LIFEBREATH®

HEAT RECOVERY VENTILATORS (HRVs)

OWNERS OPERATION AND INSTALLATION MANUAL

For Models:
2500IFD
2500EFD

APPLICATION WARNING!!!

CAUTION

Before installation, careful consideration **must** be given to how this system will operate if connected to any other piece of mechanical equipment, i.e. a forced air furnace or air handler, operating at a higher static. After installation, the compatibility of the two pieces of equipment **must** be confirmed, by measuring the airflow's of the Heat Recovery Ventilator (HRV), by using the balancing procedure found in this manual.

It is always important to assess how the operation of any Heat Recovery Ventilator may interact with vented combustion equipment.

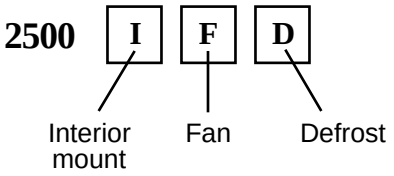
NEVER install an Heat Recovery Ventilator in a situation where its normal operation (including defrost function), lack of operation or partial failure may result in the backdrafting or improper functioning of vented combustion equipment!!

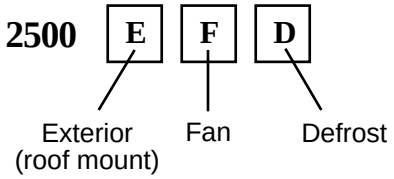
Do Not Attempt Installing Unit
Without First Reading Entire Manual

TI-59
OOO3

INTRODUCTION

These Heat Recovery Ventilators (HRVs) are designed for commercial and industrial applications to provide fresh air to a building while exhausting an equal amount of stale air. During the winter months the incoming cold fresh air is warmed by utilizing the heat recovered from the stale air before it is exhausted to the outdoors. During summer months when the indoor space is air conditioned, the Heat Recovery Ventilator will help in cooling the incoming fresh air with the stale air that is being exhausted.





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LIFEBREATH®
HEAT RECOVERY VENTILATORS (HRVs)

Selecting the Correct Size HRV

Commercial and Institutional Requirements

For outdoor air requirements, ASHRAE has produced the Ventilation Standard 62-1989 that is used to determine acceptable ventilation rates. This standard is referenced directly or used as "Good Engineering Practice" in most Code documents or design criteria.

Small restaurants,Donut Shops and Fast food stores

Seats	40	
Employees	5	
Total	45	
ASHRAE requirement		20 cfm (10L/s) per person
Ventilation required		45 x 20 = 900 cfm (450 L/s)

Bank

Customers	25	
Staff	9	
Total	34	
ASHRAE requirements		20 cfm (10 L/s) per person
Ventilation required		34 x 20 = 680 cfm (320 L/s)

Bar or Tavern

Seats	50	
Employees	7	
Total	57	
ASHRAE requirement		30 cfm (15L/s) per person
Ventilation required		57 x 15 = 1710 cfm (855 L/s)

Bingo Hall

Customers	180	
Staff	20	
Total	200	
ASHRAE requirements		30 cfm (15 L/s) per person
Ventilation required		200 x 30 = 6000 cfm (3000 L/s)

Classrooms and School Portables

Seats	29	
Teacher	1	
Total	30	
ASHRAE requirement		15 cfm (7.5L/s) per person
Ventilation required		30 x 15 = 450 cfm (255 L/s)

Print Shop, Duplicating

Square footage of shop	2000 square ft (m2)
ASHRAE requirements	0.5 cfm/ft2 (2.5 L/s-m2) per person
Ventilation required	2000 x 0.5 = 1000 cfm (500 L/s)

Beauty Salon

Customers	12	
Employees	6	
Total	18	
ASHRAE requirement		25 cfm (12.5L/s) per person
Ventilation required		18 x 25 = 450 cfm (255 L/s)

Swimming Pools

1 cfm per sq. ft. of the water surface area
or
.5 cfm per sq. ft. of the water surface plus deck area

Hot Tubs

7 - 10 cfm per sq. ft. of the water surface area

MAKE UP HEAT REQUIREMENT at 1200 CFM (566L/s)

Outdoor Temp. C°	Outdoor Temp. F°	Nominal kW Req. for 20°C (68°F) Air Delivery	Nominal kW Req. for 25°C (77°F) Air Delivery	Nominal kW Req. for 30°C (86°F) Air Delivery
0	32	7	10	14
-10	14	10	14	17
-20	-4	12	15	19
-30	-22	15	19	22
-40	-40	17	21	24

LIFEBREATH®
HEAT RECOVERY VENTILATORS (HRVs)

Model 2500IFD

SPECIFICATIONS

AIR FLOW:
2100 cfm (985 L/s) at 1.0"wg ESP

PERFORMANCE:
70% effective at 2500 cfm (1172 L/s)

CORE:
Modular aluminum sensible heat recovery core.
Plate-to-plate type. Slides out of either side of cabinet for service.

MOTORS:
Two single shaft PSC, 3-speed, 208/230V,5.1 amps, 1 ph, 1 hp

BLOWERS:
Two direct-drive centrifugal blowers, one per air stream.

FILTERS:
Two 18" X 24" 4-inch pleated filters in each air stream.

DUCT CONNECTIONS:
Four 24" X 16" (610mm X 406mm)

CABINET:
20 gauge powder coated galvanized steel (G60) for superior corrosion resistance. 16 gauge galvanized frame, insulated with 1.5" fibreglass insulation to prevent condensation.

DRAIN:
Two stainless steel drain pans with 1/2" NPT drain spouts.

MOUNTING:
Unit to be set on support brackets hung by threaded rod type apparatus. Brackets and rod not provided.

CONTROLS:
24V terminal strip inside electrical box, to connect optional remote controls (not included), obtain on/off and high/low functions.

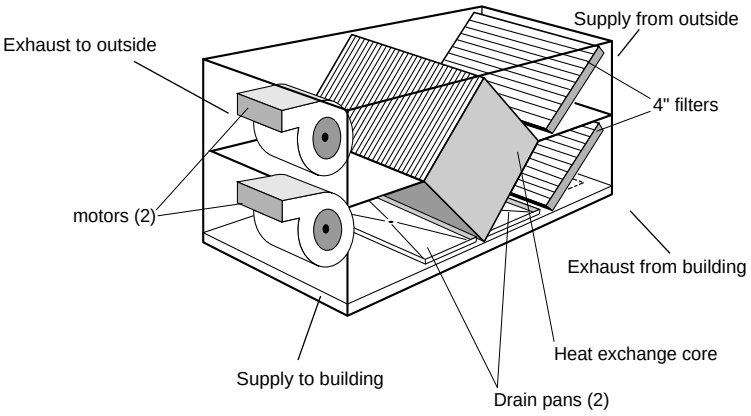
DEFROST:
Factory set defrost time (user adjustable).
Supply motor is shut off while exhaust air defrosts core.

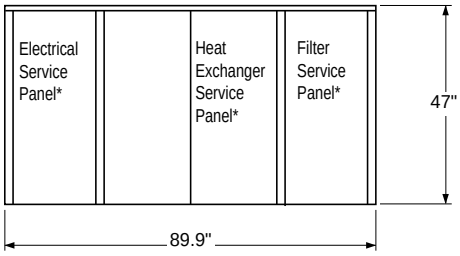
WARRANTY:
15 year warranty on heat exchanger, and 2 years on parts

WEIGHT:
700 lbs.

