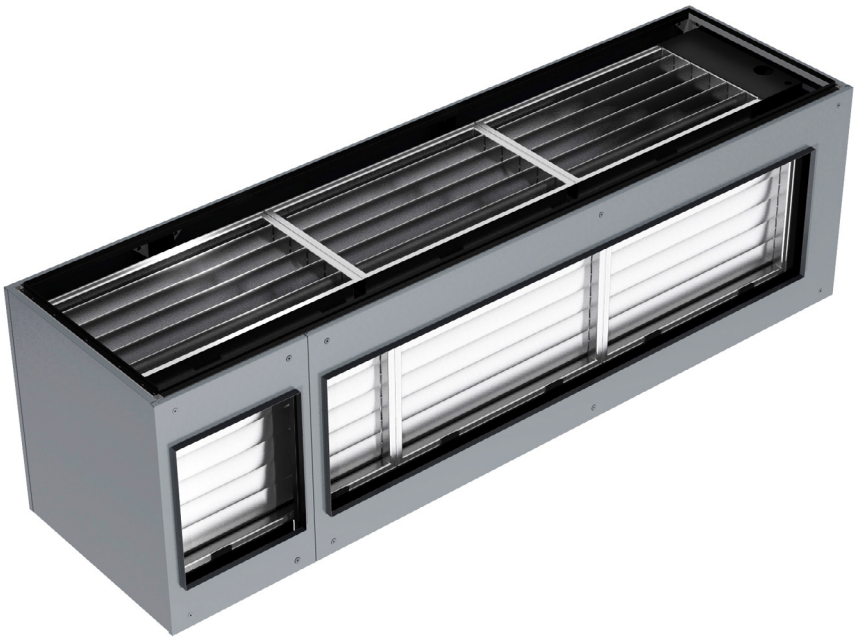
Precision Cooling
For *Business-Critical Continuity™*

Liebert® Air Economizer™ for Liebert DS™ & Liebert CW™

User Manual



EMERSON
Network Power

GENERAL SAFETY GUIDELINES

Before beginning the installation of the Liebert Air Economizer, read all instructions, verify that all the parts are included, and check the nameplate to be sure the Liebert Air Economizer voltage matches available utility power.

Follow all local and national codes.

WARNING

Risk of electric shock. Can cause injury or death.

Disconnect all local and remote electric power supplies before working within.

WARNING

Risk of unit falling over. Can cause death, injury and equipment damage.

The Liebert Air Economizer is top-heavy. Use extreme caution and care when moving and installing this unit.

CAUTION

Risk of piping and component rupture. May cause injury or equipment damage.

Closing service valves may isolate liquid refrigerant, causing high pressure and rupture of piping. Do not close valves without following recommended procedures for repair, maintenance and replacement of components. Install pressure relief valves in field piping that may become isolated by service valves.

NOTE

This document is to be used together with site-specific documentation and documentation for other parts of the system (heat rejection devices and cooling modules).

NOTE

Before any action that could cause a disturbance in the cooling system's function is begun, the facility manager MUST be informed. In addition, after the action is taken and the work is finished, the facility manager MUST be informed.

TABLE OF CONTENTS

FIGURES

TABLES

1.0 PRODUCT DESCRIPTION

1.1 General Product Information

The Liebert Air Economizer is an option for Liebert DS™ downflow units and Liebert CW™ chilled water downflow units. The Liebert Air Economizer uses cool outdoor air in mild climates to condition indoor spaces. It is functional only on cooling units with Liebert iCOM® controls that have been factory-wired and configured to accommodate the Liebert Air Economizer.

The Liebert Air Economizer is supplied with electrical wiring for connection to the cooling unit, outdoor air sensors, return air sensors and a temperature-and-humidity-sensing unit.

Special firmware is loaded into the primary cooling unit at the factory to permit the primary cooling unit to control the Liebert Air Economizer.

NOTE

When upgrading the firmware for the primary cooling unit, either a Liebert DS downflow unit or Liebert CW chilled water downflow unit, ensure that the new firmware includes the Liebert Air Economizer controls. If in doubt contact the factory.

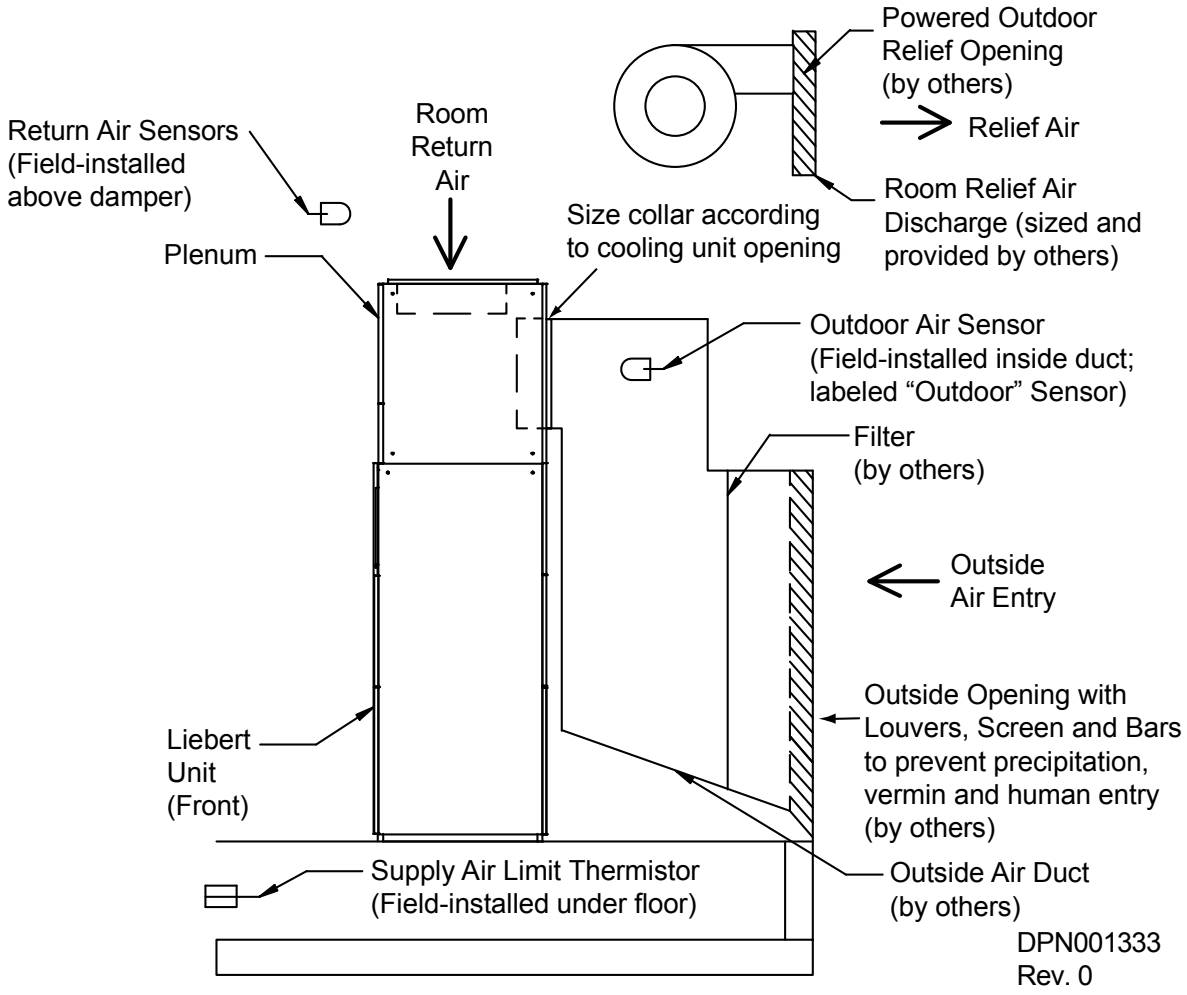
1.1.1 Customer-Supplied Equipment and Ductwork

Installation and operation requires outside-air entry ductwork with louvers, screening and filtration to prevent intrusion of precipitation, particulates, vermin and unauthorized entry (see **Figure 1**).

