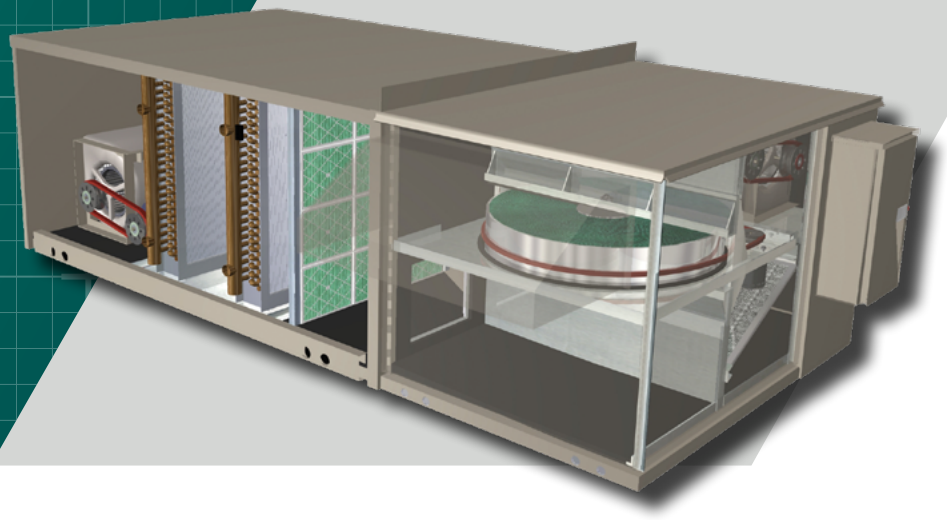
FläktGroup®

SEMCO®

FLÄKTGROUP® SEMCO® FV PRE-CONDITIONER WITH COIL MODULE

OWNER'S MANUAL



CM-2000
CM-3000
CM-4000
CM-5000
CM-7500

TABLE OF CONTENTS

THE FV+CM SERIES

The FläktGroup® SEMCO® Fresh Air Ventilator (FV)+Coil Module (CM) Series has been specifically designed to complement and attach directly to the FV 'H' outdoor air pre-conditioner.

This powerful combination provides an effective solution to the ASHRAE Standard 62 dilemma, providing a significant increase in the outdoor air quantity (5 to 20 cfm/person) without increasing operating costs.

The FV+CM Series is available in five cabinet sizes ranging in airflow capacity from 800 scfm to 9,000 scfm. Each module can be configured for indoor or outdoor installations, and horizontal or vertical airflow.

The FV+CM Series offers several heating and cooling options. The cooling options include either chilled water or DX cooling coils, with options regarding the number of fins per inch and the number of rows. The heating options include hot water or electric coils.

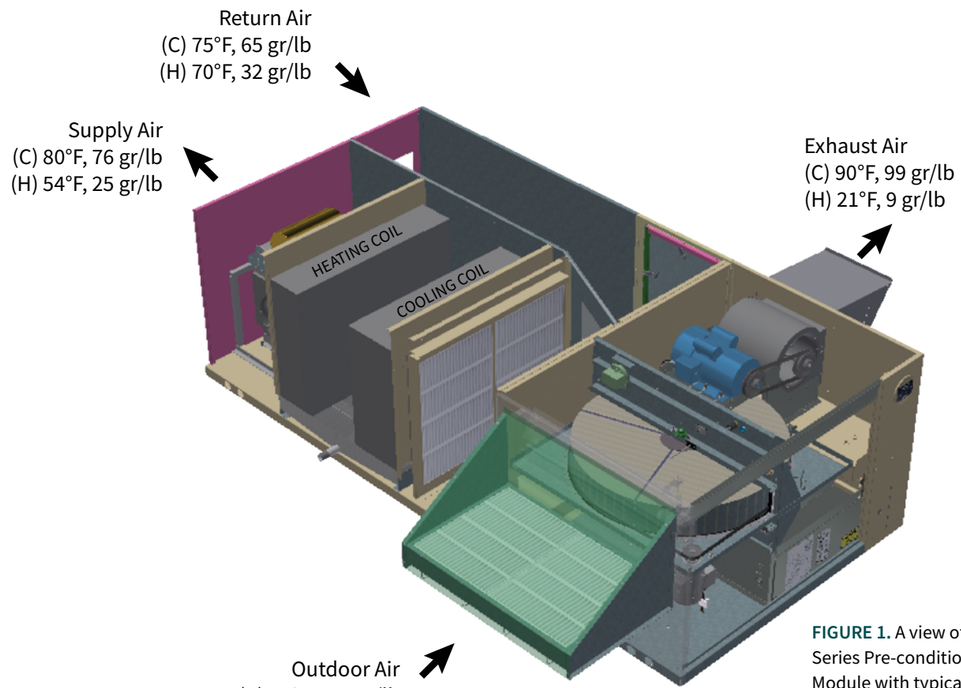


FIGURE 1. A view of the FV+CM Series Pre-conditioner & Coil Module with typical operating temperatures during the cooling (C) and heating (H) season, respectively.

DEFINITIONS

See FIGURE 2 on PAGE 3 for a diagram matching the corresponding components with the numbered definitions below.

1. **ADSORPTION** – The physical bonding of water vapor on the surface of the desiccant.

2. **CASSETTE** – The framework supporting the wheel. (SEE ALSO WHEEL)

3. **DESICCANT** – A naturally occurring or man-made material with a high affinity for water vapor. FläktGroup SEMCO uses a highly selective 3Å molecular sieve desiccant material which minimizes cross contamination.

4. **ENTHALPY WHEEL** – A common term used to describe all rotating, wheel-shaped heat transfer devices that exchange sensible (temperature) and latent (water vapor) energy from one airstream to another. The word, enthalpy, means heat content or total heat. The term, enthalpy exchanger, may also be used.

5. **EXHAUST AIR** – The air from indoors that passed through the energy recovery wheel and is being ducted outdoors.

6. **HEAT WHEEL** – This generally describes all rotating devices which transfer only sensible energy.

7. **MEDIA** – The corrugated material inside the wheel.

8. **OUTDOOR AIR** – The fresh outside air that is being drawn in the energy recovery wheel. Once it passes through the wheel it becomes the supply air.

9. **RETURN AIR** – Air from the indoor space that is pulled through the energy recovery wheel. Once it passes through the wheel it is referred to as exhaust air.

10. **ROTOR** – The media-filled wheel that rotates. It transfers heat energy and water vapor from one ducted airstream to the other. Often, the rotor will be referred to as a wheel.

11. **SEAL** – The soft material that closely surrounds the rotor to limit the amount of bypass air around the rotor.

12. **SUPPLY AIR** – Air provided to the indoor space. Outside air that passes through the energy recovery wheel becomes supply air.

13. **UNIT** – Used frequently throughout this manual to mean the Fusion 3Å total energy recovery wheel and attendant components such as cabinets, motors, fans and other parts that work together to make an effective energy recovery product.

14. **WHEEL** – Refers to the rotating wheel containing the coated media. The stationary framework supporting the wheel is the wheel cassette.

15. **MAIN ELECTRICAL PANEL** – Distribution panel which divides an electrical power supply into subsidiary circuits, while providing a protective fuse or circuit breaker for each circuit in a common enclosure.

16. **GEAR MOTOR** – Integrated electric motor and reduction gear train used to provide rotational movement to the wheel.

17. **COOLING COILS** - chilled water, DX cooling coils, which allows for a full integration of cooling options.

18. **HEATING COILS** - hot water or electric pre-heat coils, which allows for a full integration of heating options.

19. **OUTSIDE AIR DAMPER** – A set of blades used to regulate the outside air flow into the unit.

20. **RETURN AIR FILTERS** - 2” MERV 8 air filters used to filter return air before traveling through the coil module.

21. **OUTDOOR SUPPLY AIR FILTERS -** 2” MERV 8 air filters used to filter incoming outdoor air before it reaches the energy recovery wheel.

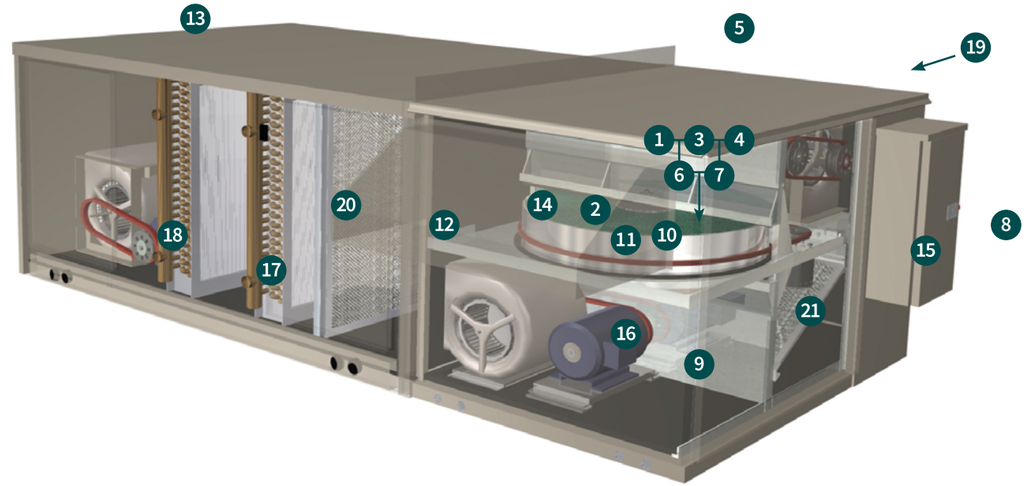


FIGURE 2. Standard FV+CM unit with components highlighted per definitions on PAGE 2.

RECEIVING & INSPECTION

Upon delivery, confirm that the quantity and model(s) received matches the Bill of Lading. If there is any discrepancy, immediately notify FläktGroup SEMCO.