SHIPPING WEIGHT:
1100 lbs.

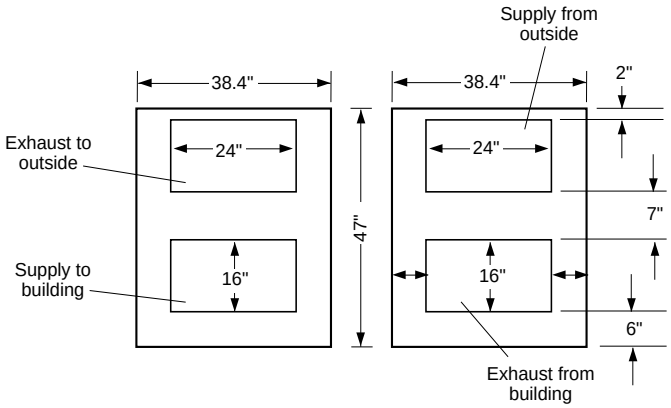
All units conform to CSA and UL standards.





SIDE VIEW

***NOTE:** Removable service access panels on both sides of 2500 IFD cabinet.



FRONT VIEW BACK VIEW

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LIFEBREATH®
HEAT RECOVERY VENTILATORS (HRVs)

Model 2500EFD (Rooftop)

SPECIFICATIONS

AIR FLOW:
2100 cfm (985 L/s) at 1.0"wg ESP

PERFORMANCE:
70% effective at 2500 cfm (1172 L/s)

CORE:
Modular aluminum sensible heat recovery core.
Plate-to-plate type. Slides out of either side of cabinet for service.

MOTORS:
Two single shaft PSC, 3-speed, 208/230V,5.1 amps, 1 ph, 1 hp

BLOWERS:
Two direct-drive centrifugal blowers, one per air stream.

FILTERS:
Two 18" X 24" 4-inch pleated filters in each air stream.

DUCT CONNECTIONS:
Two 24" X 16" to and from the building under cabinet.
Two 28" X 18" hoods included on side of cabinet, with screens.

CABINET:
20 gauge powder coated galvanized steel (G60) for superior corrosion resistance. 16 gauge galvanized frame, insulated with 1.5" fibreglass insulation to prevent condensation.

DRAIN:
Two stainless steel drain pans with 1/2" NPT drain spouts.

MOUNTING:
Rooftop mounted on optional roof curb (Part No. 53-2500)

CONTROLS:
24V terminal strip inside electrical box, to connect optional remote controls (not included), obtain on/off and high/low functions.

DEFROST:
Factory set defrost time (user adjustable).
Supply motor is shut off while exhaust air defrosts core.

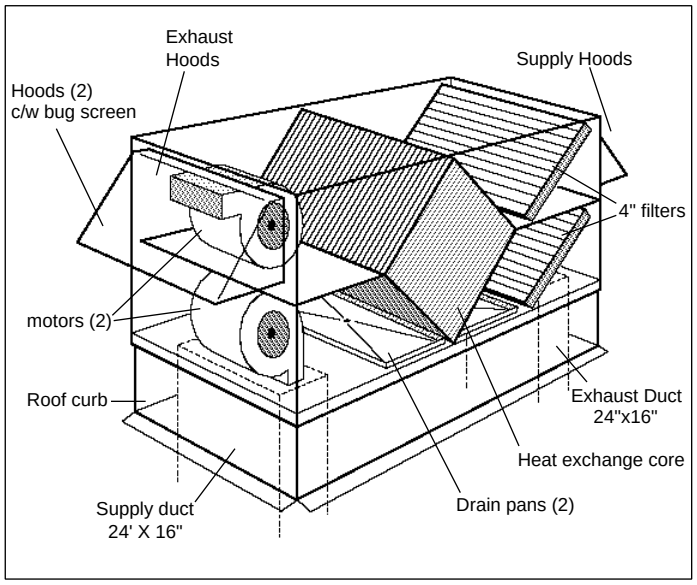
WARRANTY:
15 year warranty on heat exchanger, and 2 years on parts

WEIGHT:
700 lbs.

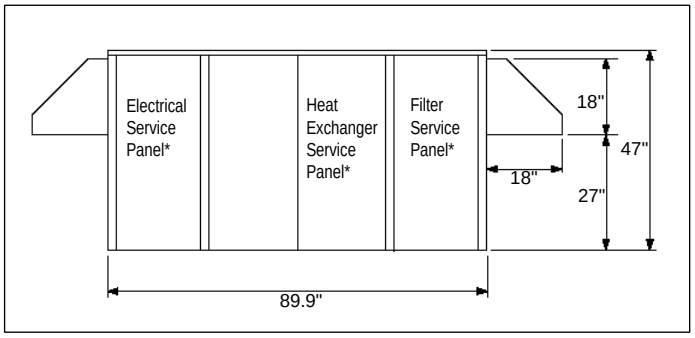
SHIPPING WEIGHT:
1100 lbs.

OPTIONAL CURB:
WEIGHT: 50 lbs.

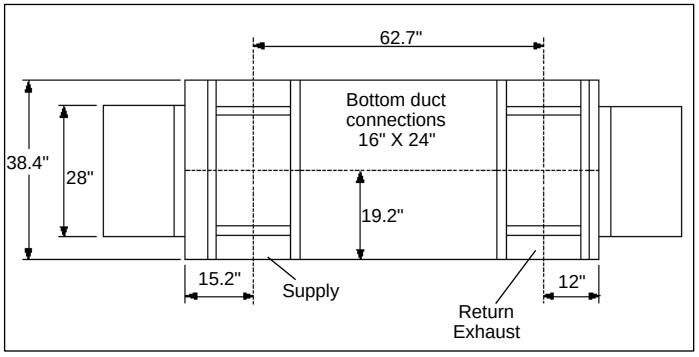
All units conform to CSA and UL.