Proper installation also requires a customer-provided powered relief-air discharge to rid the structure of the outside air drawn in for cooling. The relief-air discharge must be equivalent to the airflow of the total of all cooling systems equipped with the Liebert Air Economizer.

A flange is provided to attach the Liebert Air Economizer to the outdoor air duct **Figures 2**, **3** and **4**.

Figure 1 Liebert Air Economizer arrangement, typical



1.2 Equipment Inspection

When the unit is delivered, inspect all items for visible and concealed damage. Report any damage to the carrier immediately and a file a damage claim. Send a copy of the damage claim to Emerson Network Power or to your sales representative.

1.3 Equipment Handling

WARNING

Risk of top-heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Read all of the following instructions before attempting to move, lift, remove packaging from or preparing unit for installation.

WARNING

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from or prepare this unit for installation.

1.3.1 Handle the Liebert Air Economizer With Skid

- Always keep the unit upright, indoors and protected from damage.
- If possible, transport the unit using a pallet jack or forklift.
- Personnel should be properly certified and trained to move and rig equipment.
- If using a forklift, make sure that the forks (if adjustable) are spread to the widest allowable distance that will fit under the skid.
- When moving the skidded Liebert Air Economizer with a forklift, do not lift the unit any higher than 6" (152mm). If circumstances require the unit to be lifted higher than 6" (152mm), all personnel not directly involved in raising the unit must be no closer than 20 feet (5m) from the lift point of the unit.

1.3.2 Move the Liebert Air Economizer With a Forklift

1. Remove the exterior packaging.
2. Align forklift with either the front or rear of the unit. Ensure that the forks are locked at the widest position that will fit under pallet.
3. Drive the forklift forward, sliding the forks under the base of the unit.
4. Move the Liebert Air Economizer as close to its installation location as possible.

NOTICE

Verify that the floor will support the cooling unit and the Liebert Air Economizer. If a forklift will be used to move either unit, verify that the floor will support the forklift.

1.4 Unpack the Liebert Air Economizer

WARNING

Risk of sharp bands under tension. Can cause personal injury.

The bands securing the Liebert Air Economizer to the skid are under extreme tension. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to remove packaging from this unit.

Save all recyclable materials for reuse. Dispose of any non-recyclable materials properly.

1. Cut the bands securing the Liebert Air Economizer to its skid.
2. Remove any protective and cushioning material.
3. Remove the plastic bag from the unit.

2.0 INSTALLATION

Install the Liebert Air Economizer in accordance with the instructions in this manual and site specific documentation.

WARNING

Risk of heavy unit falling. Can cause equipment damage, personal injury and death.

The Liebert Air Economizer is heavy. The heaviest unit weighs more than 480lb (218kg) without its exterior panels. Verify that all lifting and supporting mechanisms and methods are adequate for the weight of the Liebert Air Economizer being installed. See the documentation included with the unit.

When raising the Liebert Air Economizer, secure it to sufficiently strong overhead structure with straps, slings and or belts for safety to prevent it from falling. Spreader bars may be required with some lifting or securing methods to prevent damaging the Liebert Air Economizer.

2.1 General Considerations

Emerson Network Power recommends installing the cooling unit to be equipped with the Liebert Air Economizer, then installing the Liebert Air Economizer and then installing the ductwork.

The ductwork to the outside must be constructed to mate with the outside air intake on the rear of the Liebert Air Economizer. For dimensions and specifications, see **Figures 2**, **3** and **4** and **Tables 1** and **2**.

2.2 Install the Liebert Air Economizer—Preliminary Steps

1. Remove the exterior panels from the Liebert Air Economizer to lighten it and to gain access to the unit's frame.
2. Attach the safety straps, slings or belts to the Liebert Air Economizer's frame.
3. Attach the lifting method or mechanism to the Liebert Air Economizer.
4. Raise the Liebert Air Economizer and position it on the cooling unit and connect the units as described in either **2.2.1 - Position the Liebert Air Economizer on a Liebert CW** or **2.2.2 - Position the Liebert Air Economizer on a Liebert DS**.

2.2.1 Position the Liebert Air Economizer on a Liebert CW

The Liebert CW has flanges to help position and attach the Liebert Air Economizer.

1. Fit the Liebert Air Economizer over the flanges on either end of the Liebert CW.
2. Fit the Liebert Air Economizer inside the flange on the rear of the cooling unit.

Secure the Liebert Air Economizer to the Liebert CW

The Liebert Air Economizer must be attached to the cooling unit to prevent movement. Use field-supplied, sheet metal screws with blunt tips to connect the units on each end.

NOTICE

Do not drill or screw into the rear of either the Liebert Air Economizer or the Liebert CW. Screws should be used on both ends of the units.

1. Working from inside, drill two holes in the flange on each end of the Liebert CW and into the frame of the Liebert Air Economizer.
2. Insert the sheet metal screws into the frame of the Liebert Air Economizer and tighten until the units are securely attached.
3. After the units are securely connected, remove the safety straps attached in **Step 2** in **2.2 - Install the Liebert Air Economizer—Preliminary Steps**.
4. Clean up any metal particles and other debris from the installation.
5. Reattach the exterior panels to the Liebert Air Economizer.

2.2.2 Position the Liebert Air Economizer on a Liebert DS

The Liebert DS has no flanges on top. Position the Liebert Air Economizer on top of the Liebert DS so that it covers the air entry opening and the plenum and unit will be flush on the ends and back when the panels are installed.

WARNING

Risk of heavy unit falling. Can cause equipment damage, personal injury or death.

The Liebert Air Economizer must be supported until it is securely connected to the Liebert DS to prevent it from slipping off the cooling unit.

1. Locate the holes in the rear filter support flange in the plenum; use these as guides to drill screw pilot holes into the top of the unit rear sheet metal blocker.
2. Insert sheet metal screws through these flanges into the top of the unit.
3. Measure and mark the distance from the front of the electric box top flange in unit back to the center of the plenum frame bottom 1 x 1 tubing, approximately 1.5 inches (38mm).
4. Cover electric box components to prevent metal shavings and debris contamination from the drilling process.
5. Drill screw pilot holes from inside the electric box up through the plenum frame (3-6 places depending on length of plenum).
6. Insert screws through electric box and plenum tubing to secure the front of the plenum.
7. After the units are securely connected, remove the safety straps attached in **Step 2** in **2.2 - Install the Liebert Air Economizer—Preliminary Steps**.
8. Clean up any metal particles and other debris from the installation.
9. Reattach the exterior panels to the Liebert Air Economizer.

Figure 2 Dimensions—Liebert Air Economizer and Liebert CW models CW106D/114D

Typical unit shown.
Refer to dimensions and layout for your unit.