Inspect the skidded FV+CM(s) for signs of damage. If damage is suspected, sign the bill of lading “damaged”. If no visible damage is apparent, the unit should be properly lifted and stored until installation.

While skidded, the FV+CM can be lifted by a forklift using the skid. Once removed from the skid, lifting must only be performed with spreader bars, cable and hooks as shown in **FIGURE 3**. Do not attempt to lift the FV+CM by grasping the hoods.

NOTE: In the table of weights on the right, the package weighs approximately 100 lbs. more than the net weight.

MODEL	NET WEIGHT (LBS)
CM-2000	550*
CM-3000	900*
CM-4000	1,300*
CM-5000	1,300*
CM-7500	1,850*

* Weight includes maximum size coils with fluid. Does not include weight of the FV unit. Standard piping connections shown.

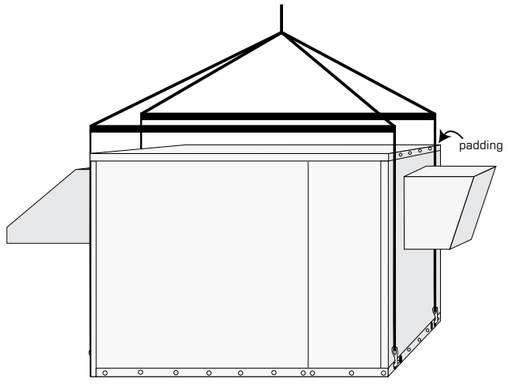


FIGURE 3. Correct lifting technique using spreader bars.

STORAGE

If the FV+CM is to be stored for any time before installation, it must be protected from the weather. Indoor storage is recommended. The unit has openings provided for ducting. These openings make the internal equipment (motors, belts, fans and insulation) vulnerable to inclement weather conditions (prior to installation) and can cause standing water to accumulate inside the enclosure. This is to be absolutely avoided.

LIFTING TECHNIQUE

When rigging the FV+CM unit, spreader bars must be used. Padding must be inserted between the straps and the unit to avoid scratching the paint. It is suggested to locate the unit prior to installing the hoods or indoor duct intake. Lifting holes are provided at four points located on the base perimeter of the unit. The weights shown in **FIGURE 3** may be used as maximum weights for rigging.

INSTALLATION

Installation of the FV+CM is a relatively simple procedure, but should be undertaken in a methodical fashion, following the directions outlined in this manual.

NOTE: Prior to starting unit, open access door and;

Remove loose parts shipped inside;

Remove wheel shipping restraint (FV+CM-3000 thru FV+CM-7500 only).

The installation location should be chosen to provide easy, convenient access. As with all mechanical equipment, routine maintenance and inspection is necessary. Choose a site from which connecting duct is visible. Avoid locations that are near or downwind of smoke, fumes or exhaust outlets of other equipment. The front access panel should have clearance space equal to the depth of the unit to allow for service.

Several ducting arrangements are possible. Make sure your duct plans match the FV+CM duct opening arrangement.

The FV+CM can be ordered for indoor or outdoor installation. An outdoor unit is identified by the existence of two hoods that are shipped on top of the FV+CM unit. It will be necessary to attach the outdoor air intake hood (larger one with filter rack) and the exhaust air outlet hood (smaller one with damper) on their designated openings (see **FIGURE 6A-D**). The indoor unit is identified by a rectangular duct shipped on top of the unit. This indoor intake duct must be installed over the outdoor air intake opening.

If the unit is a rooftop unit, it may be installed on a curb. If FläktGroup SEMCO supplies the curb, then it will have been shipped separately. The curb must be installed before a rooftop FV+CM can be placed. Proper care should be taken to ensure correct placement of the curb before holes are cut for ducting through the roof itself. Effective waterproofing of the rooftop interface is necessary. That means sealing around the roof curb to prevent any leakage into the building or the air ducts. The curb and FV+CM must be level and installed and operated in a horizontal position.

If the unit is not installed on the roof, then a level concrete or paved pad to support the FV+CM must be provided. The pad must be of sufficient height and located to assure proper water drainage in any weather.

When the unit has been placed in its permanent location, duct work should be brought up to and attached to the unit. Duct work may be flanged and screwed to the unit face for horizontal connections. Duct work for a vertical unit should be flanged and gasketed level with the curb to allow the unit weight to form the seal. Penetrations through the unit floor must be avoided to prevent any water penetrating into the cabinet.

The standard electrical power penetration location is marked on the front of the unit, to the right of the main service access door. The power connection terminals can be accessed by opening the service door and removing the electrical panel cover. The wiring connection should be made in accordance with all local codes and regulations.

If the unit has been ordered with electric preheat, it is shipped installed. The main power connection to the unit is then made at the electric preheat panel instead of the unit electrical panel. For the indoor version of the FV+CM, the electric heater should be externally insulated after installation.

On the front right side of the FV+CM is the unit identification tag. It states the electrical requirements for the unit. (If electric preheat option has been ordered, the unit ID tag is located on the heater.) Make sure the power provided to the installation site matches that required by the unit. Note and verify that voltage/phase/capacity needed and provided are the same, and the line voltage must not vary more than +/-5%.

Inspect the interior of the unit for any damage. On the floor inside the unit is the outdoor air metal filter and optional filter media. This filter is to be installed at the outdoor air intake opening after the hood (outdoor FV +CM only) has been attached.

The FläktGroup SEMCO energy recovery wheel is mounted horizontally inside the FV. The motor and belt arrangement that turn the wheel are visible next to the wheel at the access panel opening. The motor wires running to the electrical panel are attached by a quick release disconnect. The quick disconnect must be separated before sliding out the wheel cassette. The wheel cassette need not be moved for installation or hookup, but it can be pulled out for easy maintenance and inspection purposes. On the FV+CM-3000 - FV+CM-7500 remove wheel shipping restraint.

APPLYING THE FV+CM UNIT

The SEMCO FV+CM Series units are offered in two basic configurations depending on the location of the supply air discharge opening. The H (horizontal) series has the supply and return air openings located on the back of configurations depending on the location of the supply air discharge opening. The H (horizontal) series has the supply and return air openings located on the back of the unit (See **FIGURE 4**). The V (vertical) series features the supply and return air openings in the floor of the unit (See **FIGURE 5**).

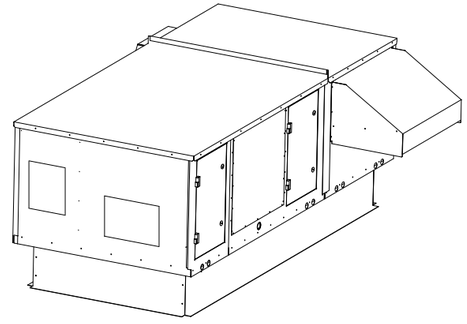


FIGURE 4. FV+CM Series with horizontal airflow application.

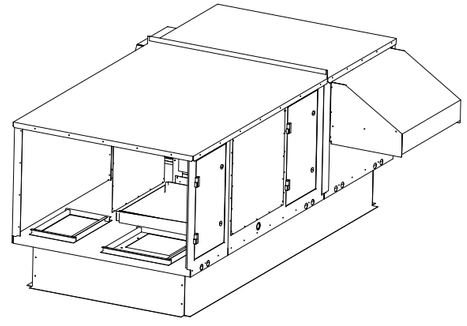


FIGURE 5. FV+CM Series with vertical airflow application.

FV-H + CM INSTALLATION*

*APPLIES ONLY TO FV-H UNITS

1. Place supplied gasket around the supply air and the return air openings of the FV unit. See **FIGURE 6**.

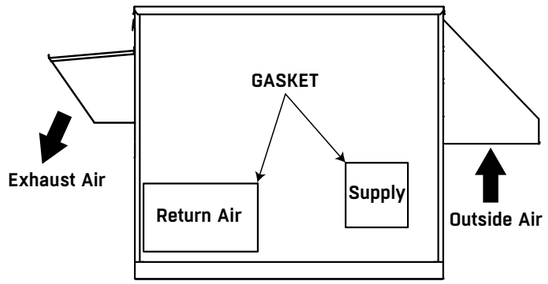


FIGURE 6.

2. Butt the FV unit and coil module unit up to each other as tightly and squarely as possible. Be sure that the unit faces match up uniformly and tightly around their entire perimeter so the there are no gaps – particularly along the bottom edge. The coil module supply air side (the side with filters, coils and fans) should match the Supply air opening on the FV unit. Proper orientation will result in the coil module supply fan at the end furthest from the FV unit. (See **FIGURE 7**)

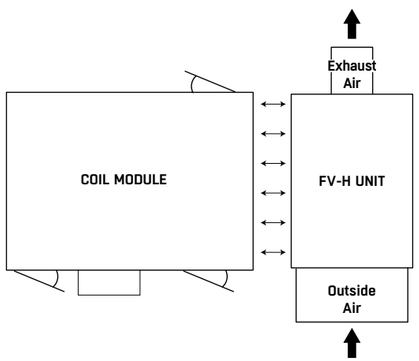


FIGURE 7.

3. Caulk as necessary to make a moisture-tight seal at the seams. There are two strips of sheet metal (butt straps) provided to join the vertical side panels. These should be centered over the joint, caulked and attached, using provided TEK screws, to both the FV and the coil module. (See **FIGURE 8**)

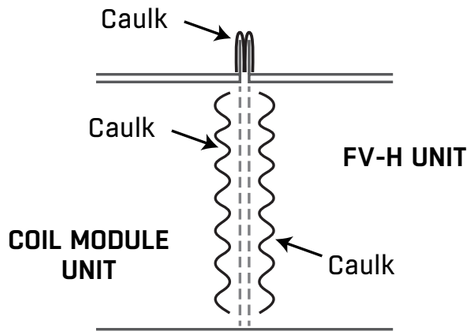


FIGURE 8.