***NOTE:** Roof curb is one inch smaller than outside dimensions of cabinet.



***NOTE:** Removable service access panels on both sides of 2500 EFD cabinet.



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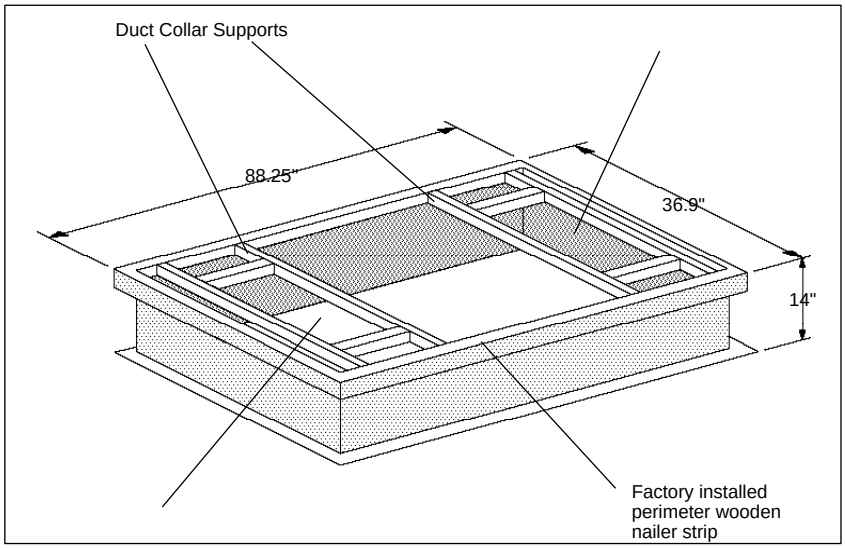
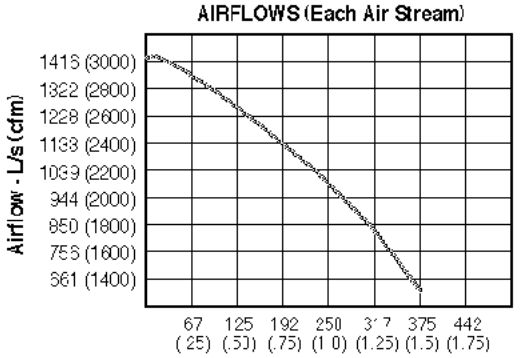
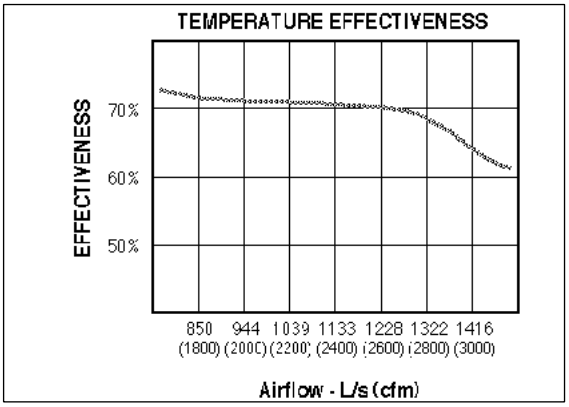
Roof Curb (optional)
Part No. 53-2500



PERFORMANCE





OPTIONS AND ACCESSORIES

99-101: CRANK TIMER
Mechanical timer to activate high speed.

***99-104: DIGITAL ELECTRONIC TIMER (DET)**
20, 40, or 60 minutes of high speed at the touch of a button.

***99-105: PROGRAMMABLE VENTILATION CONTROL (PVC)**
Activates high speed via built in 99-109 Air Sentry, dehumidistat and 24 hour timer.

***99-109: AIR SENTRY (AIR QUALITY SENSOR)**
Activates high speed when contaminants such as alcohols, formaldehyde, propane or cigarette smoke are detected.

99-116: DEHUMIDISTAT VENTILATION CONTROL (DVC)
Turns unit on/off via slider switch and high/low via built-in dehumidistat.

99-117: COMMERCIAL INTERFACE CONTROL (CIC)
Connects low voltage terminals on HRV to specified digital controls above.

99-130: DEHUMIDISTAT
Activates high speed when indoor humidity rises above set point on control.

99-140: 4" TECHGRILLE
99-141: 5" TECHGRILLE
99-142: 6" TECHGRILLE
99-148: 8" TECHGRILLE
Round, white, step-type diffusers.

53-2500: OPTIONAL ROOF CURB
Supports HRV on roof and connects HRV to ducting below.
WEIGHT: 50lbs

Information about design-built electric and hydronic make-up heat coils available upon request.

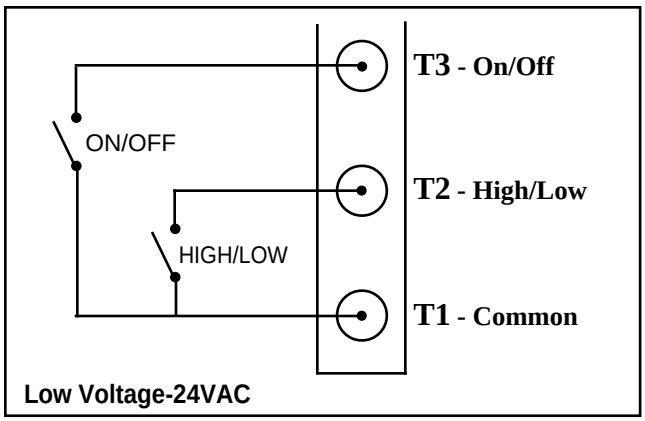
***** These devices require connection to the 99-117 CIC to function.

OPERATION INSTRUCTIONS

The LIFEBREATH 2500 series HRV is designed to be operated continuously or intermittently to meet the requirements of the application.

CONTINUOUS OPERATION

For continuous operation, a simple jumper across the ON/OFF and COMMON jumper terminals is needed. HIGH/LOW speed selection requires another jumper across HIGH/LOW and COMMON; select as required. See below and wiring diagram.



INTERMITTENT OPERATION

Due to variance in the times in which buildings are occupied and equipment or machinery operated, intermittent ventilation may be the preferred method.

Dry contacts located inside the electrical panel enable this unit to turn ON and OFF, and/or jump between HIGH and LOW speeds when optional low voltage controls are connected. See above and Figure 5.

OPTIONAL REMOTE CONTROLS

Basic controls such as dehumidistats, mechanical crank timers, 24-hour timers or toggle switches can be used to control the unit. See Figure 5.

INSTALLATION TIPS

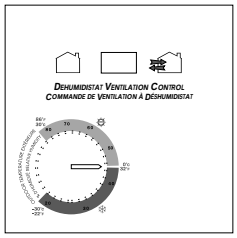
1. Whichever method is chosen to operate the 2500, keep in mind that Air-to Air exchangers in general are not "booster fans" and are normally sized to ventilate at a steady rate.

   To achieve optimum performance from the 2500, the desired ventilation rate (speed of the system) should be reached before the contaminant to be removed has reached its maximum.

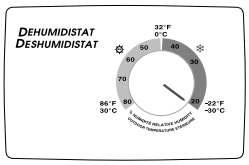
   EXAMPLE: A bingo hall opening at 7:00PM that is sized for 5000 cfm should have at least this amount of air exchange by that time. If the unit is not turned on or set to its designated speed until after the contaminant has reached an uncomfortable level, then it may result in a number of hours passing before the system could catch up.

2. It is highly recommended that back draft dampers be installed in the supply and exhaust duct work to the outside, to prevent air from entering in through the HRV when the unit is off. Failure to install back draft dampers may result in damage to HVAC equipment and/or other building components.

