

# SD DOWNFLOW DUCTED PACKAGED TERMINAL AIR CONDITIONERS

Heating and Cooling Unit  
Cooling - Only Unit

## INSTALLATION & OPERATION MANUAL

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Effective February 1985 (Revision Date: April 2009)  
This manual supersedes all previous issues.



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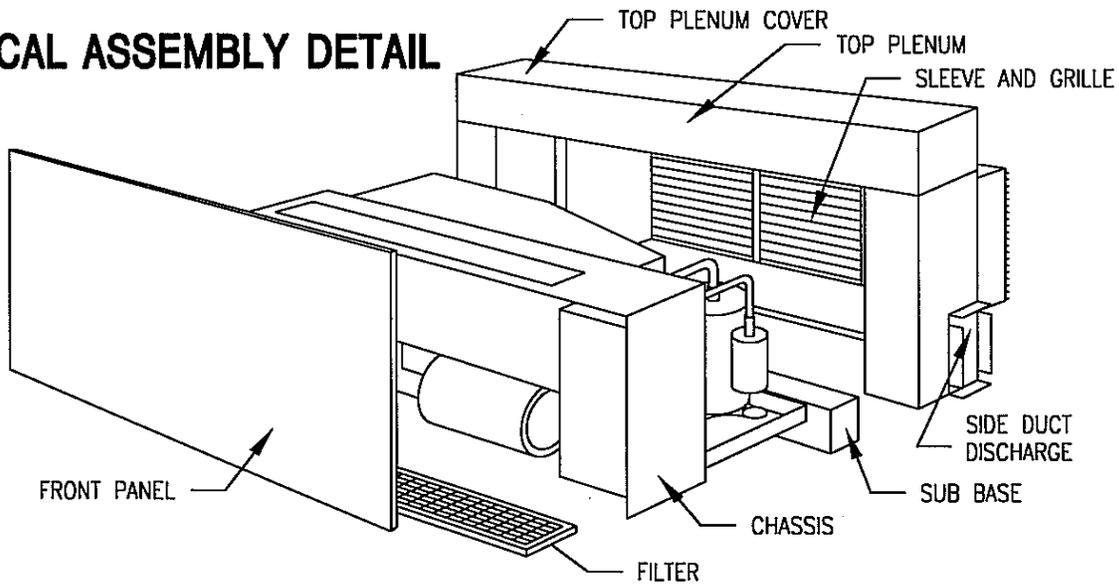
## WARNING: SAFETY HAZARD

THE SD SERIES UNITS MUST BE USED FOR DUCTED APPLICATIONS ONLY.

FREE AIR DISCHARGE APPLICATIONS REQUIRE THE SU SERIES, WHICH IS A SPECIALLY CONFIGURED UNIT, SIMILAR IN APPEARANCE, BUT WHICH INCORPORATES A DISCHARGE GRILLE AND OTHER SAFETY FEATURES REQUIRED FOR FREE AIR DISCHARGE APPLICATIONS.

FAILURE TO HEED THIS WARNING COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

## TYPICAL ASSEMBLY DETAIL



# COMPONENTS

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## 1. Wall Sleeve & Outdoor Grille

The wall sleeve is to be built into the wall during construction. The wall sleeve is used for all wall thicknesses from 2" through 13" maximum. For a 13" deep wall the outdoor louvers will have to be mounted flush with the outside wall surface. For walls thicker than 13", a cabinet extension is required. For installation of wall sleeve extensions, see instructions packed with the extensions.

The wall sleeve must penetrate into the room by a fixed distance in order for the downflow room cabinet apparatus to function properly. Therefore set the sleeve in the wall so that 1" of the sleeve protrudes into the room. This is necessary in order to obtain the 10" distance between the front panel and the inside wall face as shown in Figures 1 and 2, once the plenum and side ducts are added. After installation of the wall sleeve, the sleeve should be thoroughly cleaned. The room-side portion of the cabinet should be carefully protected during the construction period to prevent scratching of the paint.

### **IMPORTANT:**

The heating/cooling unit must not be used for temporary heating or cooling during the building's construction stage.

## 2. Heating/Cooling Chassis

This chassis includes all cooling components, air moving components and controls, except for the 24-volt room thermostat.