4. The standing seam on top should also be caulked as necessary. Additionally, there is a “u”-shaped clip that should be press-fit over the top of the standing seam. It is recommended that a bead of caulk be run along the top of this standing seam before pressing the u-clip down over it. Screw through the clip and standing seam with the provided TEK screws. (See **FIGURE 7**)

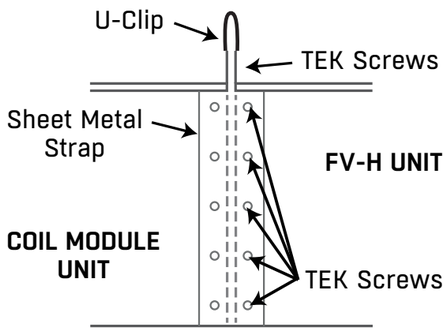
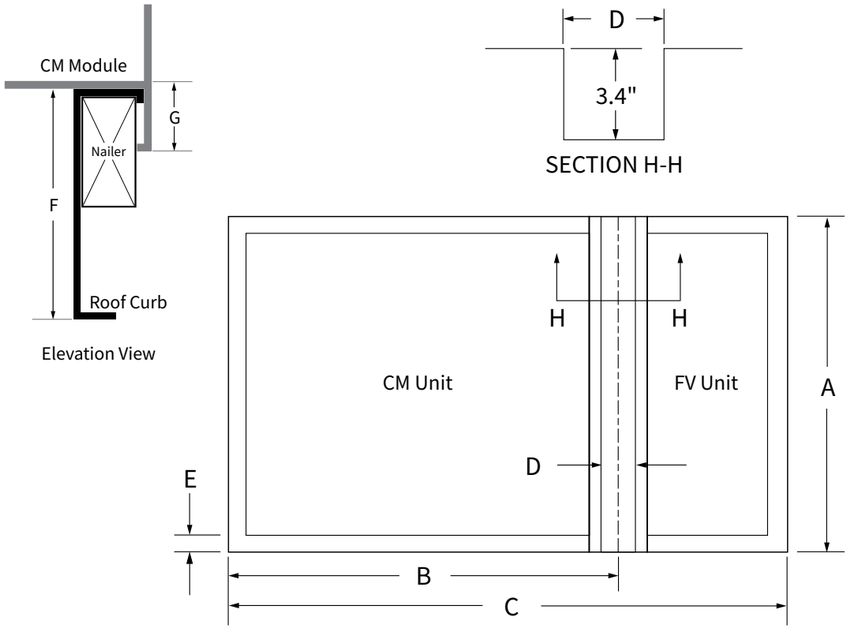


FIGURE 9.

CURB MOUNTING

The FV+CM series is generally installed on a curb (unless mounted indoors). The curb ships separately for pre-installation to simplify rigging. The dimensions of the curbs required for the unit are listed below.

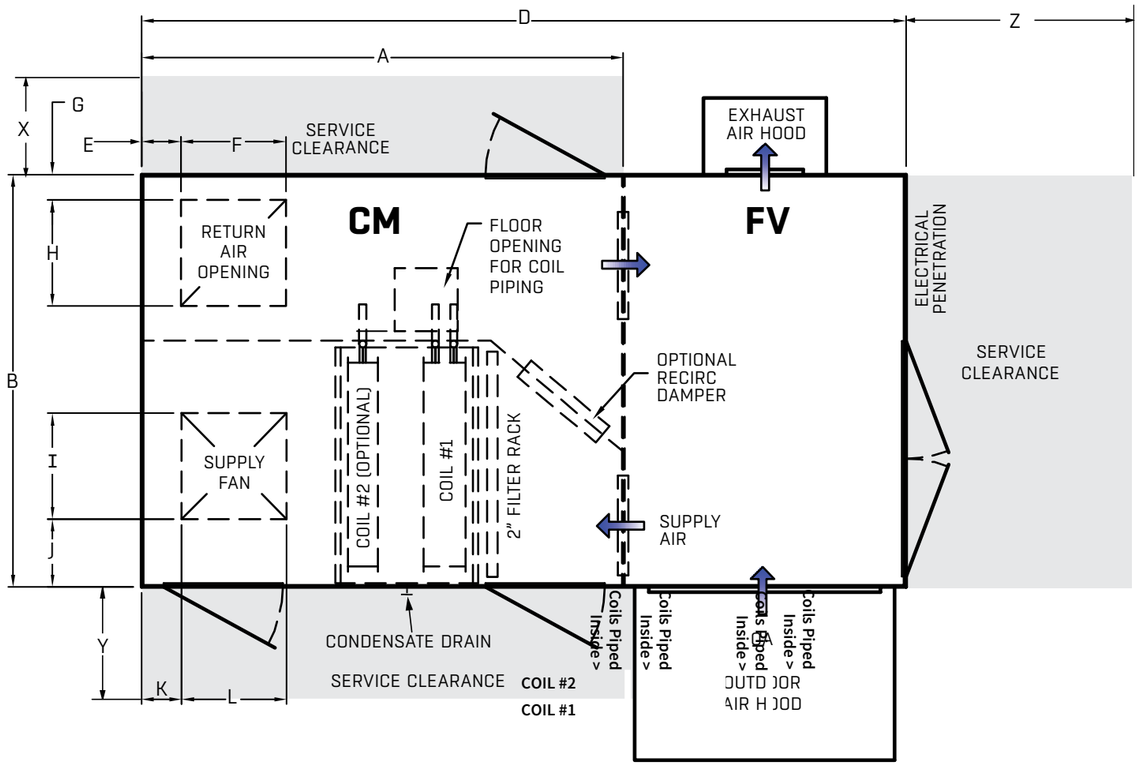
The FV+CM-H and the FV+CM-V have the same curb dimensions. The curb can be provided by SEMCO or purchased from a curb manufacturer provided it is designed to support the weight of the unit specified in this manual and conforms to the dimensions listed in **FIGURE 10** below.



Model #	A	B	C	D	E	F	G
FV-2000+CM	47.4	70.0	104.9	4.1	1.7	14.0	2.0
FV-3000+CM	60.6	81.9	124.8	4.1	1.7	14.0	3.0
FV-4000+CM	74.6	89.9	141.8	4.1	1.7	14.0	3.0
FV-5000+CM	74.6	89.9	141.8	4.1	1.7	14.0	3.0
FV-7500+CM	91.1	89.9	152.4	4.1	1.7	14.0	3.0
High Static FV-7500+CM	91.1	99.7	162.2	4.1	1.7	14.0	3.0

FIGURE 10. Curb dimensions in inches.

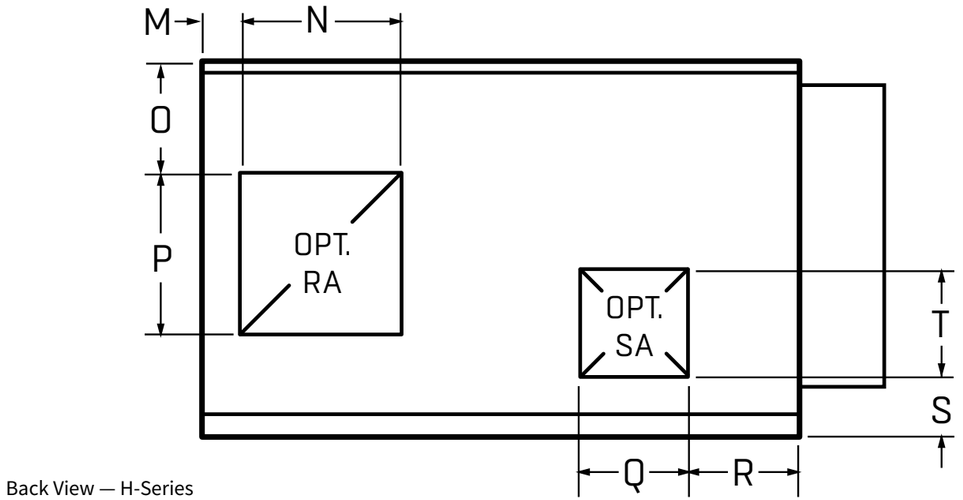
UNIT DIMENSIONS: PLAN VIEW



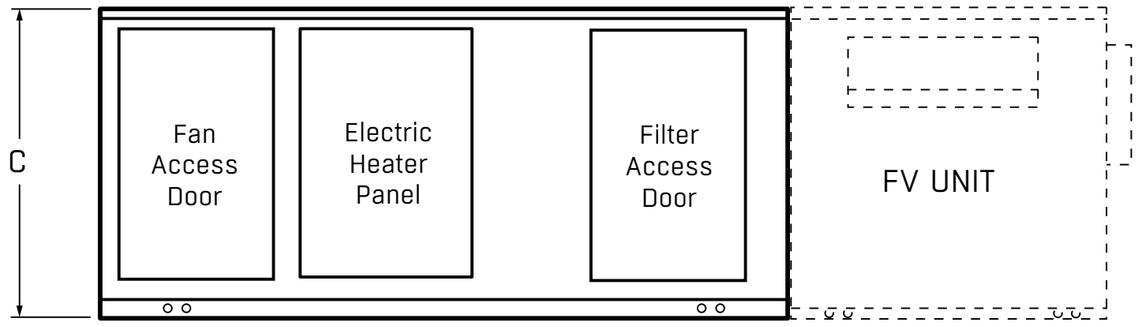
Model #	Net Wt. (lbs.)	Dimensions (inches)												
		A	B	C	D	E	F	G	H	I	J	K	L	M
FV-2000+CM	550*	72.0	51.5	32.4	109.0	4.5	18.0	4.5	10.0	12.0	11.4	3.5	10.4	2.7
FV-3000+CM	900*	84.0	64.8	47.7	129.0	10.0	17.0	7.0	17.0	13.1	12.6	4.9	11.4	7.0
FV-4000+CM	1300*	92.0	78.8	51.5	146.0	7.9	20.0	5.3	19.0	14.6	16.4	4.0	13.4	5.3
FV-5000+CM	1300*	92.0	78.8	51.5	146.0	7.9	20.0	5.3	19.0	18.6	16.4	4.0	15.9	5.3
FV-7500+CM	1850*	92.0	95.3	58.6	156.6	7.9	27.3	5.1	23.0	18.6	22.3	4.0	15.9	3.3
High Static FV-7500+CM	1850*	101.8	95.3	58.6	166.4	7.9	27.3	5.1	23.0	22.4	20.4	10.6	22.5	3.3

* Weight includes maximum size coils with fluid. Does not include weight of the FV unit. Standard piping connections shown.