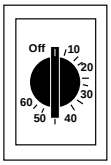
FIGURE 5 - Optional Remote Controls



DEHUMIDISTAT VENTILATION CONTROL*
LOCATION: Spa or pool area, anywhere that humidity is a concern. (connect 1/unit only)
• Ventilation control turns HRV system OFF and ON.
• Dehumidistat increases ventilation when required
Red - common / Black - hi/low / Orange - on/off
PART NO. 99-116 c/w 3 wire cable 60' (18m)



REMOTE DEHUMIDISTAT
LOCATION: Spa or pool area, anywhere that humidity is a concern.
• Provides high speed ventilation when humidity level exceeds selected setting.
PART NO. 99-130



CRANK TIMER
• Provides high speed ventilation as required.
Crank Timer - 60 minute
PART NO. 99-101

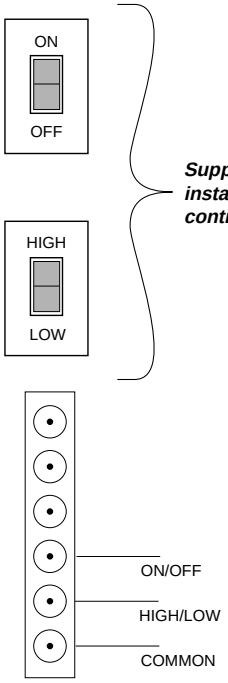
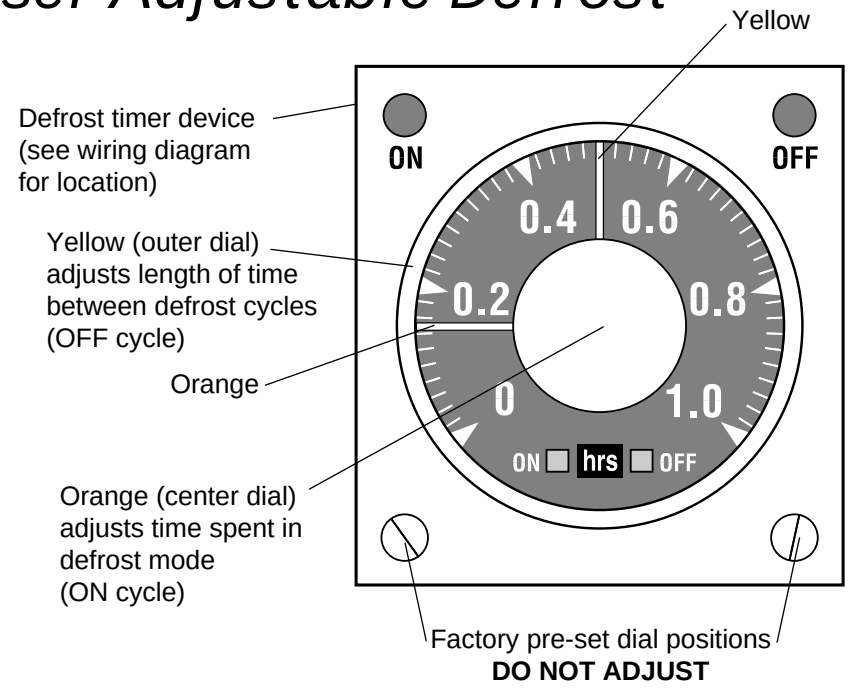


FIGURE 6 - User Adjustable Defrost

OPERATION

Once the snap disk senses temperatures below -3°C (27°F), it will activate the defrost mode, which begins with the Defrost OFF cycle, and then continues into the Defrost ON cycle.



Factory pre-set defrost cycle and time are:
DEFROST CYCLE (ON)
= .15 hr. (10 mins)
DEFROST TIME (OFF)
= .50 hr. (30 mins)

EXAMPLES OF DEFROST TIMES

32°F (0°C)	**No defrost required**
13°F (-11°C)	**10 mins. defrost ON - 30 mins. defrost OFF**
-40°F (-40°C)	**15 mins. defrost ON - 30 mins. defrost OFF**

FAN DEFROST

The Models 2500IFDand 2500EFD 59N86 are equipped with an electronically controlled fan defrost system to remove frost that collects on the warm air side of the aluminum heat transfer surfaces of the heat exchanger core. When the outside temperature drops below 27˚F(-3˚C), a defrost timer is activated which provides for an automatic defrost cycle. During the automatic defrost cycle, the fresh air supply is shut off while the exhaust fan continues to operate. Both the times between defrost cycles and the length of time spent in defrost are adjustable (See Fig. 6 for details). This allows warm inside air to flow over the heat exchanger core, melting any frost accumulation. After the defrost period, the fresh air supply fan automatically returns to the normal speed and fresh outside air continues to be drawn into the building. Water from the melted frost collects in the bottom drip pans and drains out through the bottom drain connections. The defrost cycle repeats automatically until the air temperature rises above 27°F (-3°C).

LOCATION

The 2500EFD is designed to be mounted outdoors, usually fastened to a roof curb assembly. Special care and attention should be given to positioning the cross members of the roof curb, so that they line up exactly with the duct openings on the HRV (see Fig. 3).The 2500IFD must be located in a heated space where the surrounding air temperature does not fall below freezing point. The exhaust air temperature must be above 60˚F (16˚C) for proper defrost operation.

If the air temperature is too low the defrost time may need to be increased. The unit must be mounted level (horizontal) to obtain proper drainage of water from the heat exchange cores and drip pans.The warranty will be void if these conditions are not met.

Typically, the HRV is positioned close to an outside wall or the roof to simplify the connections and keep the length of insulated ducting to a minimum.

A minimum clearance of 40 in. (1 m) on one side of the HRV is recommended to service the heat exchanger cores and the filters.

MOUNTING

The 2500EFD is designed to be mounted on a roof curb. **When assembling the curb, note position of cross members which provide duct support** (see Figs. 1 & 3). Note access through the roof will be required.

It is also important to ensure that the perimeter of the curb is insulated, but the interior of the curb is not. This allows heat from the building to prevent freezing of the drain lines and pans.

The 2500IFD should be hung by a threaded rod type assembly which provides a cradle for the unit (see Fig. 8). Note that 2X4's should sit under the unit to avoid damage to the lip of the cabinet. The HRV may also be mounted on an equipment platform provided that the drain hoses are clear and there is sufficient space for service access.

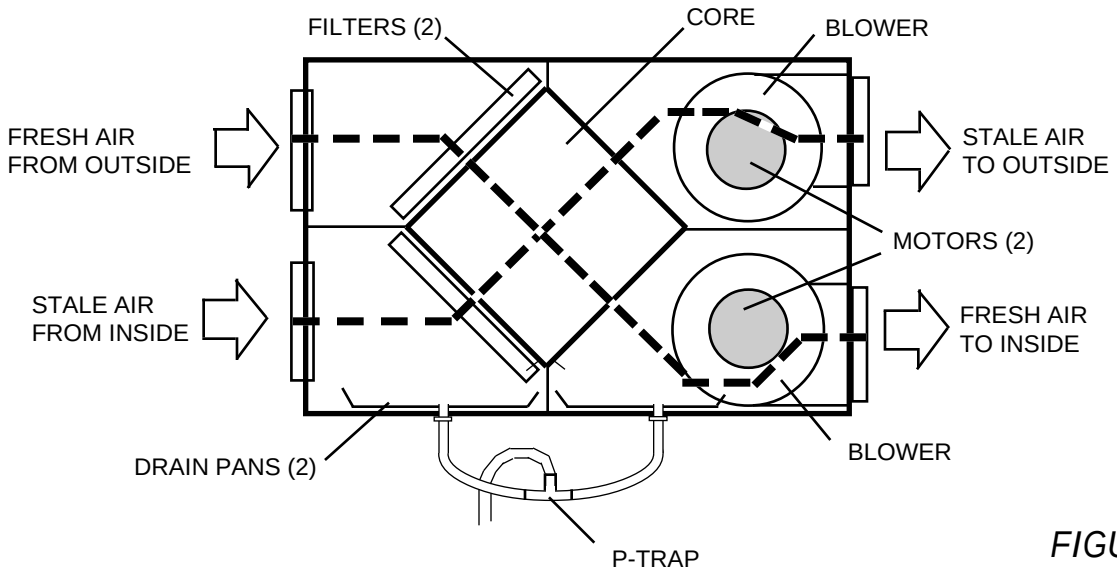
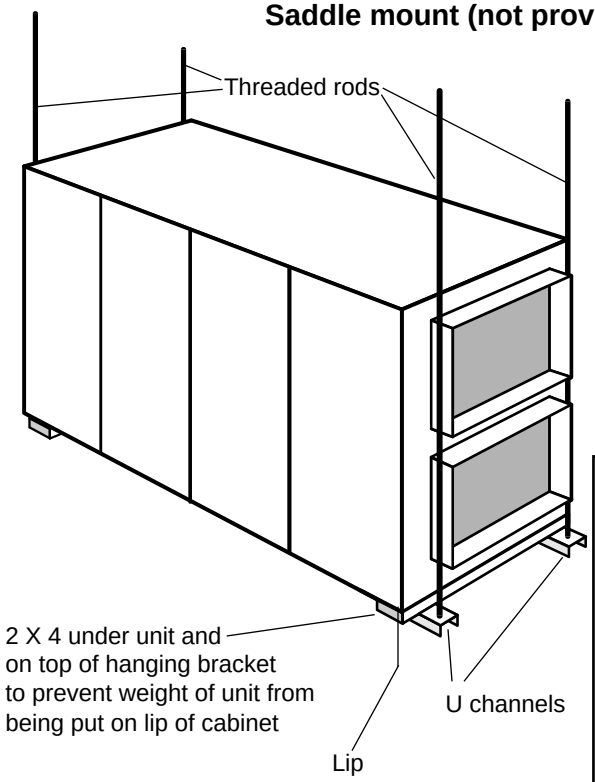