## 3. Power Supply Cord & Plug

A power supply cord with 30 Amp or 50 Amp male plugs (as

applicable) extends from the left side of the control section located on the right hand side of the unit. This cord is to be attached to a field – supplied receptacle mounted in the factory – supplied junction box mounted in the sub base located under the unit. The sub base is sized to fill the gap between the finished floor and the room cabinet when the wall sleeve is installed 4" above the finished floor as shown in Figure 1.

If the maximum fuse or circuit breaker listed on the unit rating plate is 30.0 Amps or less, then a NEMA 6-30R receptacle is used. If the marked maximum fuse or circuit breaker rating exceeds 30.0 Amps, then a NEMA 6-50R receptacle must be used. The cover plate is supplied with the sub base.

## 4. Plenum / Vertical Ducts

The plenum is a horizontal duct that attaches by screws to the top panel of the chassis, once the chassis is fully inserted and drawn up tightly in the wall sleeve. The plenum collects the air as it exits from the top of the chassis, and turns the air in a right hand and left hand direction. When the air reaches the ends of the plenum, it is directed downward into the vertical side ducts where it flows toward the floor. Air duct outlet collars are provided on the side ducts.

The left and right vertical side ducts are fully insulated and connect to the underside of the plenum using the sheet metal screws provided. Ensure the duct collars on the side ducts are facing away from the chassis so air will be directed out the left and right sides of the room enclosure apparatus.

## 5. Ducting

The vertical side ducts come complete with a duct collar on the lower outboard side, to accept 6" wide by 8" high lateral flanking duct. The unit must be ducted out both sides. The interior of the flanking duct must be insulated with a minimum of 1/2" thick fiberglass duct liner, suitable for the air velocities involved. The outlet vents should be located on the top of the distribution ductwork facing up.

## 6. Duct Sizing

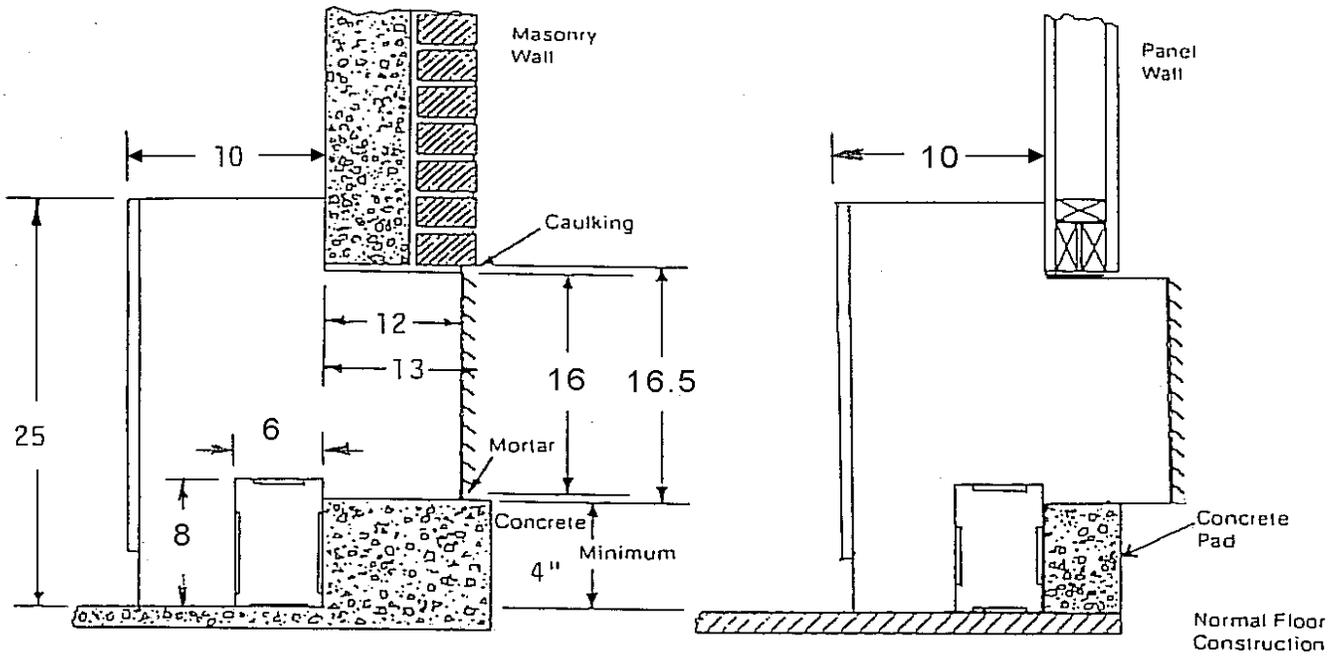
The ducts must be sized for a maximum pressure drop of 0.20" of water column at 400 CFM total airflow directed out both sides of the unit. This will ensure that adequate airflow will result when the unit is operating at the factory – set indoor blower speeds for the particular heating and cooling capacity of the unit. There is no minimum pressure drop so large or short ducts are not a problem.