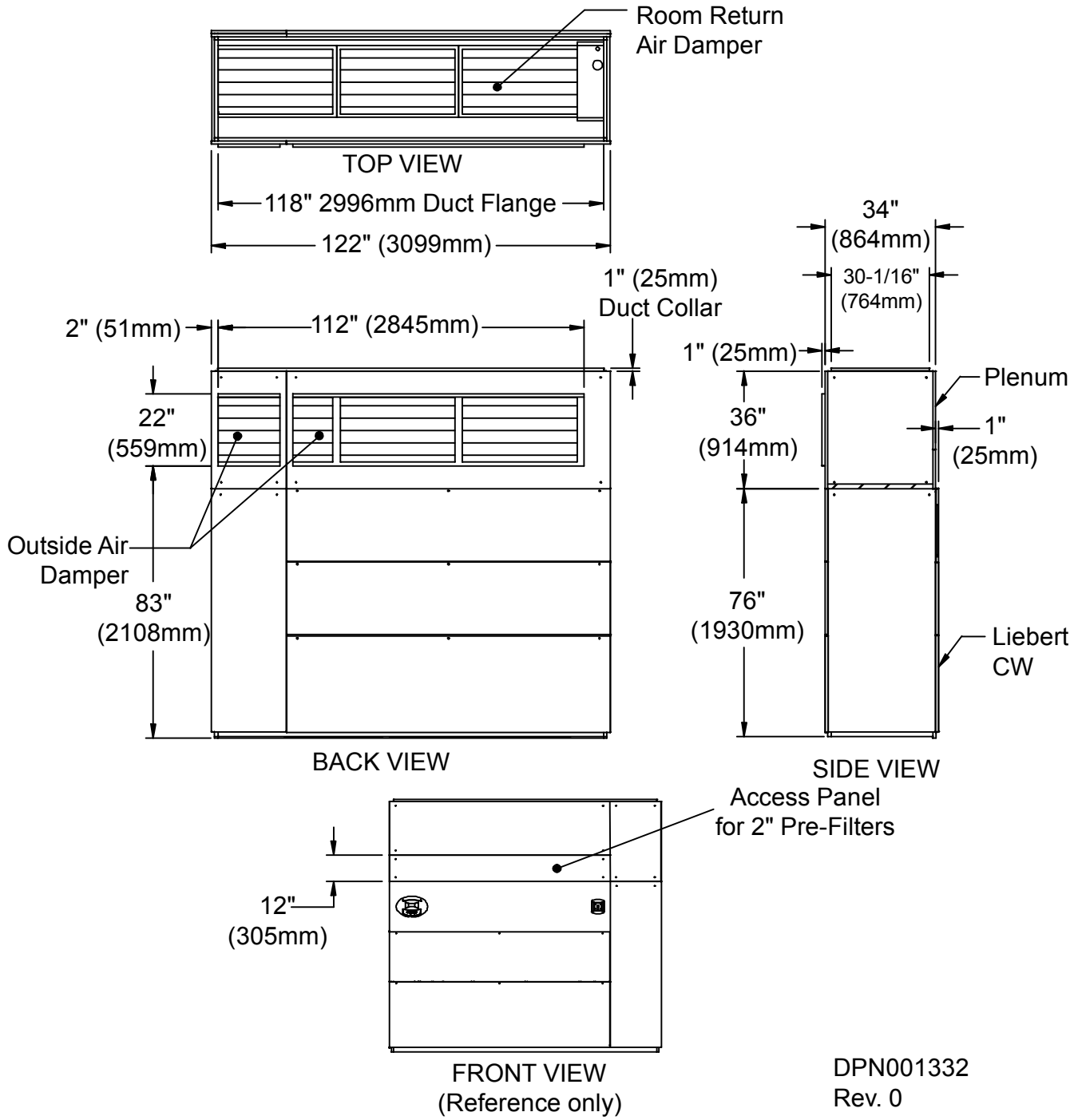


Figure 3 Dimensions—Liebert Air Economizer and Liebert CW models CW026D-CW084D

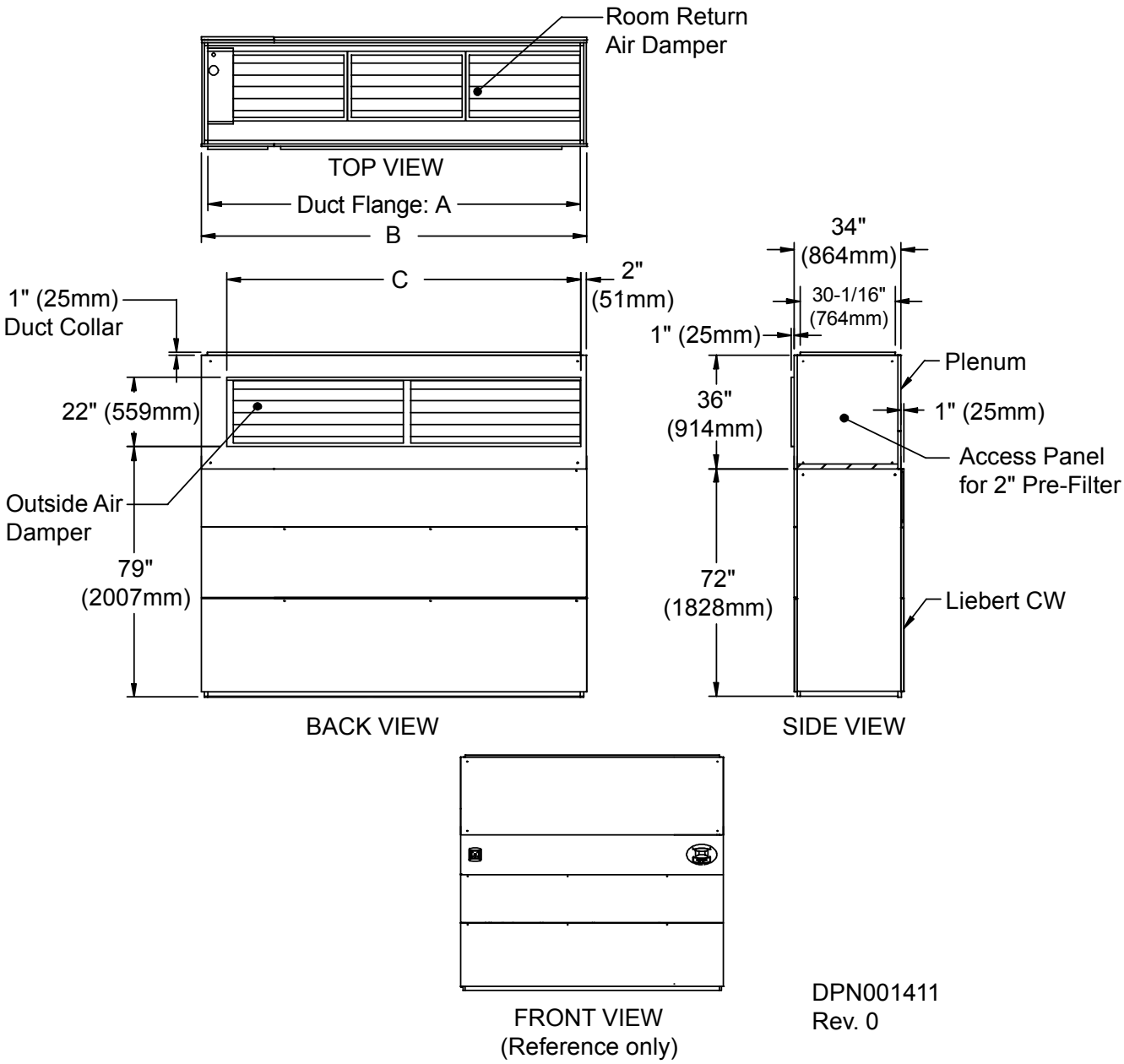


Table 1 Dimensions—Liebert Air Economizer and Liebert CW models CW026D-CW084D

Liebert CW Model	Dimensions, inches (mm)		
	A	B	C
CW026D, CW038D, CW041D	46 (1168)	50 (1270)	40 (1016)
CS051D, CW060D	70 (1778)	74 (1880)	64 (1626)
CW076D, CW084D	95 (2413)	99 (2515)	89 (2261)

Source: DPN001411, Rev. 0

Figure 4 Dimensions—Liebert Air Economizer and Liebert DS downflow units, 28-105kW (8-30 tons)