FIGURE 7

FIGURE 8 - MOUNTING THE 2500

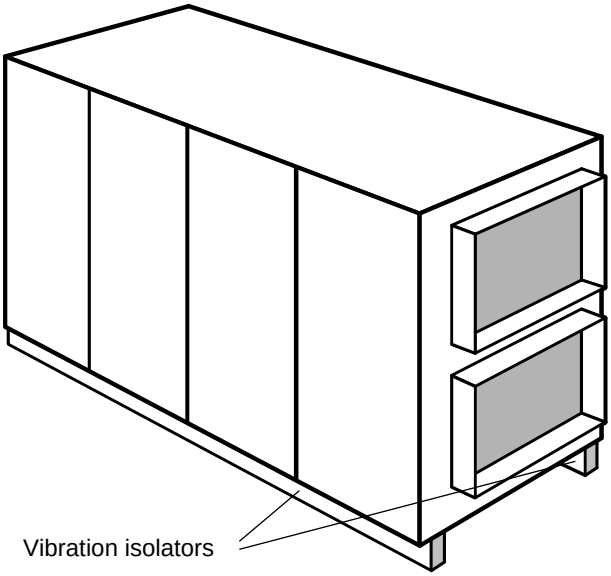
2500IFD
Saddle mount (not provided)



Hang unit with threaded rods and U channel members

*** NOTE:** *When installing your LIFEBREATH® HRV, flexible duct connectors should be installed between the HRV and the galvanized ductwork.*

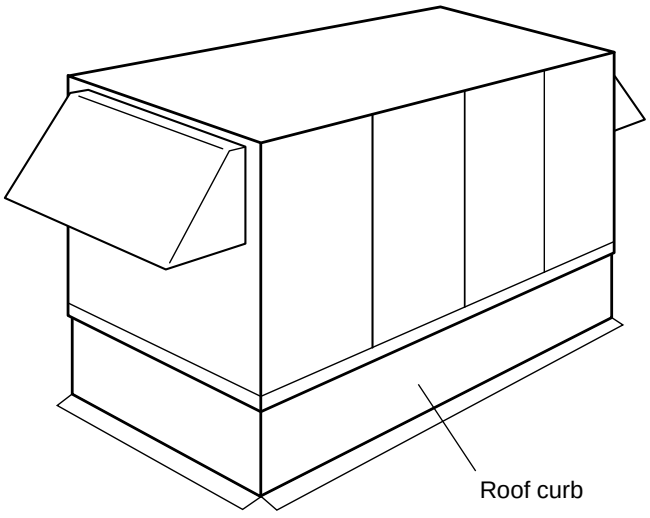
2500IFD
Platform mount (not provided)



May be anchored to floor,
leaving space for drain connections.

Mount unit on wooden or metal support assembly. Unit must be raised an adequate height for installation and slope of drain lines

2500EFD
Roof mount



NOTE: Roof curb is one inch smaller than outside dimensions of cabinet

FRAME ASSEMBLY

1. Take one end piece (locking tabs) and one side piece (slots). Stand both pieces vertically on the floor or roof. See Figure 9A.

2. Raise slightly the corner of the end piece (locking tabs) and mate with side piece (slots), ensuring that lower locking tab with leading edge is through slot opening. See Figure 9B.

3.Push down on top edge of end piece. Ensure that all 3 of the locking tabs are feeding into each corresponding slot. Once both pieces are flush, the process is complete. See Figure 9C.

4. Drive one spike provided into wood nailer strips at each corner. See Figure 9C.

FRAME APPLICATION AND LOCATION

This roof mounting frame provides necessary support when the unit is installed. The frame can be installed directly on deck having adequate structural strength or on roof supports under deck.

SECURING THE FRAME

To ensure proper mating with unit, it is critical that mounting frame be squared to the roof, as follows:

1. With frame situated level in desired location on roof trusses, tack weld one corner of frame.

2. Measure frame diagonally from one corner to the opposite corner. Repeat with the remaining two corners. These dimensions must be equal for the frame to be square.

3. It is extremely important to sight frame from all corners to ensure that the frame is not twisted across top side. Shim frame under any low sides.

4. After frame has been squared, straightened and shimmed, weld or attach frame securely to roof.

MAX. SLOPE TOLERANCE: 1/16" per linear foot in any direction.

Note specification of duct location on bottom of HRV when positioning cross members (duct cavity). See Fig. 3.