Size the duct for the anticipated fraction of 400 CFM pertaining to that branch. In other words, if 40% airflow is desired out of the left side and 60% out the right, then size the duct as follows:

40/100 X 400 = 160 CFM at .20" w.c. maximum, out the right side.

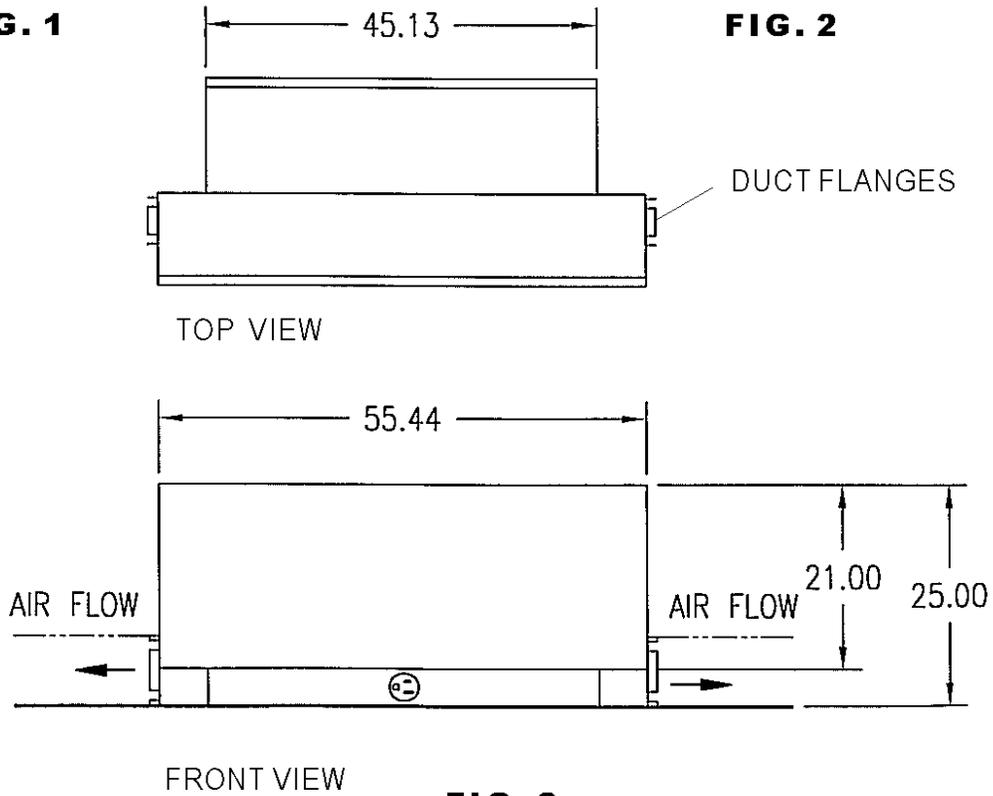
60/100 X 400 = 240 CFM at .20" w.c. maximum, out the left side.

Or, design both ducts for 240 CFM at .2" w.c. maximum and use dampers or the right side outlet grilles to throttle the flow down to 160 CFM in the right side branch. The .20" w.c. pressure drop should also include the air resistance through the outlet vents calculated at the predicted CFM exiting out each vent.