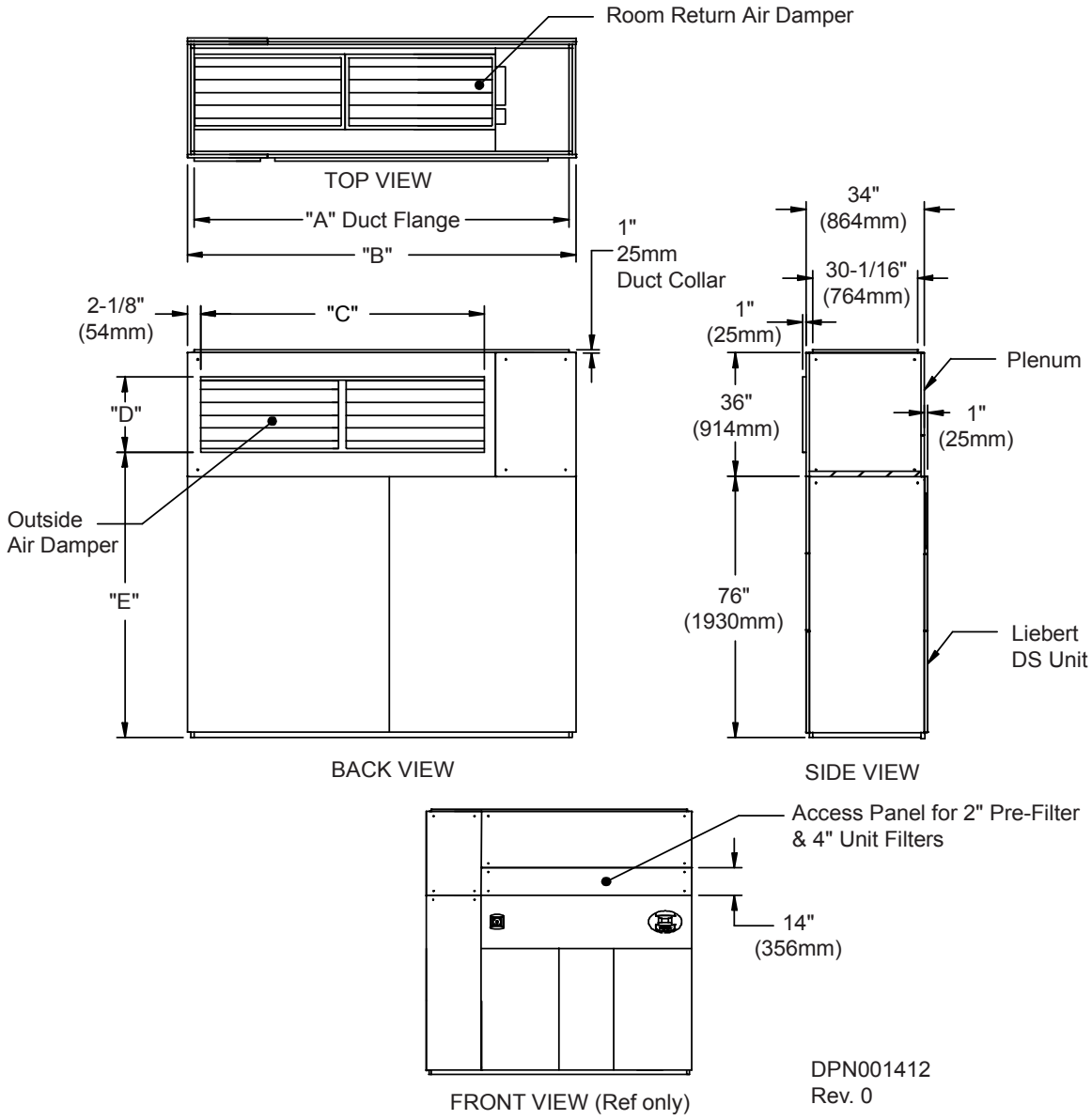


Table 2 Liebert DS model dimensional data, 28-105kW (8-30 tons)

Model # and Flow Rate	Compressor Type	Dimensions, inches (mm)				
		A	B	C	D	E
028-042 (5500 cfm [2596 l/s] or less)	Semi-Hermetic	82 (2083)	86 (2184)	56 (1422)	14.5 (368)	91 (2311)
028-042 (5500 cfm [2596 l/s] or less)	Scroll	69 (1755)	73 (1854)	56 (1422)	14.5 (368)	91 (2311)
028-042 (more than 5500 cfm [2596 l/s])	Semi-Hermetic	82 (2083)	86 (2184)	56 (1422)	17.5 (445)	88 (2235)
028-042 (more than 5500 cfm [2596 l/s])	Scroll	69 (1755)	73 (1854)	56 (1422)	17.5 (445)	88 (2235)
053-077	Semi-Hermetic	105 (2667)	109 (2769)	79 (2007)	17.5 (445)	88 (2235)
053-077	Scroll	94 (2388)	98 (2489)	79 (2007)	17.5 (445)	88 (2235)
105	All Types	128 (3251)	132 (3353)	102 (2591)	17.5 (445)	88 (2235)

Source: DPN001412, Rev. 0

2.3 Wiring the Liebert Air Economizer

WARNING

Risk of electric shock. Can cause injury or death.

Disconnect all local and remote electric power supplies before working within.

The Liebert Air Economizer must be connected by a licensed and qualified electrician only. Ensure that the Liebert Air Economizer cooling unit are electrically isolated for the duration of the connection operation and are secured against unauthorized startup

WARNING

Risk of electric shock. Can cause injury or death.

Disconnect all local and remote electric power supplies before working within. Prior to beginning installation, shut down the cooling unit, disconnect it from input power and secure it against unauthorized startup.

CAUTION

Risk of sharp edges and heavy parts. May cause personal injury or equipment damage.

Wear gloves to prevent injury to hands.

Damage to wiring or components can make unit unsafe to operate.

Use caution when installing wiring to prevent damage to factory wiring.

Install protective bushings in wiring knockouts as required

Do not disturb factory wiring or route field-installed wiring over electrical terminals.

Use NEC Class 1 wiring for all hazardous voltage electrical power supplies.

Check and retighten all wiring connections before starting the unit.

NOTE

Before beginning to install the Liebert Air Economizer, read all instructions, verify that all the parts are included and check the nameplate to be sure the Liebert Air Economizer voltage matches available utility power.

Follow all local and national codes.

2.3.1 Wire the Dampers

The damper wiring is coiled and attached to the interior of the Liebert Air Economizer. The locking connectors must be snapped into similar connectors in the primary cooling unit for the dampers to operate. The wiring must also be secured to the Liebert Air Economizer's frame to protect it.