FIGURE 9 - Roof Curb Assembly

Figure 9A

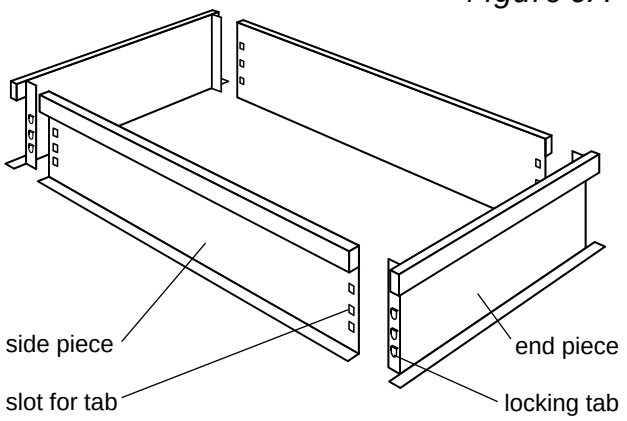


Figure 9B

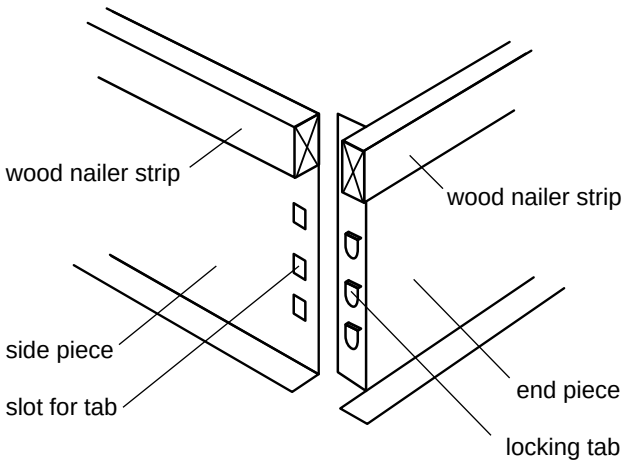
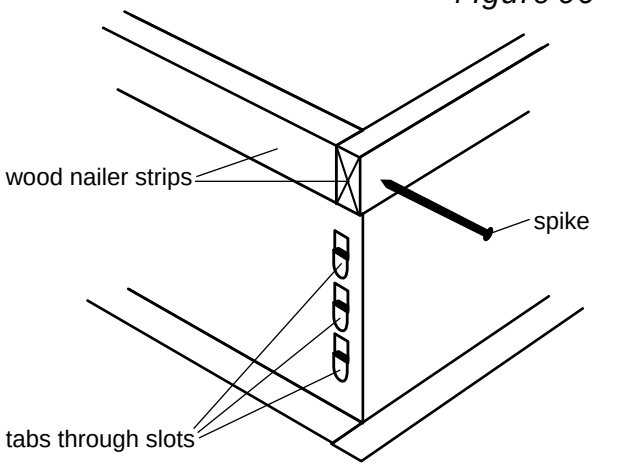


Figure 9C



DRAINS

Connect the stainless steel drain pans in the bottom of the HRV to a drain line fastened to the holes provided. See Figure 7 for location of the drain pans and the drain connections. Create a "P" trap to prevent odours from being drawn through. Make sure the drain line slopes down to drain properly and if this is not possible a condensate pump will be required for removal of the water. Note that stagnant water is a leading cause of indoor air quality problems; confirm drainage after installation by pouring water into trays. Drain line must be installed where it will not freeze.

THE DUCTWORK SYSTEM

A well designed ducting system will allow the HRV to operate at its maximum efficiency. Avoid the use of undersized ducting and sharp radius bends and tees which can significantly increase the system pressure drop and reduce the air flows.

NOTE: *Fully insulated ducting with an integral vapour barrier must be used on all runs passing through unheated areas in order to avoid condensation problems and energy losses from the air streams.*

*** Consult local Codes**

To minimize pressure drop and noise, galvanized metal ducts sized for 1200 fpm (6.09 m/s). (maximum velocity) are recommended. Keep ducting as short as possible and use a minimum of elbows and tees. Connecting sections and shorter runs may be flexible ducting one size larger than the metal duct. **Use flexible duct connectors** at the HRV to avoid noise transmission.

All duct joints must be secured with screws, rivets or duct sealant and sealed with aluminum duct tape to prevent leakage.

OUTSIDE WEATHERHOODS

The 2500EFD is shipped with 2 weatherhoods inside the cabinet which attach to the outer ends of the cabinet using bolts provided. The 2500IFD requires hoods to be built elsewhere and provided by the contractor.

The 2500EFD has built-in screens to prevent foreign objects from entering into theductwork through the outside hoods.

NOTE: It is extremely important to design and install the fresh air intake in an area where the hoods will gather the freshest air, free from restriction.
Recommended:

- no less than 10 ft. (3 m) apart from each other
- at least 18 in. (46 cm) above ground level
- away from sources of contaminants, such as automobile exhaust fumes, gas meters, garbage containers, cooling towers, etc.
- not exposed to prevailing winds, whenever reasonably possible.

The outside perimeter of the weatherhood must be caulked to prevent leakage into the building.

The design and size of the weatherhoods or louvers chosen by the installer must allow for adequate free area. Water and snow penetration of the system is minimized when the airflow does not exceed 750 FPM (3.81m/s) free area velocity.

DUCTING from the WEATHERHOODS

Galvanized sheet metal ducting with sufficient cross section with an integral single piece vapour barrier should be used to connect the HRV to the weatherhoods. **All ducting must meet ULC Class 1 Fire Rating.**

A **minimum** R value of insulation should be equal to 4 (RSI 0.75), or as stated in local codes.

A good bead of high quality caulking (preferably acoustical sealant) and taping with a high quality aluminum foil tape is recommended to seal the duct to both the HRV and the weatherhood.

WARMSIDE DUCTING - General

Ducting from the HRV to different areas within the building should be galvanized metal whenever possible.

To minimize airflow losses in the ductwork system, all ducts should be as short as possible and with as few bends or elbows as possible. 45˚ elbows are preferred to 90˚ elbows, whenever possible. Use Y tees instead of 90˚ tees whenever possible.

All duct joints must be fastened securely and wrapped with a quality duct tape to prevent leakage. We recommend aluminum foil tape.

STALE AIR RETURN SYSTEM

The stale air return system is used to draw air from the points in the building where the worst air quality problems occur. Balancing dampers and/or adjustable grilles are recommended on all return air lines which are used during installation to help balance the "draw" from different areas of the building. Note that the installation schematics show balancing dampers and/or adjustable grilles on all return air lines coming back to the unit.

Alternately, the stale air may be drawn directly from the return air duct. When this system is used the air handler's blower will need to operate constantly when ventilation is required. The exhaust takeoff connection must be at least a meter from a directly connected HRV supply duct if both are connected to the same duct run.

NOTE: See the INSTALLATION WARNING under "The Integrated HVAC System" on page 16

A damper located just prior to the HRV is required to balance the stale air exhausted with the fresh air supply entering the building.

Return air suction points should be located at the opposite side of the room to the fresh air inlet. The inlets may be located in the ceiling or high on the walls and fitted with inlet grilles.

Many commercial activities produce air contaminants in the form of dusts, fumes, mists, vapours and gases. Contaminants should be controlled at the source so that they are not dispersed through the building nor allowed to increase to toxic concentration levels. The heat recovery ventilator allows for economical operation of the HVAC system while effectively removing contaminants from the space. In designing the exhaust portion of the system the exhaust grilles are placed so as to remove the contaminants while not allowing them to enter the breathing zone of the occupants.

For contaminants that are lighter than air, grilles should be located high on the wall. If contaminants are heavier than air, a lower placement of the grilles will be required. Information on a contaminants specific gravity and toxicity should be available from the chemical data sheets.

FRESH AIR SUPPLY SYSTEM

The fresh air supply ductwork from the HRV may be directly connected to the return air duct of the forced air system. When directly connected it is recommended that the air handler blower be in constant operation to move the fresh air about the building (**see Installation Warning under "The Integrated HVAC System" on page 16**). Also, it is advisable to include a short length of fabric flex duct or other non-metallic connector in this hard ducted line in order to keep the HRV acoustically isolated and separately grounded (electrically) from the air handler. This will avoid a possible shock hazard to service people if a short to ground develops in one of the devices. It may be necessary to install a separate fresh air supply ductwork system if the heating is other than forced air.

When installing an HRV, the designer and installer should be aware of local codes that may require smoke detectors and/or firestats in the HVAC or HRV ductwork. Because an HRV is designed to bring fresh air into the building, structures may require a supply voltage interrupt when smoke or flame sensors are triggered or central fire alarm system is activated.