UNIT ARRANGEMENT H-SERIES: BACK & SIDE VIEW



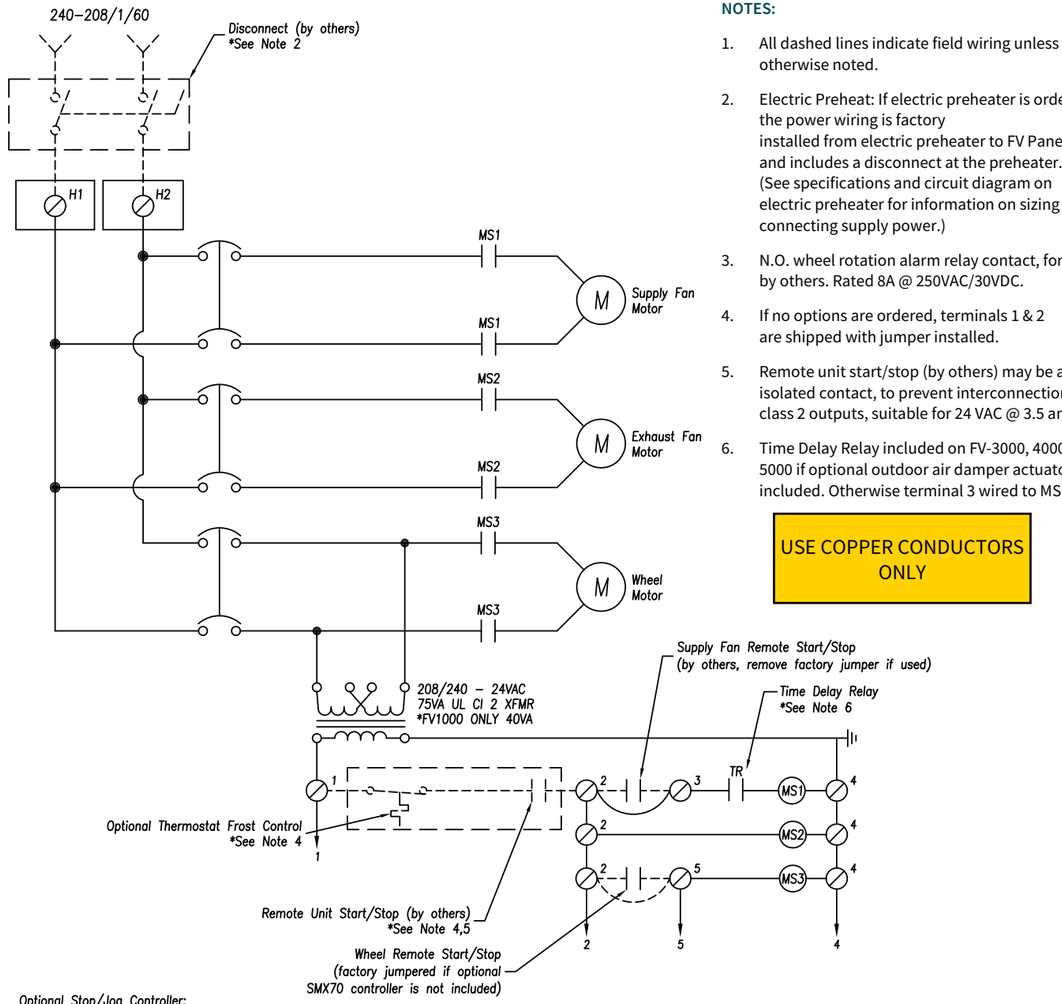
Back View — H-Series



Side View — H-Series

Model #	Dimensions (inches)									
	N	O	P	Q	R	S	T	X	Y	Z
FV-2000+CM	12.6	10.0	14.2	11.8	11.5	5.0	10.3	24.0	44.0	37.0
FV-3000+CM	17.0	6.8	17.0	13.1	12.6	9.6	11.4	24.0	44.0	45.0
FV-4000+CM	19.0	17.2	20.0	14.6	16.4	10.2	13.4	24.0	44.0	54.0
FV-5000+CM	19.0	17.2	20.0	18.6	16.4	12.2	15.9	24.0	44.0	54.0
FV-7500+CM	25.0	18.9	25.0	18.6	22.3	11.5	15.9	24.0	54.0	64.6
High Static FV-7500+CM	25.0	18.9	25.0	22.4	19.8	13.6	22.0	24.0	54.0	64.6

1Ø CIRCUIT DIAGRAM, FV-2000+CM THROUGH FV-5000+CM

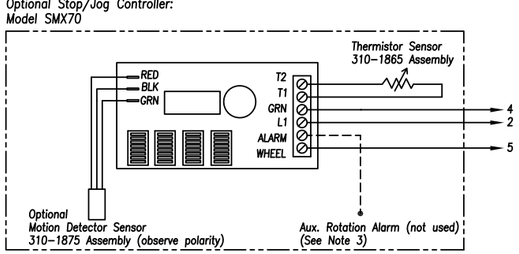


NOTES:

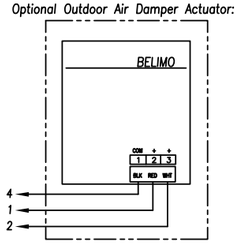
1. All dashed lines indicate field wiring unless otherwise noted.
2. Electric Preheat: If electric preheater is ordered, the power wiring is factory installed from electric preheater to FV Panel and includes a disconnect at the preheater. (See specifications and circuit diagram on electric preheater for information on sizing and connecting supply power.)
3. N.O. wheel rotation alarm relay contact, for use by others. Rated 8A @ 250VAC/30VDC.
4. If no options are ordered, terminals 1 & 2 are shipped with jumper installed.
5. Remote unit start/stop (by others) may be any isolated contact, to prevent interconnection of class 2 outputs, suitable for 24 VAC @ 3.5 amps.
6. Time Delay Relay included on FV-3000, 4000, and 5000 if optional outdoor air damper actuator is included. Otherwise terminal 3 wired to MS1.

USE COPPER CONDUCTORS ONLY

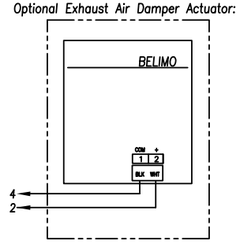
Optional Stop/Jog Controller:
Model SMX70



Optional Outdoor Air Damper Actuator:



Optional Exhaust Air Damper Actuator:

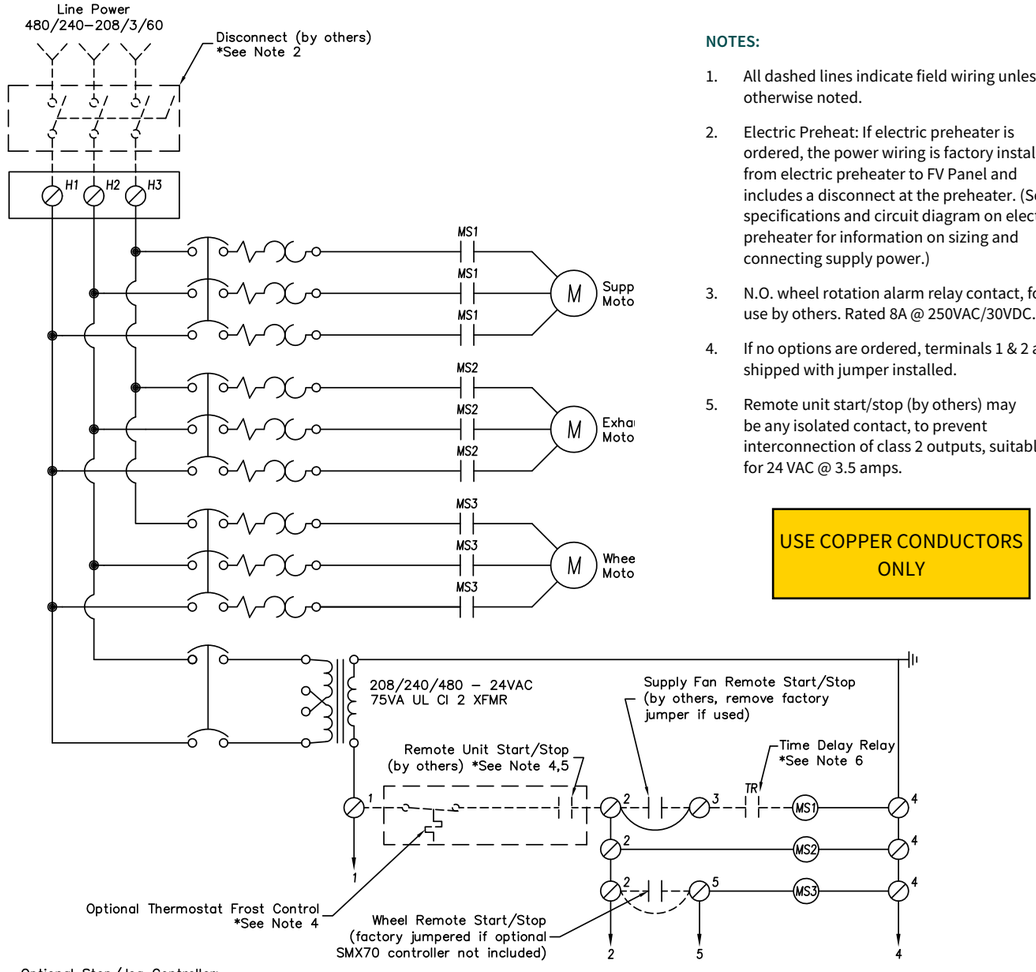


TERMINAL TORQUE REQUIREMENTS	
AWG SIZE	IN–LB
18–10	20
8	25
6–4	35

NOTES:
*COPPER CONDUCTORS ONLY

To avoid possible contactor failure, place start/stop relays inside the electrical enclosure.