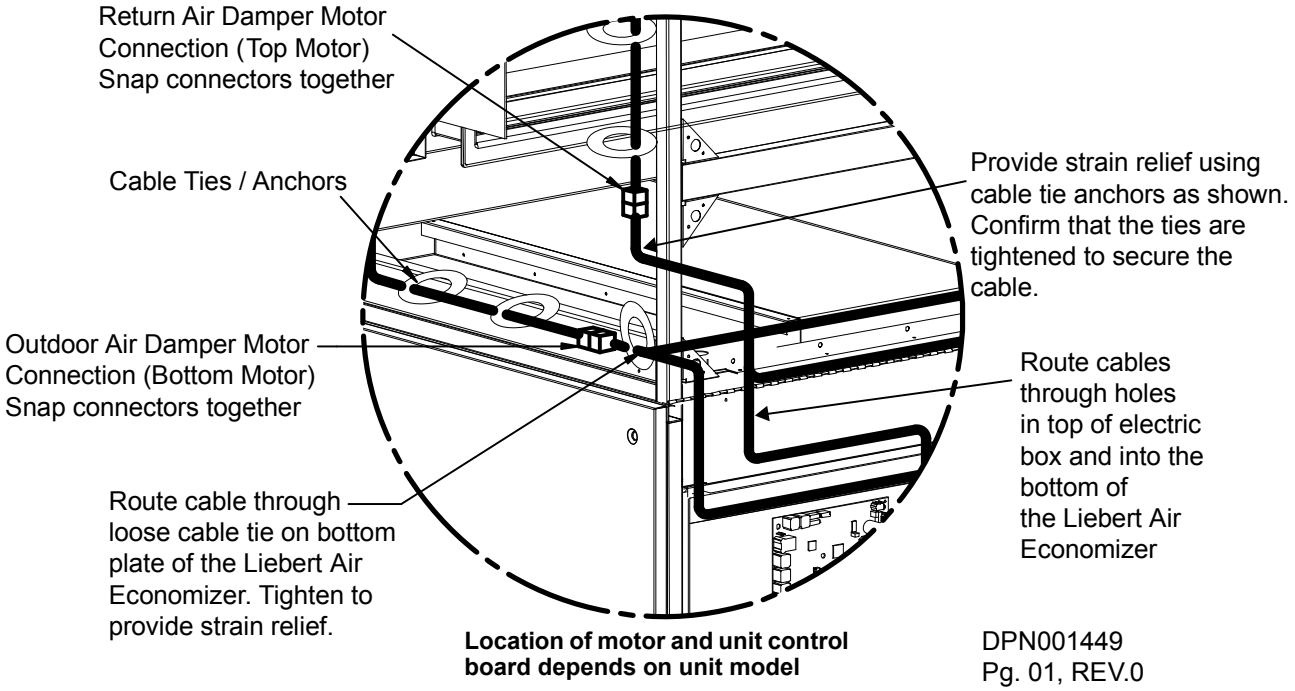
NOTICE

Turn Off all power to the indoor cooling unit before connecting cables or wires. Failure to do so may damage this equipment.

To connect the damper wiring:

1. Locate the damper wiring inside the Liebert Air Economizer—see **Figure 5**.
   The wires are coiled and attached to the Liebert Air Economizer frame.
2. The wires have snap connectors that mate to wires secured to the cooling unit's frame.

Figure 5 Damper wiring connections—Liebert DS and Liebert CW units



2.3.2 Outdoor Air and Return Air Temperature and Humidity Sensor Connections

The Liebert Air Economizer ships with sensors to determine the temperature and humidity of return air and outdoor air. The sensors and wiring to connect them are in boxes inside the Liebert Air Economizer:

- Outdoor air sensor
- Return air sensor
- Supply air limit thermistor (factory-connected to the main interface board)

These must be installed and connected to the primary cooling unit. The outdoor air sensor and return air sensor connections for the Liebert DS and Liebert CW are shown in **Figure 6**. Connect the supply air limit thermistor as shown in **Figure 7** (it must be routed from the cooling unit and secured). The illustration shows connections for the Liebert DS and Liebert CW.

NOTICE

Turn Off all power to the indoor cooling unit before connecting cables or wires. Failure to do so may damage this equipment.

Figure 6 Temperature and humidity sensor connections—Liebert DS and Liebert CW

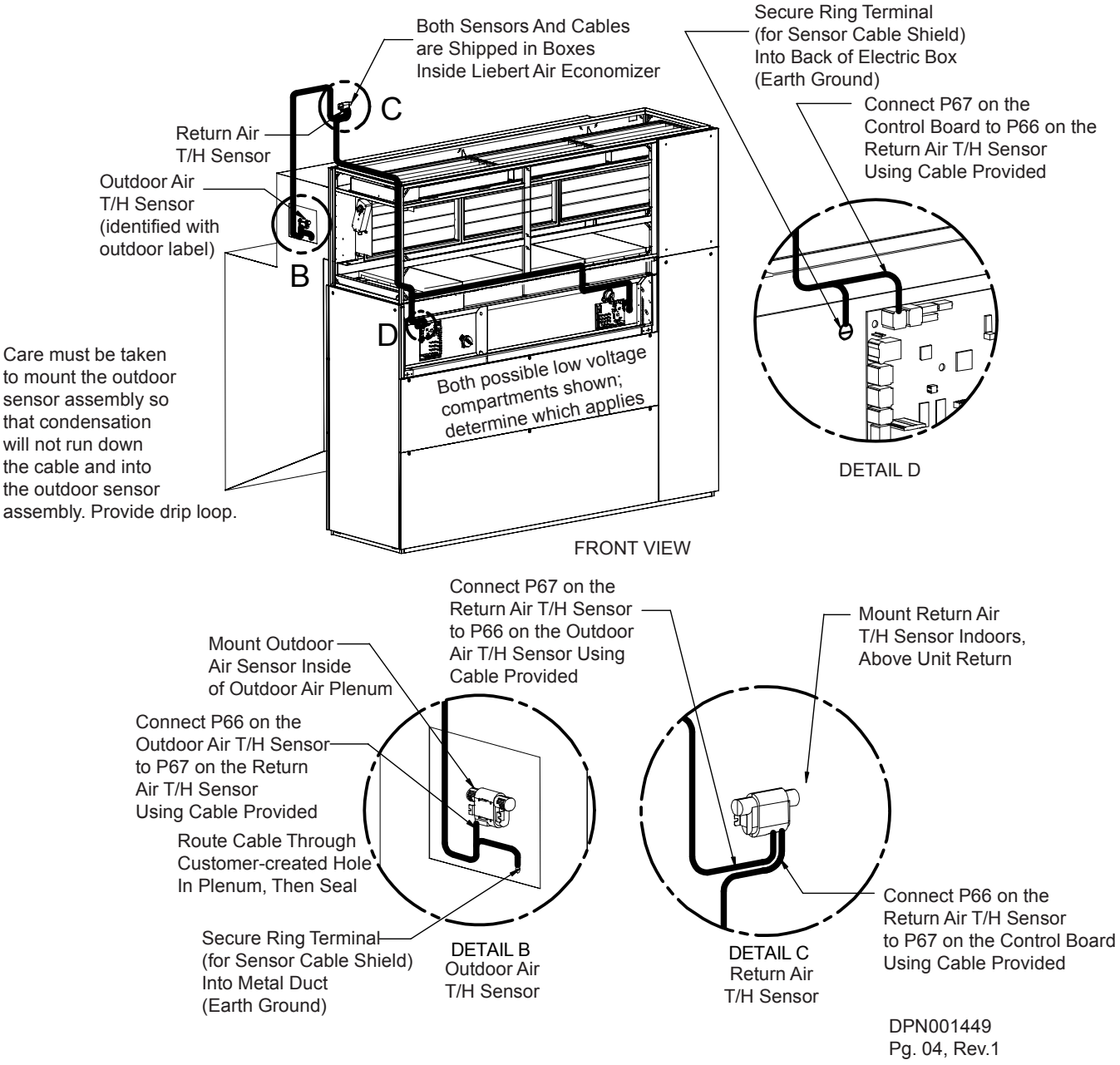
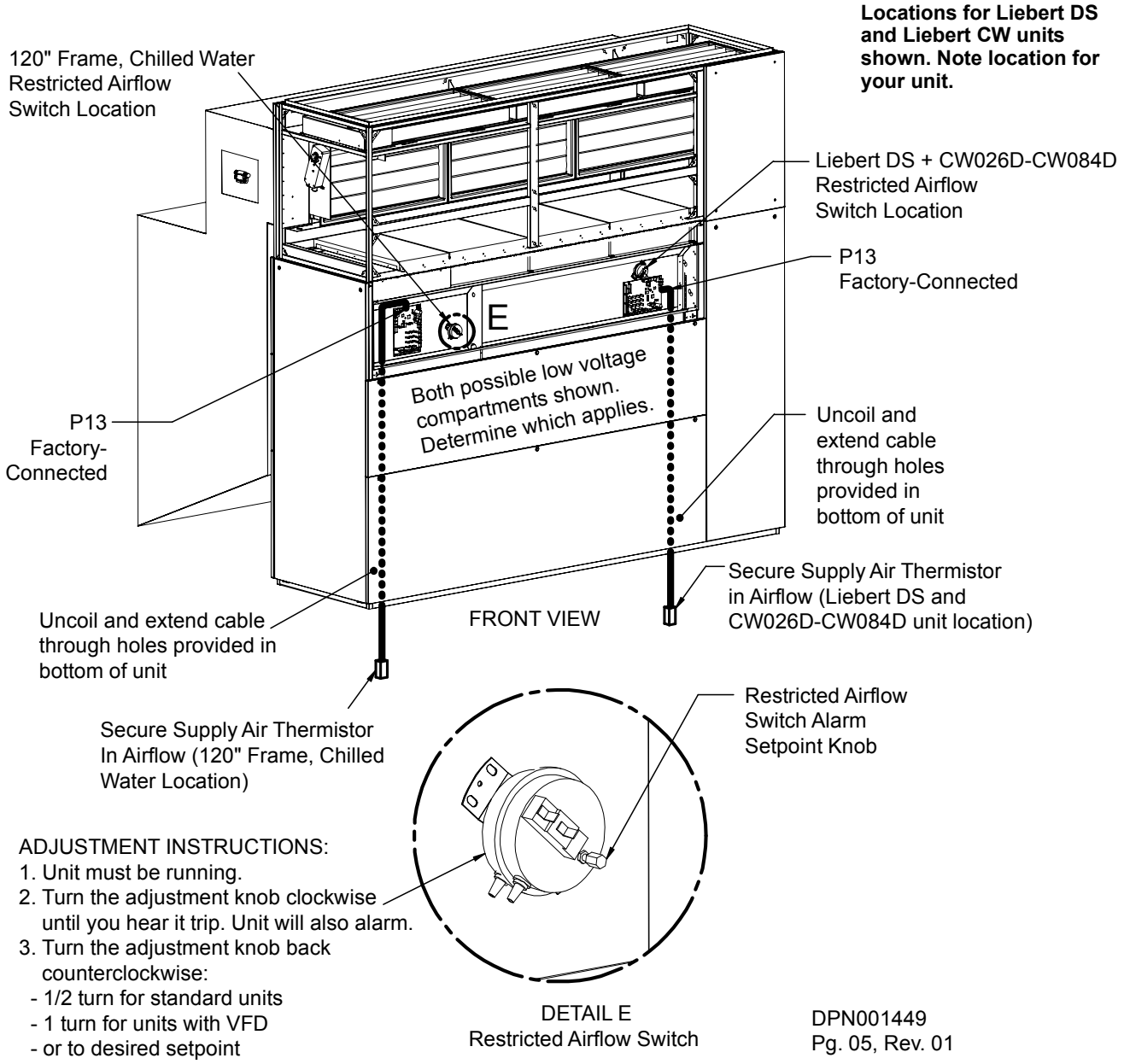