Supply air grilles may be ceiling or high wall mounted. Avoid locating incoming fresh air grilles that could cause a direct draft on the occupants as the incoming air may be below room temperature. A reheat duct heater can be installed to improve occupant comfort. Information on electric or hydronic heaters is available through Nutech.

The use of balancing dampers or adjustable grilles as supply air diffusers and air exhaust grilles are recommended. TECHGRILLES™ are round, efficient, sound absorbing devices available in 4", 5", 6" and 8" (100, 125, 150 and 200mm).

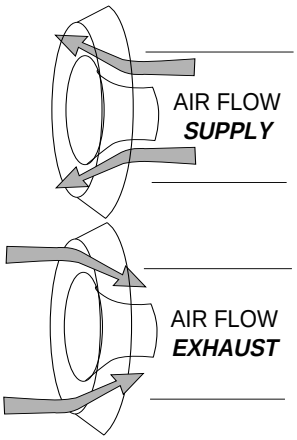


Figure 10
TECHGRILLE™ (Optional)

PITOT TUBE AIR FLOW BALANCING - "COMMERCIAL"

It is necessary to have balanced air flows in an HRV. The volume of air brought in from the outside must equal the volume of air exhausted by the unit. If the air flows are not properly balanced, then;

- The HRV may not operate at its maximum efficiency
- A negative or positive air pressure may occur in the house
- The unit may not defrost properly
- Failure to balance HRV properly may void warranty

Excessive positive pressure may drive moist indoor air into the external walls of the building where it may condense (in cold weather) and degrade structural components. May also cause key holes to freeze up.

Excessive negative pressure may have several undesirable effects. In some geographic locations, soil gases such as methane and radon gas may be drawn into the home through basement/ground contact areas. Excessive negative pressure may also cause the backdrafting of atmospherically vented combustion equipment.
Read the Application Warning on the front of this manual!

Prior to balancing, ensure that:

1. All sealing of the ductwork system has been completed.
2. All of the HRV's components are in place and functioning properly.
3. Balancing dampers are fully open.
4. Unit is on HIGH speed.
5. Air flows in branch lines to specific areas of the house should be adjusted first prior to balancing the unit. A smoke pencil used at the grilles is a good indicator of each branch line's relative air flow.
6. After taking readings of both the stale air to the HRV duct and fresh air to the house duct, the duct with the lower CFM ([L/s] velocity) reading should be left alone, while the duct with the higher reading should be dampered back to match the lower reading.
7. Return unit to appropriate fan speed for normal operation

BALANCING PROCEDURE

The following is a method of field balancing an HRV using a Pitot tube, advantageous in situations when flow stations are not installed in the ductwork. Procedure should be performed with the HRV on high speed.

The first step is to identify the supply duct to the house and the return duct from the house. Choose the straightest section of duct between the HRV and any branches or take-offs (Fig. C). This will be for both the supply and return ducts.

Drill a small hole in the duct (about 3/16"), three feet downstream of any elbows or bends, and one foot upstream of any elbows or bends. These are recommended distances but the actual installation may limit the amount of straight duct.

The Pitot tube should be connected to a magnehelic gauge or other manometer capable of reading from 0 to 0.25 in. (0-62 Pa) of water, preferably to 3 digits of resolution. The tube coming out of the top of the pitot is connected to the high pressure side of the gauge. The tube coming out of the side of the pitot is connected to the low pressure or reference side of the gauge.

Insert the Pitot tube into the duct; pointing the tip into the airflow.

More precise readings can be made by taking a number of readings through a cross section of the duct. The readings should be taken at the centers of equal areas in the duct.

This procedure is outlined in the instructions accompanying the pitot tube. This method is also described in the Ashrae Handbook of Fundamentals, chapter on measurements and instruments.

Determine which duct has the highest airflow (highest reading on the gauge). Then damper that airflow back to match the lower reading from the other duct. The flows should now be balanced.

Actual airflow can be determined from the gauge reading. The value read on the gauge is called the velocity pressure. The Pitot tube comes with a chart that will give the air flow velocity based on the velocity pressure indicated by the gauge. This velocity will be in either feet per minute or meters per second.

To determine the actual airflow, the velocity is multiplied by the cross sectional area of the duct being measured.

This is an example for determining the airflow in a 6" duct.
The Pitot tube reading was 0.025 inches of water.
From the chart, this is 640 feet per minute.
The 6" duct has a cross sectional area of $= (3.14 \times [6"/12]^2)/4$
$= 0.2$ square feet
The airflow is then 640 ft./min. X 0.2 square feet $= 128$ cfm

For your convenience, the cross sectional area of some common round duct is listed below:

DUCT DIAM. (inches)	**CROSS SECTION AREA** (sq. ft.)
5	0.14
6	0.20
7	0.27

The accuracy of the air flow reading will be affected by how close to any elbows or bends the readings are taken. Accuracy can be increased by taking an average of multiple readings as outlined in the literature supplied with the Pitot tube.

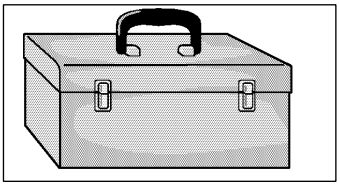


Figure A:
Pitot Tube Air Flow Balancing Kit
c/w magnehelic gauge, Pitot tube, hose and carry case.

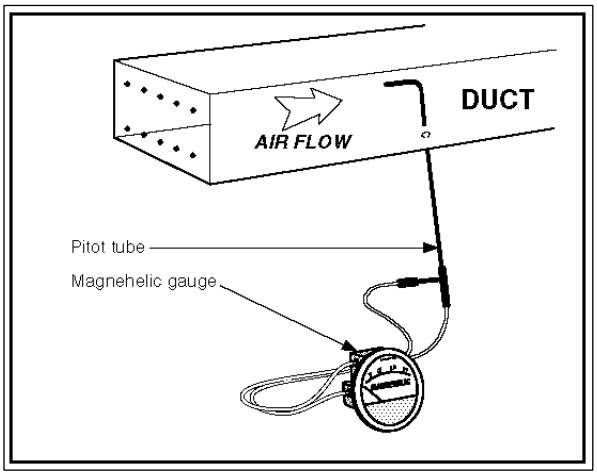


Figure B: **Pitot tube and gauge**

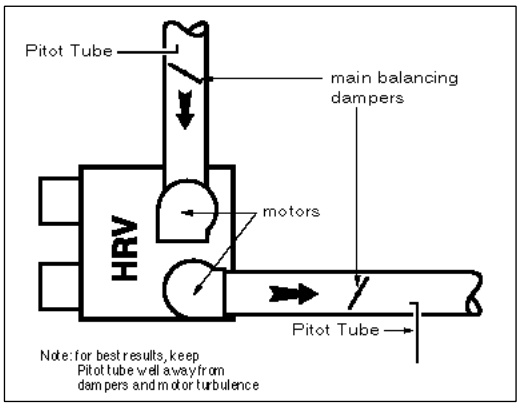


Figure C: **Placement of Pitot tube**

THE INTEGRATED HVAC SYSTEM

The 2500 is a quiet, efficient, low pressure system. Special care and attention should be given if connecting this unit to any other air handler that may draw more air than the 2500 is designed to accomodate.