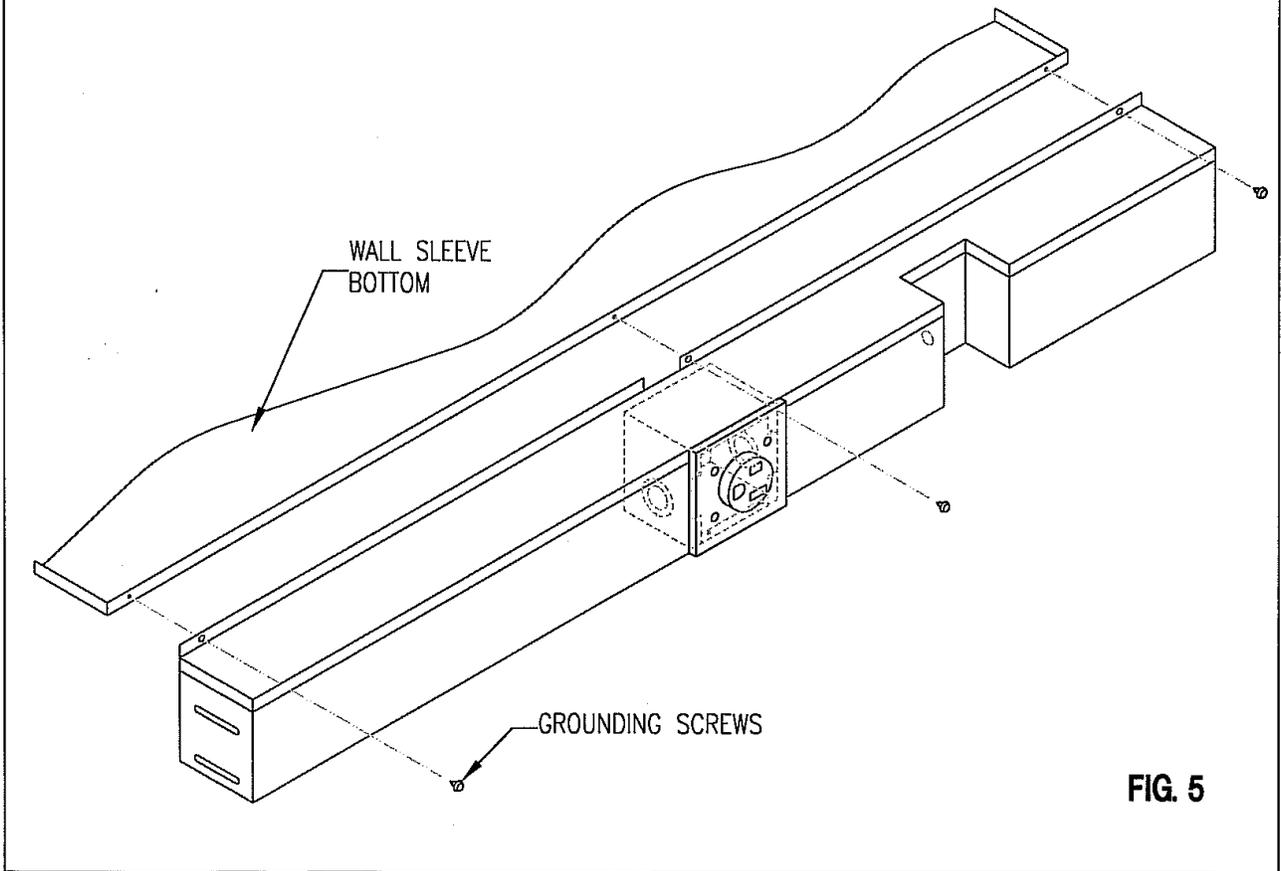
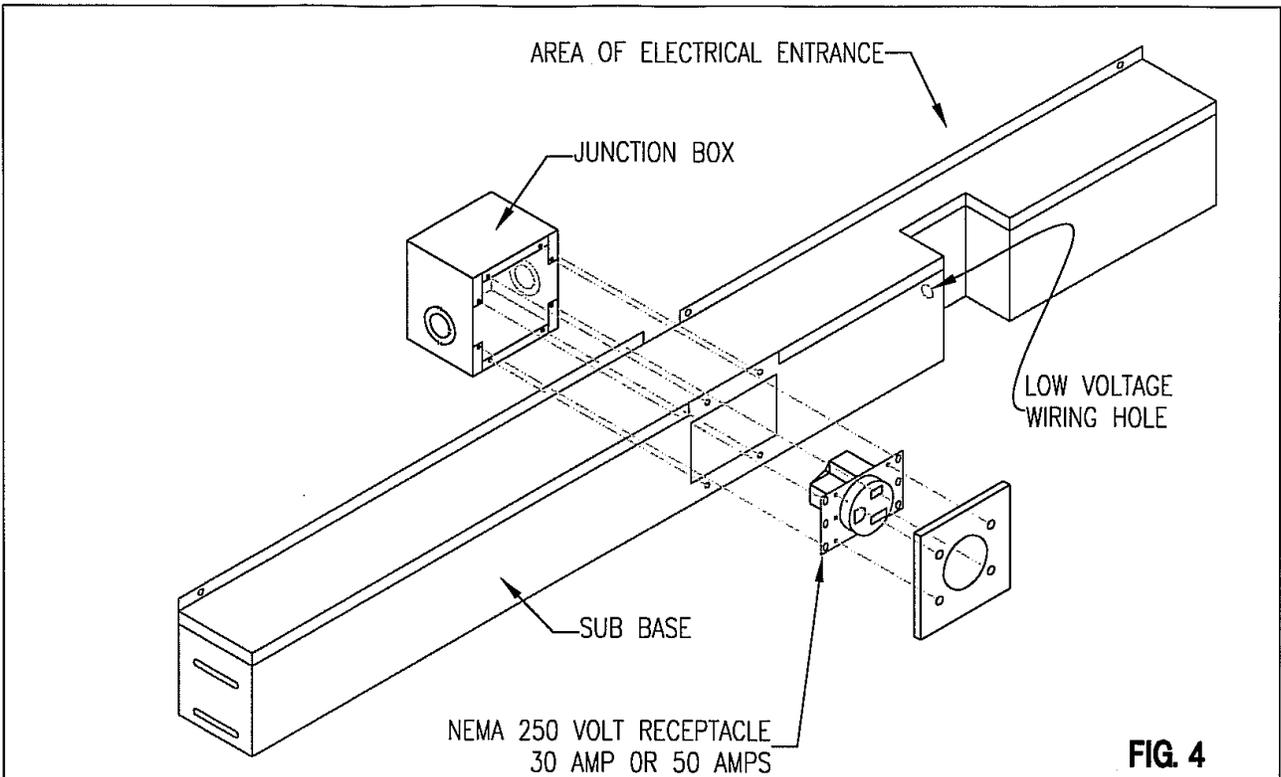
**FIG. 1**