3Ø CIRCUIT DIAGRAM, FV-2000+CM THROUGH FV-7500+CM



NOTES:

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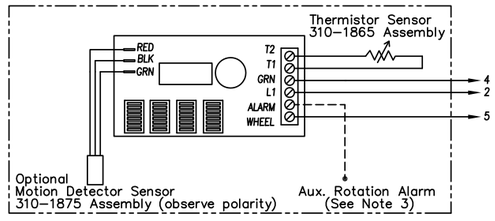
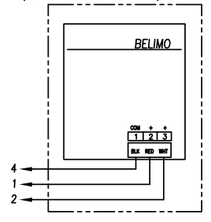
3. N.O. wheel rotation alarm relay contact, for use by others. Rated 8A @ 250VAC/30VDC.
4. If no options are ordered, terminals 1 & 2 are shipped with jumper installed.
5. Remote unit start/stop (by others) may be any isolated contact, to prevent interconnection of class 2 outputs, suitable for 24 VAC @ 3.5 amps.

USE COPPER CONDUCTORS ONLY

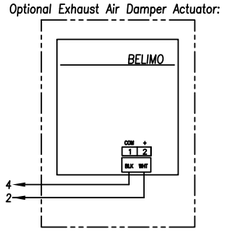
Optional Stop/Jog Controller:
Model SMX70



Optional Outdoor Air Damper Actuator:



Optional Exhaust Air Damper Actuator:

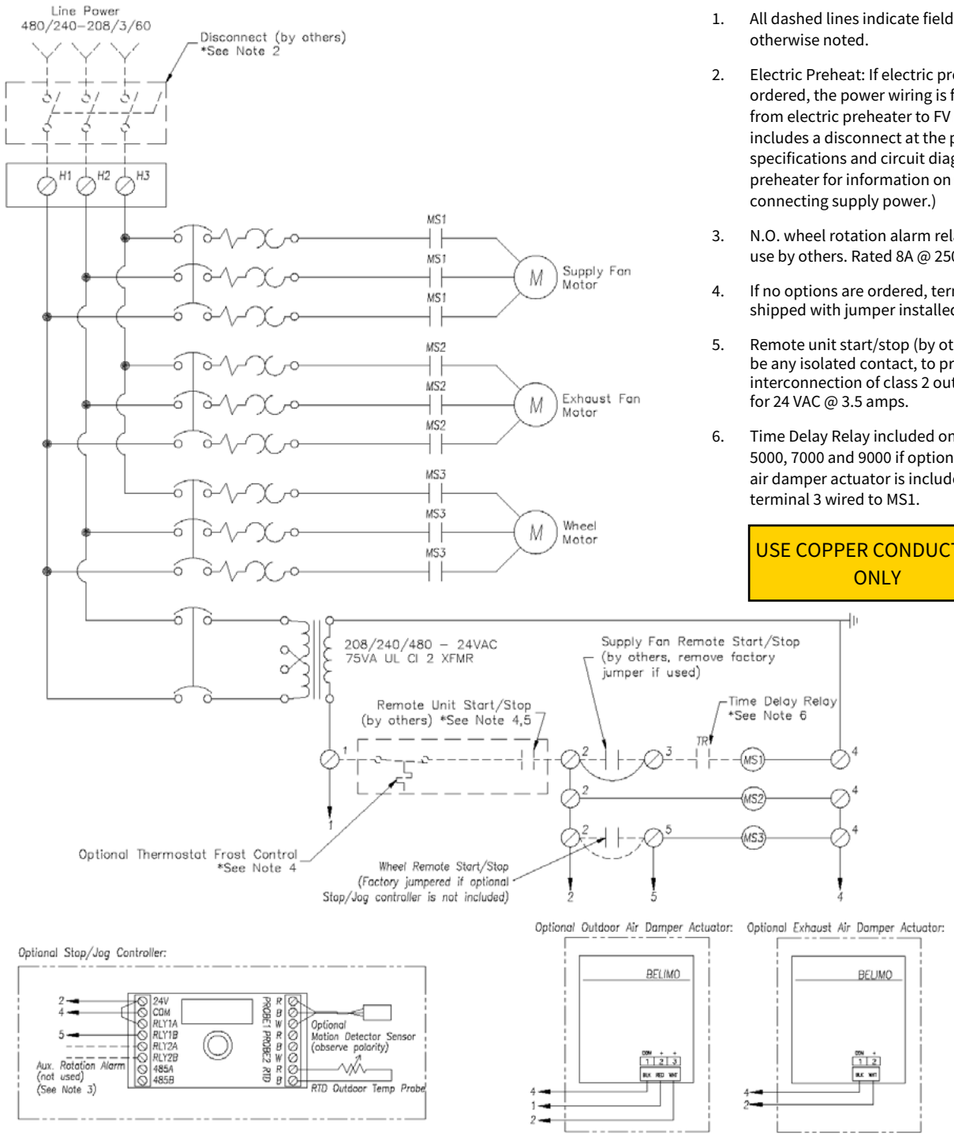


TERMINAL TORQUE REQUIREMENTS	
AWG SIZE	IN–LB
18–10	20
8	25
6–4	35

NOTES:
*COPPER CONDUCTORS ONLY

To avoid possible contactor failure, place start/stop relays inside the electrical enclosure.

3Ø CIRCUIT DIAGRAM, FV-2000+CM THROUGH FV-7500+CM WITH VARIABLE FREQUENCY DRIVES



NOTES:

1. All dashed lines indicate field wiring unless otherwise noted.
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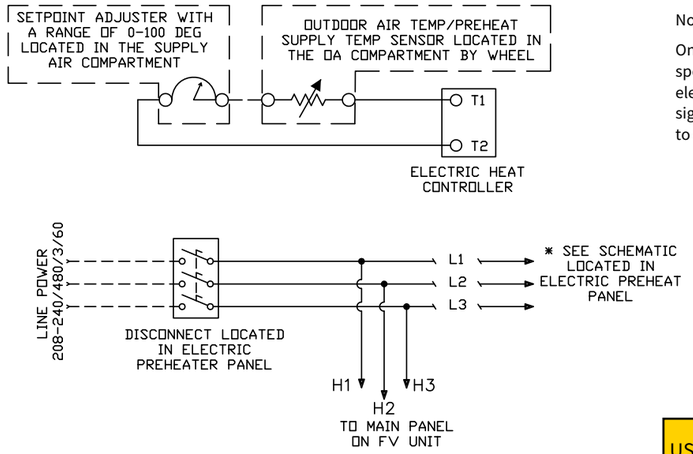
3. N.O. wheel rotation alarm relay contact, for use by others. Rated 8A @ 250VAC/30VDC.
4. If no options are ordered, terminals 1 & 2 are shipped with jumper installed.
5. Remote unit start/stop (by others) may be any isolated contact, to prevent interconnection of class 2 outputs, suitable for 24 VAC @ 3.5 amps.
6. Time Delay Relay included on FV-3000, 4000, 5000, 7000 and 9000 if optional outdoor air damper actuator is included. Otherwise terminal 3 wired to MS1.

USE COPPER CONDUCTORS ONLY

To avoid possible contactor failure, place start/stop relays inside the electrical enclosure.

3Ø ELECTRIC PREHEAT FROST CONTROL CIRCUIT DIAGRAM

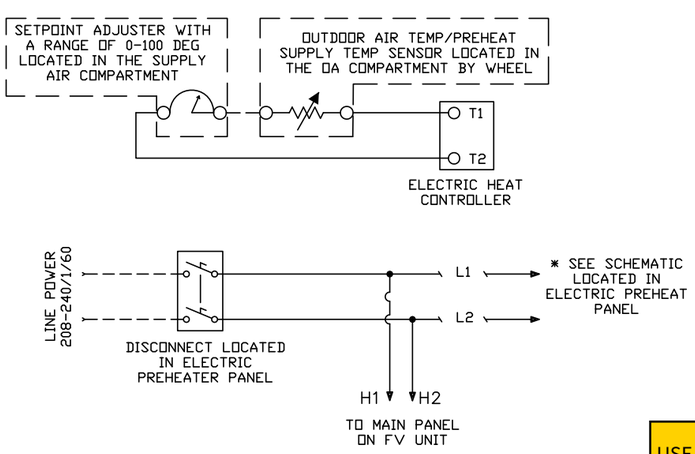


Note:

On units equipped with the variable speed wheel control package, electric heat is controlled by analog signal from the unit controller. Refer to electrical schematic for details.