Figure 7 Supply limit thermistor wiring and restricted airflow switch location



2.4 Adjust the Restricted Airflow Switch

The restricted airflow switch inside the cooling unit must be adjusted for the Liebert Air Economizer to operate properly and efficiently. To adjust the switch:

1. Inspect all connections, restore power to operate the unit's blower.
2. Find the restricted airflow switch in the cooling unit (see **Figure 7**; the illustration shows the switch location in both the Liebert CW and Liebert DS units).
3. Turn On the Liebert DS or Liebert CW—the cooling unit must be running for the switch to be adjusted.
4. Turn the restricted airflow switch alarm setpoint knob clockwise until it trips. The cooling unit will also alarm.
5. Turn the setpoint knob counterclockwise:
   a. half a turn for standard cooling units (about 75% airflow)
   b. one full turn for cooling units equipped with a variable frequency drive (about 50% airflow)
   c. or to the desired setpoint.

3.0 INSTALLATION CHECKLIST

___ 1. Liebert Air Economizer received, unpacked and checked for damage.
___ 2. Liebert Air Economizer positioned and secured to indoor cooling unit.
___ 3. Duct work to outdoor opening properly sloped to prevent precipitation and dust infiltration.
___ 4. Outdoor air duct opening properly screened to prevent vermin from entering.
___ 5. Outdoor air duct opening protected against human intrusion.
___ 6. Filters installed in air intake duct work.
___ 7. Restricted airflow switch settings made
___ 8. Low voltage connections made.

4.0 OPERATION

The Liebert cooling unit controls the Liebert Air Economizer through special software. The primary cooling unit responds to sensors that monitor the temperature and humidity of the outdoor air, return air and supply air. If outdoor conditions are within the tolerances set, the primary cooling unit opens the Liebert Air Economizer's dampers varying amounts to use outdoor air for cooling.

When outdoor conditions are too warm or humid for cooling, the primary cooling unit closes the Liebert Air Economizer's dampers, taking it out of the cooling process.

NOTICE

While the Liebert Air Economizer is operating, the primary cooling unit's humidification and dehumidification are inhibited. If humidity level is important to operational requirements, it must be controlled by other methods during operation of the Liebert Air Economizer.

While the primary cooling unit is cooling without the Liebert Air Economizer, the primary cooling unit will control humidity levels according to its setpoints.

NOTICE

Low outdoor temperatures can produce freezing conditions that adversely affect cooling systems employing water, particularly when the water is not moving through the pipes. When cooling system water is not moving, frozen waterlines, burst coils and water damage are possible. The outside damper must be set so that it is fully closed when freezing temperatures are possible and the cooling system is not operating (see **4.1.3 - Disable the Liebert Air Economizer**).

NOTICE

The Liebert Air Economizer does not remove odors, smoke, gases or particulates from the outside air used for cooling. These must be controlled by other methods.

4.1 Operational Condition

4.1.1 Normal Operation

When the Liebert Air Economizer is being used for cooling, both the outside air damper and the room return air damper are active in an opposed relationship. The cooling requirement and temperature of the outdoor air will determine the position of the outside air damper. It will range from fully closed to fully open. As the outside air damper moves toward fully open, the room return air damper moves toward fully closed except a minimum setting of 15% room return air is maintained. This permits outside air to be drawn into the conditioned space. Closing the return air dampers reduces the percentage of warmer air from the conditioned space being drawn into the airflow. The incoming air from the outside damper requires expelling an equal volume of air through a field-provided powered relief air vent (see **Figure 1**). This value will vary from 0 to 80% of the total airflow for all Liebert Air Economizer units. The powered relief system should be sized for 80% of the total airflow for all Liebert Air Economizer units and to maintain minimal building air pressure.