**FIG. 2**



FRONT VIEW

**FIG. 3**



## Wall Sleeve & Outdoor Grille

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### IMPORTANT!

The heating/cooling unit must not be used for temporary heating or cooling during the building's construction stage.

## 7. Heating/Cooling Chassis

This chassis includes all cooling components, air moving components and controls, except for the 24-volt room thermostat.

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A power supply cord with 30 Amp or 50 Amp male plugs (as applicable) extends from the left side of the control section located on the right hand side of the unit.

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The plenum is a horizontal duct that attaches by screws to the top panel of the chassis, once the chassis is fully inserted and drawn up tightly in the wall sleeve. The plenum collects the air as it exits from the top of the chassis, and turns the air in a right hand and left hand direction. When the air reaches the ends of the plenum, it is directed downward into the vertical side ducts where it flows toward the floor. Air duct outlet collars are provided on the side ducts.

The left and right vertical side ducts are fully insulated and connect to the underside of the plenum using the sheet metal screws provided. Ensure the duct collars on the side ducts are facing away from the chassis so air will be directed out the left and right sides of the room enclosure apparatus.

## 10. Ducting

The vertical side ducts come complete with a duct collar on the lower outboard side, to accept 6" wide by 8" high lateral flanking

duct. The unit must be ducted out both sides. The interior of the flanking duct must be insulated with a minimum of 1/2" thick fiberglass duct liner, suitable for the air velocities involved. The outlet vents should be located on the top of the distribution ductwork facing up.

## 11. Duct Sizing

The ducts must be sized for a maximum pressure drop of 0.20" of water column at 400 CFM total airflow directed out both sides of the unit. This will ensure that adequate airflow will result when the unit is operating at the factory – set indoor blower speeds for the particular heating and cooling capacity of the unit. There is no minimum pressure drop so large or short ducts are not a problem.

Size the duct for the anticipated fraction of 400 CFM pertaining to that branch. In other words, if 40% airflow is desired out of the left side and 60% out the left, then size the duct as follows:

40/100 X 400 = 160 CFM at .20" w.c. maximum, out the right side.

60/100 X 400 = 240 CFM at .20" w.c. maximum, out the left side.