USE COPPER CONDUCTORS ONLY

1Ø ELECTRIC PREHEAT FROST CONTROL CIRCUIT DIAGRAM



USE COPPER CONDUCTORS ONLY

NEUTRAL LEGEND

115V – WHITE
115V – GFI PROTECTED – GREY
24V – YELLOW

TERMINAL TORQUE REQUIREMENTS

AWG SIZE	IN-LB
18–10	20
8	25
6–4	35

NOTES:

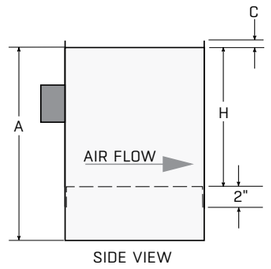
*COPPER CONDUCTORS ONLY
*CONTROL POWER MUST NOT LEAVE MAIN CONTROL PANEL.

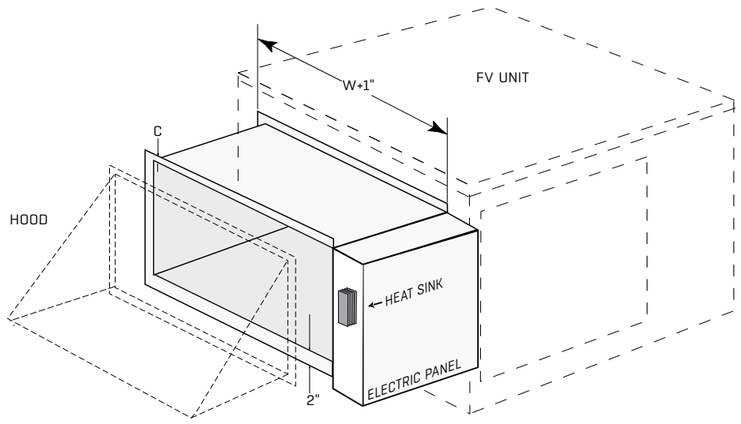
*THIS STYLE OF DASHED LINE INDICATES ITEMS THAT ARE REMOTE TO SEMCO ELECTRICAL/CONTROL PANELS, ITEMS THAT REFERENCE DWG FOOTNOTES AND DETAIL DWGS.
*THIS STYLE OF DASHED LINE REPRESENTS FIELD WIRING BY OTHER THAN SEMCO.

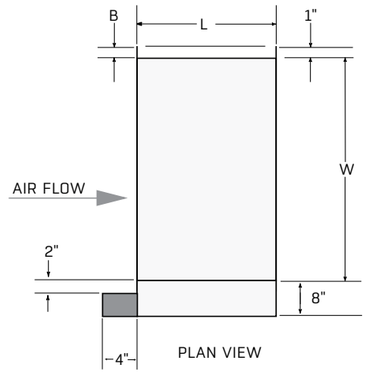
FV+CM ELECTRIC PREHEAT LAYOUT

Model #	W	H	L	A	B	C
FV-2000+CM	31.1	11.0	14.0	20.0	1.0	2.0
FV-3000+CM	39.1	16.0	20.0	40.0	1.0	2.0
FV-4000+CM	49.1	17.0	20.0	40.0	1.0	2.0
FV-5000+CM	49.1	17.0	20.0	40.0	1.0	2.0
FV-7500+CM	56.0	24.0	20.0	40.0	3.0	2.0

All dimensions in inches.

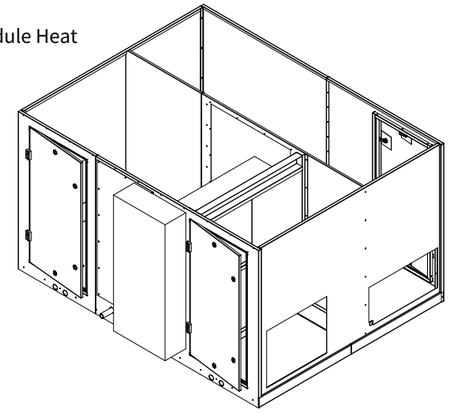




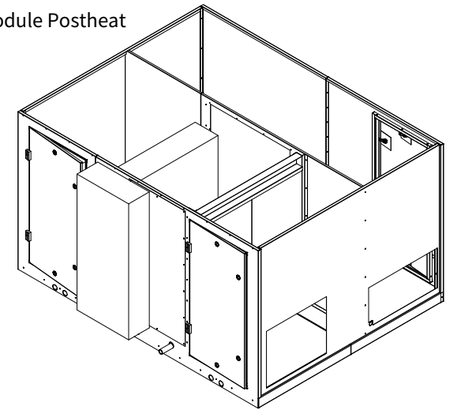


Coil Module Electric Heating

Coil Module Heat



Coil Module Postheat



INDOOR FILTER ASSEMBLY

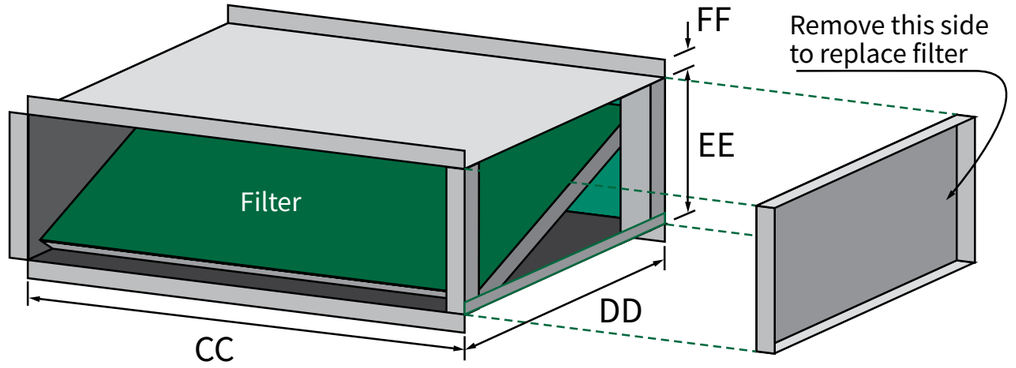


FIGURE 10. Front view of the FV Preconditioner with attached indoor filter assembly.

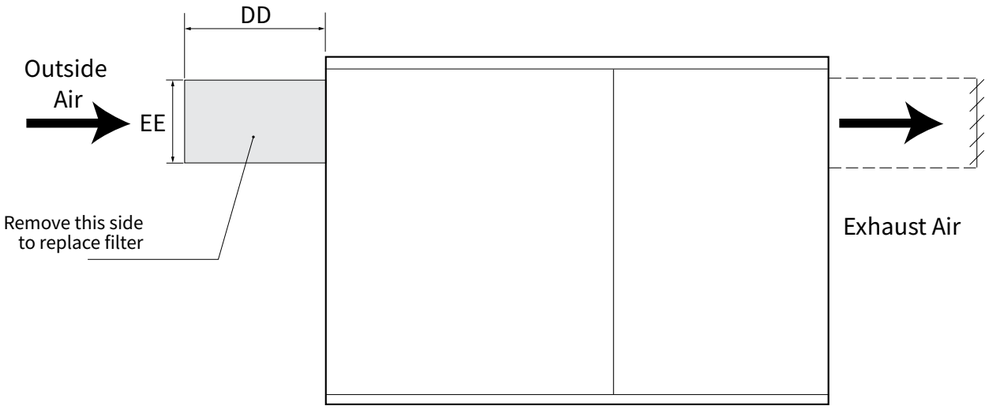
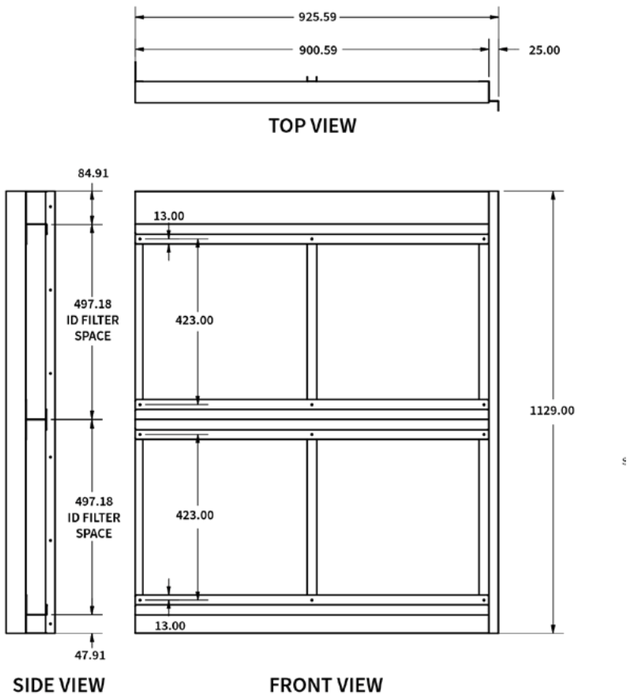


FIGURE 11. Schematic of the indoor filter assembly.

Model #	Dimensions (inches)			
	CC	DD	EE	FF
FV-2000+CM	32.1	24.0	12.3	0.8
FV-3000+CM	40.0	20.3	16.2	0.8
FV-4000+CM	50.0	20.8	18.1	0.8
FV-5000+CM	50.0	20.8	18.1	0.8
FV-7500+CM	59.0	18.8	23.0	0.8

FIGURE 12. Indoor filter assembly dimensions.

COIL MODULE FILTER RACK



MODEL	QUANTITY	FILTER TYPE	FILTER SIZE
CM-2000	2	MERV 8	16x25x2
CM-3000	4	MERV 8	20x18x2
CM-4000	4	MERV 8	25x20x2
CM-5000	4	MERV 8	25x20x2
CM-7500	8	MERV 8	16x25x2

SERVICE

The FV module has a large access panel on the front of the unit. All maintenance can be performed through this panel. The unit should be installed with clearance in front of the unit at least equal to the unit depth to assure adequate access.

- All key components including fans and wheel cassette are removable through the service panel.
- The rotor is supported by permanently lubricated wheel bearings for minimal maintenance and long life.
- Electrical panels utilize breakers to eliminate the need for fuses (when possible).
- Fluted media structure provides for laminar flow through the wheel thereby avoiding media plugging due to dust and debris.
- Intake hood/filter limits snow and rain from entering the unit.