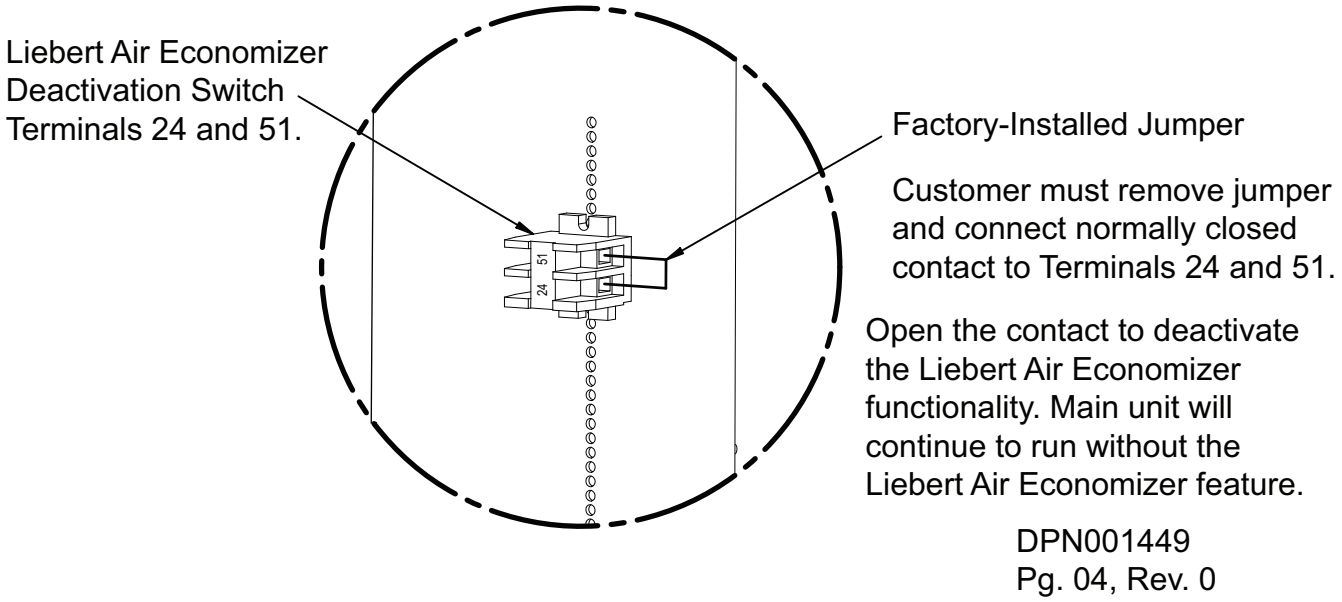
4.1.2 Out of Service

When the Liebert Air Economizer is not being used, the outside air damper is closed, the return air damper is open and the relief air vent fan is shut down. This permits air from the conditioned space to be drawn into the primary cooling unit, cooled and expelled into the conditioned space. The relief air vent is not required while the Liebert Air Economizer is not in service because no air volume is being brought into the conditioned space.

4.1.3 Disable the Liebert Air Economizer

The Liebert Air Economizer can be disabled through a deactivation switch field-installed and wired to Terminals 24 and 51 in place of the factory-supplied jumper. Removing a factory-installed jumper will deactivate the unit's function (see **Figure 8**). Deactivating the Liebert Air Economizer will transfer all cooling to the primary cooling unit.

Figure 8 Deactivation switch



4.2 Control Menu Settings

The Liebert Air Economizer control uses an outdoor temperature humidity sensor to detect when outdoor conditions are within the operating range. The outdoor sensor can be monitored from the Service/Economizer data menu on page 2 of 3 (see **Figure 10**).

The Liebert iCOM control is equipped with a series of setup parameters to allow limited adjustment and monitoring of the Liebert Air Economizer's dampers and sensor. To access these parameters from the main unit screen:

1. Press the down arrow key until User Menu is displayed.
2. From the User Menu screen, press the right arrow key to enter the Service Menu.
3. Press the **Enter** key once in the Service Menu and use the arrows to navigate to the **ECO** icon on the bottom row.
4. Once this icon is selected, press **Enter**.

The parameters for the Liebert Air Economizer are now viewable.

4.2.1 Liebert Air Economizer Status Screen

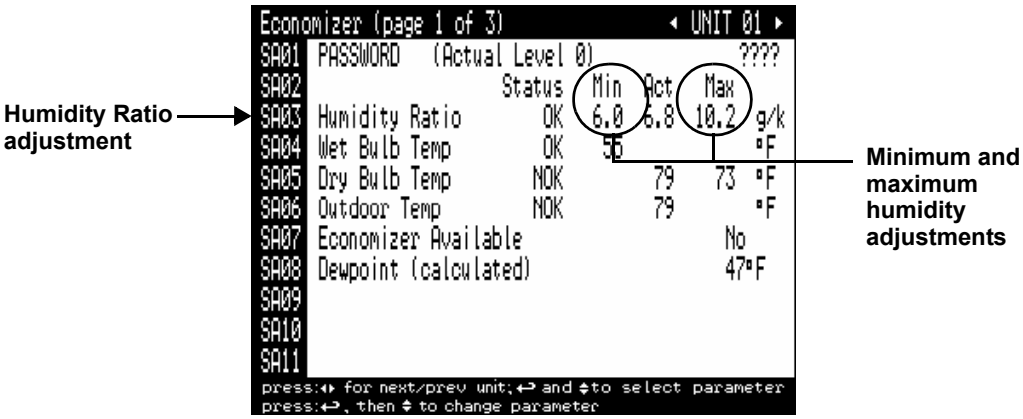
Parameters **SA03** through **SA08** of the Economizer screen will show the current status of the Liebert Air Economizer control. The Liebert Air Economizer will be activated for use if :

- All temperatures and ratios are within the outdoor sensor range
- The outdoor air is cooler than the indoor return air temperature.

Whether the Liebert Air Economizer function is available will be shown at parameter **SA07—Economizer Available**.

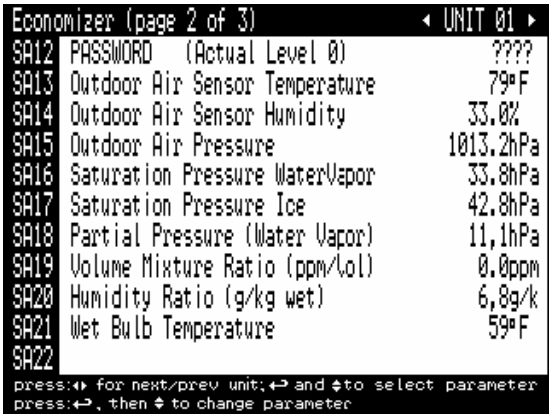
The Liebert Air Economizer control allows the range of outdoor air acceptable for cooling to be narrowed by adjusting the Humidity Ratio Min and Max settings. Refer to a psychrometric chart before adjusting humidity ratios.

Figure 9 Liebert Air Economizer status screen



Parameters **SA13** through **SA21** of the Economizer screen will show the outdoor sensor data. These readings determine whether the outdoor conditions are suitable for Liebert Air Economizer usage (see **Figure 10**).

Figure 10 Outdoor sensor data screen

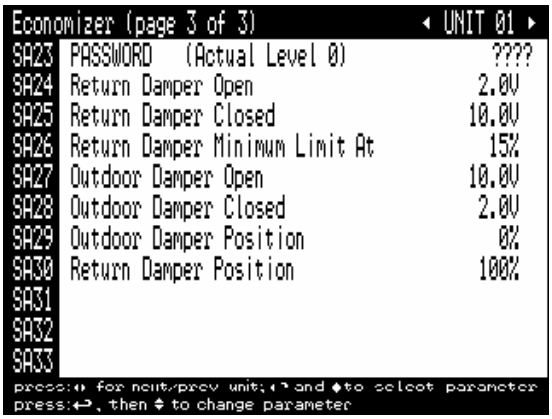


Parameters **SA23** through **SA33** of the Economizer screen show the return and outdoor damper limits and current position. The return damper will receive a 2VDC signal when fully open and an 8-10VDC signal at its most-closed position.

The outdoor damper will receive a 10VDC signal when fully open and a 2VDC signal when fully closed. If the outdoor conditions do not permit Liebert Air Economizer usage, then the outdoor damper will fully close and the return damper will fully open for normal operation of the primary cooling unit.

The actual outdoor and return damper positions are shown at parameters **SA29**—**Outdoor Damper Position** and **SA30**—**Return Damper Position** (see **Figure 11**).

Figure 11 Damper settings and limits screen



4.3 Temperature Control Modes (P and PI)

4.3.1 Proportional Control

The proportional mode adjusts the output signal in direct proportion to the controller input by comparing the current temperature and the setpoint. The adjustable parameters to be specified are the setpoint (S102) and the proportional band (S104).