The .20" w.c. pressure drop should also include the air resistance through the outlet vents calculated at the predicted CFM exiting out each vent.

## INSTALLATION

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### INSTALLATION OF THE CABINET AND WALL SLEEVE

1. The cabinet/wall sleeve may be positioned in the wall to suit the application subject to the limitations that:
  - a) The finished wall must be 10" from the front of the cabinet. See Figures 1 and 2.
  - b) The outdoor louver must be flush or extending beyond the outside wall (no recess). Use a wall sleeve extension if necessary. Figures 1 and 2 represent typical installations.
  - c) The wall sleeve must be rigidly installed in the wall. There are some installations where it may be necessary to anchor the top and sides of the wall sleeve to the wall using appropriate fasteners for the type of construction.
  - d) For best results, the rear 12" of the cabinet should be supported by concrete, regardless of wall construction. The inside edge of the cabinet must be 4" above the finished floor to allow adequate space for air flow to the unit and to ensure proper fill by the sub base. See Figure 1.
2. The cabinet/wall sleeve will not support the wall above it. Provide necessary lintels to prevent distortion of the cabinet.
3. The wall sleeve will be set in wet concrete or mortar and pressed firmly into place to get contact between the concrete and the bottom. Further details follow.

**IMPORTANT:** The wall sleeve must possess an overall 1/4" slope downward toward the outside to ensure proper water drainage. The wall sleeve must also be level from side-to-side.

**Failure to do so may cause property damage by water flowing into the conditioned space.**

4. All cracks or openings between the cabinet and the wall must be filled with mortar and/or caulked.
  5. Receptacle mounting, installation of the junction box, and rough wiring must be completed at the time of wall sleeve installation. Electrical entrance must be between the concrete, wall sleeve, and sub base. Detailed instructions follow.
- A. New Masonry Wall**
1. From the architect's drawings, determine the position of each unit and mark the centerline of the cabinet/wall sleeve. Also, mark the location of the high voltage receptacle enclosure and the area of entrance for the low voltage wiring. Low voltage wiring exits through the left side of the cord recess located in the front face of the sub base.
  2. Run wiring to location for each unit, as established in step 1.
  3. Completely finish all concrete work associated with floor and wall (fig. 2 & 3).
  4. Provide 12" wide concrete pad under unit.
  5. Install high voltage wiring/conduit into the junction box in the sub base. Leave at

least 8" of free wire inside the conduit box to facilitate connections.

6. Pull the low voltage wiring out through the hole in the cord recess area in the sub base.
7. Set the cabinet/wall sleeve in 3/4" wet concrete – it must be level from side to side, and sloped 1/4" overall, toward the outside, for proper drainage. Press into place.
8. Attach the sub base to the sleeve using the three grounding screws before the concrete sets.
9. Ensure cabinet/wall sleeve is not distorted during installation and is adequately protected during the construction period.
10. Build up wall around cabinet, making sure that the cracks are closed and that the cabinet remains square, especially on the top.

#### **B. Existing Masonry Wall**

Cut opening into wall, providing a minimum of 1/2" clearance on sides and top and 1" on the bottom, to pour new base (12" wide).

Follow steps 4 through 10 in "New Masonry Wall".

#### **C. New Panel Wall**

Provide 12" wide concrete pad under unit.

Follow steps 4 through 10 in "New Masonry Wall".

#### **D. Existing Panel Wall**

Cut Opening in existing wall slightly larger than cabinet/wall sleeve. Be sure to locate at least 4" above finished floor.

Follow steps 4 through 10 in "New Masonry Wall".

## INSTALLATION

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### POWER & CONTROL WIRING

1. Connect power supply for the unit to the correct terminals of the receptacle.
2. Install wired receptacle into conduit enclosure. Install receptacle cover plate provided with the sub base.
3. A six -position low voltage connector plug with 24" leads is provided for 24 volt Class II wiring connections. The connector plugs into a mating receptacle in the side of the chassis control box that can be unplugged to facilitate removal of the chassis for servicing.

Connections between the 24" leads and thermostat wiring can be made outside the sub base enclosure and in accordance with the specific wiring diagram affixed to the chassis. The thermostat wire connections can be stuffed back through the hole in the sub base

**CAUTION:** One side of the unit's 24-volt control system is grounded. When wiring the thermostat, care must be taken not to ground the red wire, thereby potentially burning out the transformer.