The HRV has become an integral component of the HVAC system. Figure 12A shows an HRV unit providing fresh air directly to the return air plenum of a Rooftop heat/cool unit.

Many buildings have a ceiling return air plenum as in Figure 12B. Fresh air from the HRV can be introduced directly into the ceiling space near the air handler's intake.

In installations where it is satisfactory to provide general exhaust from the space, the air to be exhausted may be taken directly from the return air plenum to the HRV as it is drawn back to the air handler. Fresh air supplied by the HRV is then introduced directly into the return air plenum but at a location closer to the air handler. The air handler would have a constant running blower to effectively distribute the fresh air and remove the stale air. Balancing dampers would be located in both the HRV supply and exhaust ducts between the return air plenum and the HRV.

ELECTRICAL CONNECTIONS

System is 208/230V, 1 phase, 60 Hz.
This unit meets all local codes and requirements.

It is STRONGLY recommended that an electrical disconnect be installed prior to the HRV, and that it is turned off and locked out before servicing the unit.

All electrical connections should be made by a qualified electrician.

Two (2) knock-outs are provided. One is to be used for line voltage, and the other one for 24V control wires.

MAINTENANCE

As with any mechanical system, a dedicated maintenance program will prolong the life of the equipment, and maintain its optimum performance.

We recommend at least two (2) full inspections and cleanings per year under normal operating conditions, and more if circumstances warrant it.

Service should include:

- Cleaning of screens protecting outside hoods.
- Cleaning of core.
  To access core, remove service panels and slide core halfway out. Wash core protruding from cabinet with water and/or a mild cleaning solution. Push core through to the other side of the cabinet and repeat procedure to clean the other side of the core. In many cases, only a vacuuming of the core surface is required.
- Inspect filters and replace as necessary.
- Wipe down drain pans and inside of cabinet, using a mild disinfectant.
- Ensure condensate drain has free flow of moisture.
- Inspect blowers and electrical panel.
- Confirm operation.

FIGURE 12 - INTEGRATED HVAC SCHEMATIC

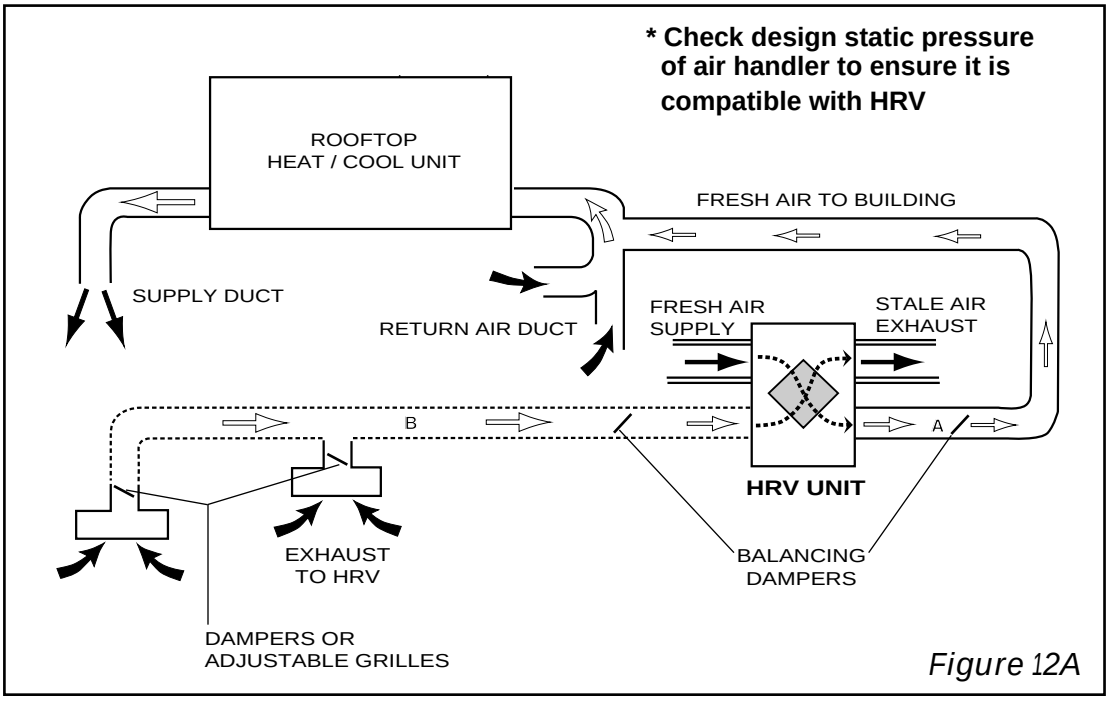


Figure 12A

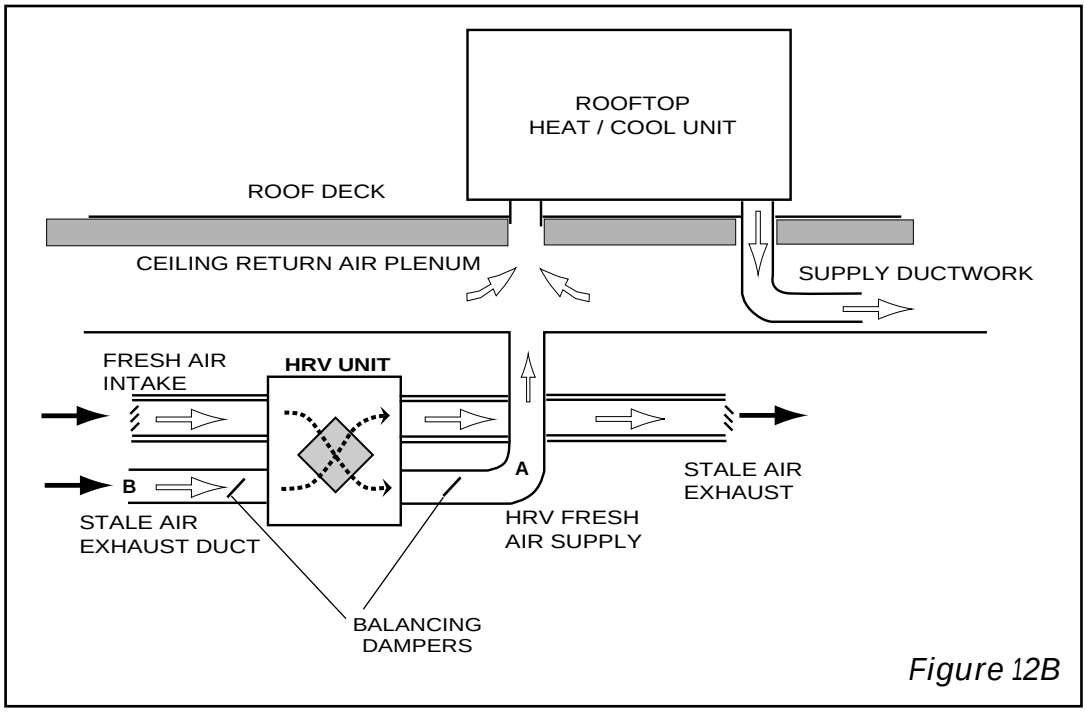


Figure 12B

BALANCING DAMPERS

A - Fresh Air Supply

B - Stale Air Exhaust