MAINTENANCE

FILTERS

Indoor FV units utilize a two-inch pleated 30/30 filter for the supply air stream and either one-inch deep industrial grade aluminum mesh filter or two-inch pleated 30/30 for the return air stream. All outdoor FV units utilize one-inch deep industrial grade aluminum mesh filters with an optional two-inch for the supply and either one-inch or two-inch for the return air streams. The aluminum mesh filters can be removed and washed. We suggest that the filters be washed or replaced a minimum of once every four months. Replacement filters are readily available through FläktGroup SEMCO or locally through HVAC supply distributors.

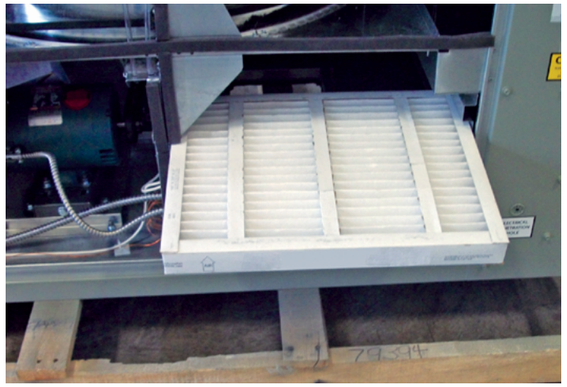


FIGURE 13. Replacing return air filters.

FILTER SIZES AND QUANTITIES

MODEL NUMBER	UNIT TYPE	OUTSIDE AIR FILTERS	RETURN AIR FILTERS	FILTER CLIPS
FV-1000	INDOOR	(1) 2x16x25	(1) 1x16x25 **or** (1) 2x16x25	N/A
	OUTDOOR	(1) 1x16x25 **or** (1) 1x16x25 + (2) 2x16x25		(4) OA - 1” or 3”
FV-2000	INDOOR	(2) 2x16x20	(2) 1x16x20 **or** (2) 2x16x20	N/A
	OUTDOOR	(2) 1x16x20 **or** (2) 1x16x20 + (2) 2x16x20		(8) OA - 1” or 3”
FV-3000	INDOOR	(2) 2x20x20	(2) 1x20x20 **or** (2) 2x20x20	N/A
	OUTDOOR	(2) 1x20x20 **or** (2) 1x20x20 + (2) 2x20x20		(8) OA - 1” or 3”
FV-4000	INDOOR	(4) 2x16x25	(3) 1x16x25 **or** (3) 2x16x25	N/A
	OUTDOOR	(4) 1x16x25 **or** (4) 1x16x25 + (4) 2x16x25		(16) OA - 1” or 3”
FV-5000	INDOOR	(4) 2x16x25	(3) 1x16x25 **or** (3) 2x16x25	N/A
	OUTDOOR	(4) 1x16x25 **or** (4) 1x16x25 + (4) 2x16x25		(16) OA - 1” or 3”
FV-7500	INDOOR	(6) 2x16x20	(6) 1x16x20 **or** (6) 2x16x20	N/A
	OUTDOOR	(6) 1x16x20 **or** (6) 1x16x20 + (6) 2x16x20		(24) OA - 1” or 3”
FV-9000	INDOOR	(6) 2x16x20	(6) 1x16x20 **or** (6) 2x16x20	N/A
	OUTDOOR	(6) 1x16x20 **or** (6) 1x16x20 + (6) 2x16x20		(24) OA - 1” or 3”

All dimensions in inches.

OUTDOOR AIR HOOD

The Outdoor Air Hood is utilized with the outdoor application of the FV and is palletized separately from the unit to minimize damage incurred during shipment. The filters that accompany the hood will be found within the cabinet (replacement filters will also be found in this location) along with filter clips, screws and caulk. Take the following steps to install the hood.

When viewing the unit from the access door side, the Outdoor Air Hood will be mounting to the left hand side. Orient hood as shown in **FIGURE 14**. Filters are intended to lay in the horizontal position. Clearance holes have been provided for ease of mounting.

Place caulk along the flanges that will mount to the left side

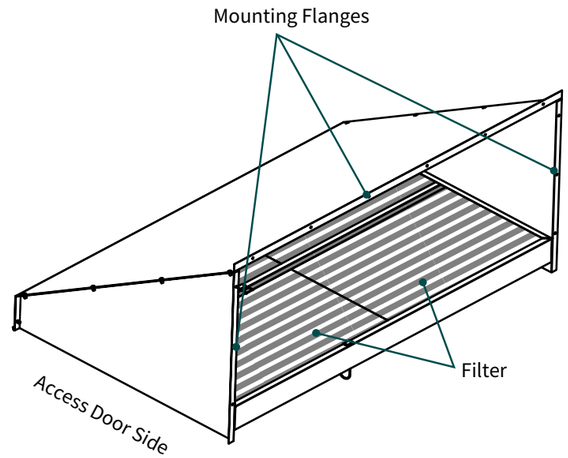


FIGURE 14. Outdoor Air Hood Installation.

of the unit. Align the clearance holes with the existing holes on the panel and use the sheet metal screw provided as means for joining. The hood will be fastened along the front, top, and back sides. Further caulking should be done along the flange edges to seal the hood from water penetration opportunities.

NOTE: if an electrical preheat is present, the hood will mount to the flanges provided by the electric heater. There will be no alignment holes on the heater itself. Ensure placement of the hood is such that no openings are present to allow for water seepage into the electrical heater. It is vital that the integrity of the electrical enclosure not be compromised; **DO NOT** screw into the electrical enclosure. Instead, fasten the bottom angle within the hood as well as the top and back flanges to the electric heater flange.

Attach the filter clips to the angles provided within the hood. There should be four clips for each filter. The hood can accommodate either one-inch metal mesh filters, or a combination of the one-inch metal mesh and the two-inch pleated 30/30 filters through use of 1” or 3” filter clips, respectively. The combination of filters should be arranged so that the metal mesh filter is the first filter passed through by the air entering the unit, ensuring any large debris will not puncture the pleated 30/30 filter (they will share the same filter clip).

The filters can then be inserted by quarter-turning the filter clips, placing the filter, and turning the clips back so that the clip lies in the position so indicated by **FIGURE 17.**

FIGURE 15

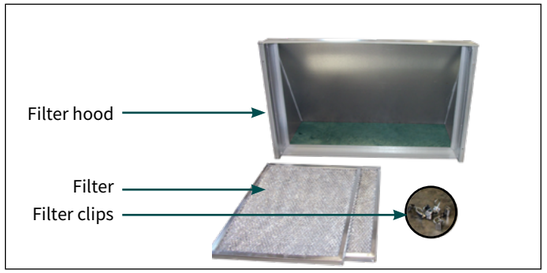


FIGURE 16

Attach filter clips to angles provided within the hood - four clips for each filter.

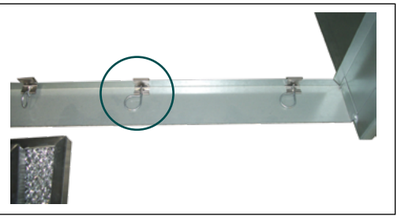


FIGURE 17

Insert filters by quarter-turning filter clips, placing the filter, and turning the clips back

INDOOR DUCT INTAKE

The Indoor Duct Intake is utilized with the indoor application of the FV and is palletized separately from the unit to minimize damage incurred during shipment. The filters that accompany the hood will be found within the cabinet (replacement filters will also be found in this location) along with screws and caulk. Take the following steps to install the intake.

When viewing the unit from the access door side, the Indoor Duct Intake will be mounting to the left hand side. Orient Intake as shown in **FIGURE 18**, the access door should face the same direction as the access door of the unit. Clearance holes have been provided for ease of mounting.

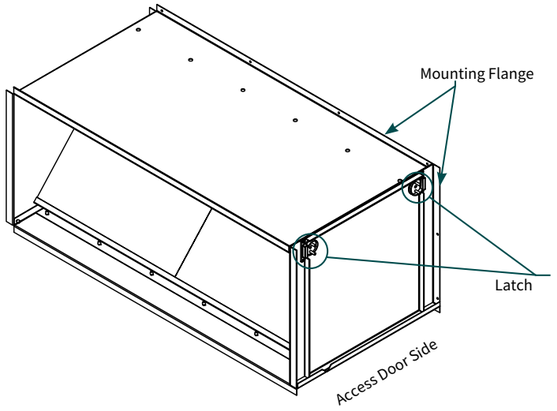


FIGURE 18. Indoor Duct Intake

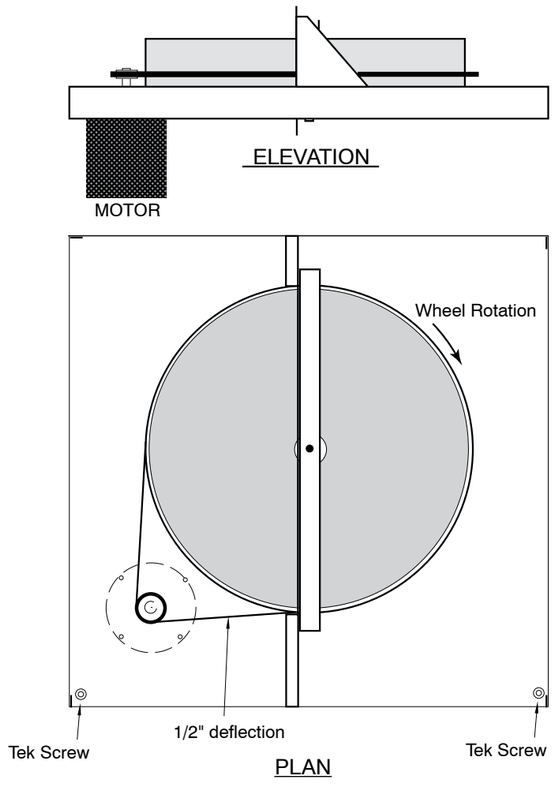
Place caulk along the flanges that will mount to the left side of the unit. Align the clearance holes with the existing holes on the panel and use the sheet metal screw provided as means for joining. The hood will be fastened along the front, top, back, and bottom sides.