### CHASSIS INSTALLATION

1. Check all air seals in the cabinet.
2. After all construction is complete and the unit location is thoroughly cleaned, the heat cool chassis is ready for installation in the cabinet/wall sleeve.

3. Unpack heat/cool chassis from shipping carton. Check for any shipping damage.
4. Position the chassis in the cabinet and slide into place. Keep the chassis level and square to prevent binding. The chassis must be pushed into the cabinet until the draw bolts screws in the chassis side panels can engage the threaded clip in the sleeve. Alternate turning the two draw bolts until the chassis is drawn snugly into the sleeve. Do not over-tighten the draw bolts.

#### NOTE:

When handling the chassis, care must be taken to ensure that no damage occurs to the fan wheels. Damaged or unbalanced fans will cause excessive noise and will impair unit performance.

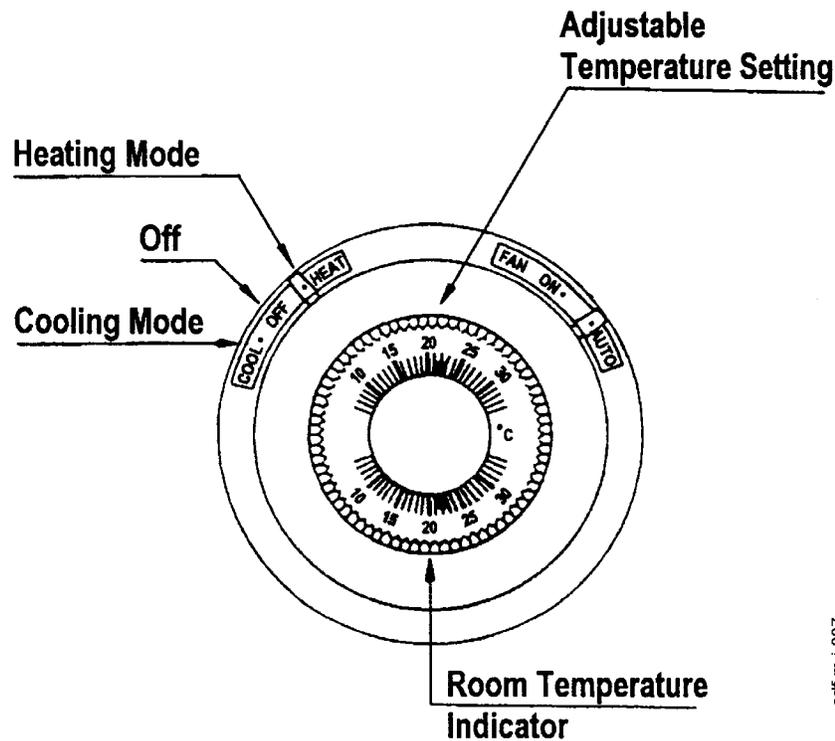
5. Position the plenum and vertical side duct assembly over the chassis. While pushing the plenum assembly against the inside wall, line up the plenum slots with the panel holes and screw the parts together.
6. Screw the plenum top cover on to the plenum.
7. Install the ducting to the side duct flanges as described in the previous section entitled "Ducting".
8. Connect low voltage wiring harness to the heat/cool chassis.
9. Plug the heat/cool chassis cord into the power receptacle in the sub base.

10. Install the unit air filter into position.

**NOTE:** Ensure that the cord is pushed well into the cord recess of the sub base or the filter will not be able to be completely inserted.

11. Install front panel.
12. Wipe unit cabinet/wall sleeve to remove dirt, etc.
13. The unit is now ready for operation, when supplied with power from the distribution panel and when wired to a thermostat.

## OPERATING INSTRUCTIONS



The Unitary Package Heating, Cooling Unit has been carefully designed and built to provide reliable operating performance when installed and maintained correctly.

### CONTROL SYSTEM DESCRIPTION

The unit is controlled on both heating and cooling by a low voltage wall mounted thermostat.

Any standard 24-volt heat/cool thermostat intended to control a gas-heating unit with cooling can be made to work with the unit.

A room thermostat is basically a switch used to direct 24 volt power from the "R" terminal to its W, Y, and G terminals, according to the function being demanded by the user. Sometimes an electronic thermostat needs to be powered with 24 volts via connection to an additional "C" or "Common"

terminal, typically if its display is backlit. If the thermostat demands that the "C" connection be made at the thermostat wiring terminals, then please order the additional black lead that will insert into the unit's low voltage connector, Part No. 18BK23Y-024.