The larger the difference between temperature and setpoint the more the controller output will increase. For instance, a 10% of scale difference will change the controller output by 10%. A proportional controller reduces error (difference between temperature and setpoint) but does not eliminate it; an error between the actual and desired value will normally exist.

4.3.2 Proportional Integral Control

The additional integral mode corrects for error that may occur between the desired value (setpoint) and the process output automatically over time. The adjustable parameter to be specified is the integral time (Ti) of the controller (S105).

4.3.3 Integral Wind-up

When a controller that possesses integral action receives an offset signal, the integral term of the controller will increase at a rate governed by the integral time of the controller. This will eventually cause the manipulated variable to reach 100% (or 0%) of its scale, i.e., its maximum or minimum limits. This is known as integral wind-up.

On PI controls there are two error variables:

- the proportional error [pe]
- the manipulated error [me]

The controller output in PI control is the manipulated error.

The integral starts calculating (manipulating) as soon as there is a *pe*. Permanent target for the integral is to increase/decrease *me* so that after the selected integral time *me* is the double of the *pe*.

For example, at a given *pe* of 10% and an integral time of 1 minute me will be 11% after 6 seconds, 12% after 12 seconds, 13% after 18 seconds, finally reaching 20% (double of *pe*) after 1 minute.

If *pe* doesn't change, *me* will reach 30% after another minute. This continues until *me* reaches 100%, which is the maximum.

If *pe* changes, *me* will also be changed with the same value. For example: *pe* is 20%, *me* is 40%. When *pe* changes to 15%, *me* will change to 35%.

4.3.4 Controller Tuning

If the controller is unstable or shows too many damper repositions (see the Liebert iCOM's Wellness menu, page 9 of 9; refer to **Figure 12**), the automatically adjusted controller values may not be best suited for this installation. Tuning the controller settings could help achieve better results.

Controller tuning involves the selection of the best values of setpoint (S102), proportional band (S104), integration time (S105) and (if enabled) the supply air limit setpoint (S125). This is often a subjective procedure and is certainly site dependent.

In most cases, unstable control (dampers constantly repositioning) is caused by too low of proportional band setting (S104) combined with an active supply limit control (the supply air temperature is close to or below the low limit S125).

A simple improvement may be to decrease the supply limit setpoint (S125).

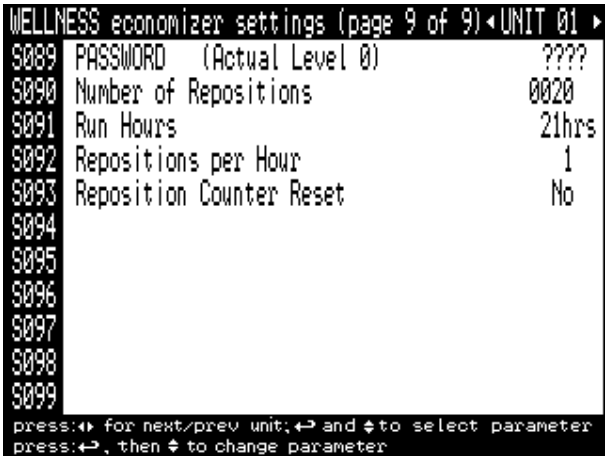
If this is not successful/feasible/desired, follow these steps:

1. Set **Autoset Enable** (S107) to **No**.
2. Set **Control Type** (S103) to **PI**.
3. Set **Supply Limit Temp Value** (S125) a few degrees higher than the current return air temperature to have it active (if S125 is used).
4. Set **Integration Time** (S105) to **0**; this will enable incrementing only the proportional band.
5. Set **Temperature Proportional Band** (S104) to **6°F** and observe the response of the controlled dampers. Allow the control to stabilize.
6. Add 2°F to S104 setting and observe the response of the controlled dampers. Allow the control to stabilize.
7. Repeat **Step 5** until the dampers operate as expected and the temperature is fairly stable on any value of temperature.
8. If the actual temperature remains too high above the set point, set **Integration Time** (S105) to **4 minutes** and observe the response of the controlled dampers. Allow the control to stabilize.
9. Increase (S105) in 1-minute steps until acceptable settings are achieved.
10. If the control operation is stable but sluggish, the proportional band can be reduced (10-15% of the current value) to allow faster reaction.
11. Set **Supply Limit Temp Value** (S125) back to the original setting.

NOTE

The time to observe stable operation in the control settings above may be 30 minutes to an hour or longer. The dampers rotate very slowly, so noting repositions requires careful observations and timing. If the Wellness menu shows the reposition rate to be less than 5-6 per hour, tuning is satisfactory. Monitoring the repositions during routine maintenance (filters, etc.) is recommended to determine if additional adjustments to reduce repositions are necessary. The damper motor duty life will increase as the reposition rate is reduced.

Figure 12 Liebert iCOM Wellness menu, page 9



Refer to the Liebert iCOM user manual for additional information. The manual, SL-18835, is available at the Liebert Web site: www.liebert.com

5.0 MAINTENANCE

The Liebert Air Economizer requires little maintenance when proper installation, startup and operation procedures are followed. The following tasks should be performed at the intervals stated:

___ 1. Check outside air entry ducting every 4-6 weeks for precipitation infiltration. Alter outside opening as required.

___ 2. Check screen and filters monthly or more often, depending on air quality.
Replace or clean as necessary.

___ 3. Inspect the damper system (louvers, motor and linkage) at startup and every 4-6 weeks for proper adjustment, dust, dirt and corrosion. Clean any matter that will inhibit air flow with compressed air or commercial coil cleaner.

___ 4. Check for bent or damaged components and repair as necessary.

___ 5. Monitor for air leaks during normal operation; check for air leakage every six months.

___ 6. Verify powered relief air system during normal operation; check operation every six months.

Perform all maintenance on your indoor cooling unit (Liebert DS or Liebert CW) as required.

6.0 TROUBLESHOOTING

Table 3 Liebert Air Economizer troubleshooting

Problem	Possible Cause	Remedy
Reduced Airflow	Blocked filter	Replace or clean filter.
	Improper duct size	Enlarge duct.
	Improper relief air/exhaust fan	Install properly sized, operating fan.
	Debris on screens	Clean debris off screen.
	Air intake location	Move air intake.
High/Low Temp	Sensors not plugged in	Connect sensors.
	Control not set properly	Adjust control/alarm setpoints.
	Plenum installed backwards	Remove plenum and reinstall correctly.
High/Low Humidity	Humidity is not controlled by Liebert Air Economizer, no alarm	Turn off Liebert Air Economizer; use primary cooling unit only.
	Lack of vapor barrier	Widen humidity alarm range.
Moisture enters unit	Improper rain shielding	Install overhang to keep rain out of intake.
	Improper duct design	Redesign duct with proper slope.
Contaminants or particulates enter conditioned space	Improper location of inlet air	Move inlet air duct
	Improper air filtration	Install higher-efficiency filters or. correct installation of current filters.
	Corrosive Environment	Contact Liebert Corporation at 1-800-LIEBERT.
Pollen, objectionable or noxious odors or gases enter conditioned space	Filters will not remove pollen or odors	Deactivate the Liebert Air Economizer.
Air damper—outside or room return—does not open or does not close	Motor not oriented properly	Adjust motor position.
	Linkage not adjusted	Adjust linkage.
	Corrosion	Clean corrosion and lubricate properly.
	Improper wiring	Check and correct wiring connections.
No damper function or signals to damper	Liebert Air Economizer software is not present, in control, or was overwritten during software upgrade	Verify Liebert Air Economizer screens are missing and install Liebert Air Economizer software to Liebert iCOM control.

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