Heating and cooling will be cycled on, as dictated by the setting of the wall thermostat. In this mode, the room-side fan will run at factory-predetermined speeds for heating and cooling.

**IMPORTANT: The factory-set indoor fan speeds must not be changed. The product safety certification relies on fan speeds being coordinated with specific heater sizes.**

The indoor fan will be off when neither heating nor cooling are required, if the fan switch on the thermostat is set to "AUTO". If the

fan switch is set to "ON", the indoor fan will circulate air continuously on low speed, until there is a call for heating or cooling.

To get reasonable comfort and energy consumption, it is recommended that wall mounted thermostats be set at 21°C (70°F) for heating and 25°C (77°F) for cooling.

Over-adjusting the thermostat will not increase the rate at which a unit will heat or cool the space; it is merely an on-off switch that responds to temperature.

**ATTENTION:** Do not place the wall thermostat in locations where it cannot detect true room temperature, such as in direct sunlight or near air registers. Also beware of drafts flowing through the thermostat wiring hole.

## OPERATING PROCEDURES

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### SUGGESTED OPERATING PROCEDURES

To obtain the maximum comfort from your packaged heating and cooling unit, the following procedures are recommended.

1. Always draw drapes or blinds in the summer, to block out direct rays from the sun.
2. Keep windows and doors closed when operating unit on cooling.
3. Prior to operating unit on cooling, ensure filter is clean for maximum efficiency.
4. Check filters regularly. Filters have to be cleaned in accordance with the unit environment. Never operate unit with a dirty filter or without a filter.
5. Ensure that the air discharge and return air openings are not obstructed, causing a restricted air flow condition. **DO NOT**

### PLACE ARTICLES ON DISCHARGE REGISTERS.

6. When adjusting the thermostat, be careful not to over control. A change in temperature of plus or minus 2 degrees can make the difference between comfort and discomfort. Set the control at the recommended comfort settings and allow the unit to operate at that setting. The unit will automatically maintain the comfort level by cycling on and off as required.

### IF THE UNIT DOESN'T WORK

The unit has been carefully designed and tested and should provide trouble free operation when properly sized, correctly installed, intelligently operated and checked by a competent serviceman at least once a year. However, if you should experience difficulty, check the following before calling for services.

1. Ensure that controls are properly set.
2. Check to see if a fuse has blown or a breaker has tripped.
3. Check to see that the power plug is properly engaged.
4. If unit is calling for cooling, check to see if outside condenser fan is running.
5. Is cooling being demanded at a very low outdoor temperature? The unit is designed to discontinue cooling operation at low outdoor temperatures where air conditioning is not typically required.

If, after checking the above, your unit is still not operating, call in competent service personnel.

**ATTENTION:** When in cooling mode, if the compressor is shut off by switching from cooling to heating with the heat/cool switch, then wait 3 minutes before re-starting. The same applies for a power interruption.

## PREVENTIVE MAINTENANCE

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**WARNING:**  
**DISCONNECT POWER SUPPLY TO UNIT BEFORE REMOVING FRONT PANEL.**

### Before each heating and cooling season:

1. Remove front panel and disconnect control wiring.
2. Clean front surfaces with vacuum cleaner and damp cloth.
3. Remove the plenum cover to access the plenum-to-chassis mounting screws – remove the screws.
4. Loosen the draw bolts that are affixed to the chassis side panels.
5. Pull the chassis out of the sleeve, and set on a stable surface.
6. Remove condenser cover and clean the condenser with a bristle brush and vacuum cleaner.
7. With condenser cover removed, reach down into the primary drain pan, at the bottom of the coil, and clean the pan, as well as the condensate drain tube. Be sure the tube is clear.
8. Clean fan wheels with a soft brush. Caution must be used to avoid bending blades.
9. The motors are permanently lubricated and need no re-oiling. Inspect electrical wiring and repair if necessary.
10. Check all sealing gaskets and repair if necessary.
11. Reinstall heating/cooling chassis. Reinstall control wiring. Reinstall grounding screws.
12. Replace front panel and reinsert plug.
13. Turn power on and test unit for proper heating and cooling.