Note: if an electrical preheat is present, the Intake will mount to the flanges provided by the electric heater. There will be no alignment holes on the heater itself. Ensure placement of the intake is such that no openings are present. It is vital that the integrity of the electrical enclosure not be compromised; DO NOT screw into the electrical enclosure. Instead, fasten only the back, top, and bottom sides to the flanges of the electric heater.

The intake can accommodate two-inch pleated 30/30 filters. The filters can be inserted by turning the two latches placed on the access door of the intake. The access door can then be removed and the filters will slide in. Replace access door and lock the latches by turning.

WHEEL CASSETTE

The wheel cassette can be serviced through the front panel. The cassette can be slid out for easy access. To remove the cassette, unplug the leads to the wheel drive motor, then remove the (2) tek screws located near the opening. This will then allow you to pull the cassette out of the unit through the access door. If the unit is equipped with a rotation sensor, it must be removed prior to sliding the cassette out.



SEALS

Surrounding the rim of the wheel is a brush seal. Running along the upper and lower wheel cassette crossmembers are brush seals that contact with the face of the wheel. Do not tamper with these seals. No maintenance of the seals is required.

MEDIA

For normal inspection and maintenance, the wheel cassette may be pulled out (like a drawer) of the metal enclosure of the unit (See **FIGURE 19**). **Prior to sliding out the wheel cassette, the wheel motor quick releases, and the rotation detector sensor must be disconnected.**

The Fusion 3Å wheel uses laminar flow technology to resist plugging and the accumulation of dust particles, therefore cleaning is usually not necessary. Constant back flushing occurs due to Supply Air and Return Air streams that move through media flutes to help keep them clean. As the media moves constantly from one air stream to the other most dirt is either passed through or blown away.

Should your application require occasional rotor cleaning, the media may be cleaned with a vacuum, compressed air (at 50 PSI max), low-pressure steam (5 PSI max), or hot water (130° F, 30 PSI max). Care should be taken to avoid bending or damaging flutes. The nozzle should be no closer than 6" from the media and should be held at a right angle to the face of the wheel. A soft brush can also be used to loosen any dirt from the face of the wheel. In general, detergents or solvents are not recommended as they may degrade the materials used to bind the desiccant to the aluminum surface in the media. If it is determined that additional cleaning power is required, light duty household cleaners (such as Simple Green® etc.) can be used.

FIGURE 19. Prior to sliding out the wheel cassette, the wheel motor quick releases, and the rotation detector sensor must be disconnected.

BELTS

The wheel drive and fan drive systems utilize a PowerTwist Plus™ belt or continuous V-belt. Periodic adjustment of the belt will be necessary. We suggest the belt be checked for sufficient tension at a minimum of once every six months. Take care to follow the directions on the following pages for instructions on measuring, assembling, and installing PowerTwist Plus V-Belts.

MODEL	FV-1000	FV-2000	FV-3000	FV-4000
LINKBELT TYPE	4L/"A"	4L/"A"	4L/"A"	4L/"A"
LINKBELT BELT LENGTH	83"	108"	134"	152"
CONTINUOUS V-BELT LENGTH	80"	105"	130"	146"

MODEL	FV-5000	FV-7500	FV-9000
LINKBELT TYPE	4L/"A"	4L/"A"	4L/"A"
LINKBELT BELT LENGTH	164"	200"	200"
CONTINUOUS V-BELT LENGTH	159"	193"	193"

FAN BEARINGS (FV-7500 ONLY)

The fan bearings for the FV-7500 require lubrication at a regular interval. Hours of operation, temperature and surrounding conditions will affect the lubrication frequency required. Therefore, when applying grease, observe the condition of the grease expelled from the bearings and note the amount of grease used. Both observations will suggest whether or not the lubrication schedule should be increased or decreased. Start with an initial monthly interval, and use a high quality NLGI No. 2, lithium soap grease with petroleum oil.

Also note that all bearings are originally filled with grease at the factory. When the fans are started, the bearings may discharge excess grease though the seals for a short period of time. If so, it is not necessary to replace this initial discharge. Lubricate bearings prior to extended shutdown or storage and rotate the shaft monthly to aid corrosion protection.

AIRFLOW DAMPERS

All outdoor FV units have airflow dampers on the supply air intake and exhaust air outlet that are field adjustable. FV units installed indoors do not have an exhaust airflow damper and one must be provided in the ductwork. However, a motorized exhaust is optional in both outdoor and indoor installations.

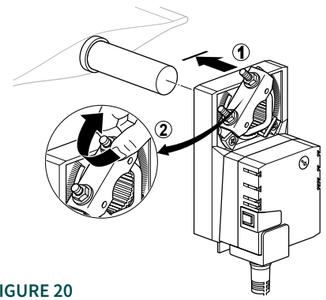


FIGURE 20

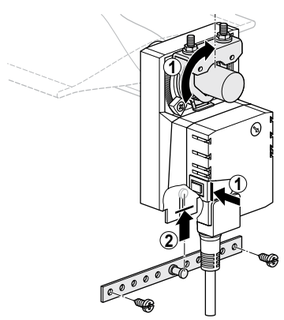


FIGURE 21

SUPPLY

To adjust the Supply / Outside Air flow damper, turn the FV unit off without shutting off the main power.

Open the access door and observe the damper, allow it to finish moving through its stroke to the full closed position, then turn off main power to the unit.

Confirm the damper is now fully closed, but the actuator is 5˚ from fully closed, (1/16” to 1/8” between stop and clamp), See **FIGURE 22**. This is called “pre-loading” the actuator. When the actuator is powered and sent to the closed position it will put its full torque on the shaft compressing the edge and blade seals. The actuator is electronically protected from overload and will not be damaged.

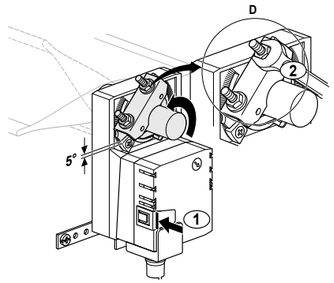


FIGURE 22

If “pre-load” setting requires adjustment follow the two step procedure listed below. If “pre-load” is correct, skip these two steps.

1) Press the manual override and turn the damper shaft until the blades are fully closed.

2) Loosen the nuts on the universal clamp. Press the manual override button and rotate the clamp to about 5˚ from fully closed, (1/16” to 1/8” between stop and clamp). Tighten the two nuts on the universal clamp with a 10 mm wrench (See **FIGURE 22**).

You have now confirmed or adjusted correct the fully closed position of the damper.

The factory-set open damper position is fully open against the mechanical limit screw in the frame of the damper. The limit screw must be left in place to prevent the damper blade from contacting the energy recovery wheel.

TESTING THE INSTALLATION

1) Without power, disengage the gear train with the manual override button (1) and move the shaft from closed to open to closed. Ensure that there is no binding and that the damper goes fully open and closes with 5º of the actuator stroke left.

2) Correct any problems and retest.

EXHAUST

To adjust the exhaust airflow damper, turn the unit off and remove the nut/bolt stops on both sides of exhaust hood. Reposition the nut/bolt stops in the desired adjusting holes and re-tighten, ensuring the exhaust damper is now between the exhaust outlet and nut/bolt stops (See **FIGURE 23**). Be sure to use matching adjusting hole on both sides of the exhaust hood. Readjust the stops as necessary to obtain the desired airflow. The exhaust airflow damper will automatically open to the set position when the exhaust fan is on, and close when the exhaust fan is off.

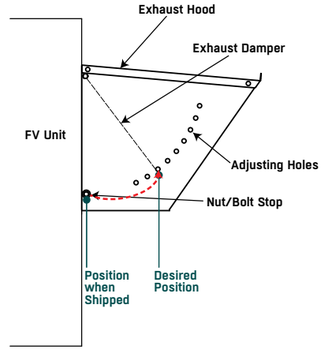


FIGURE 23. Exhaust hood damper.

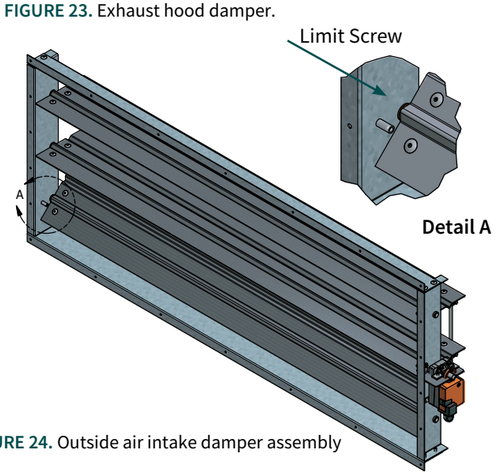


FIGURE 24. Outside air intake damper assembly

OPTIONAL MOTORIZED EXHAUST

To adjust the Exhaust Air flow damper, turn the FV unit off without shutting off the main power.

Observe the damper, allow it to finish moving through its stroke to the full closed position, then turn off the main power to the unit.

Confirm the damper is now fully closed (position a in **FIGURE 25**), but the actuator is 5˚ from fully closed. This is called “pre-loading” the actuator. When the actuator is powered and sent to the closed position it will put its full torque on the shaft compressing the edge and blade seals. The actuator is electronically protected from overload and will not be damaged.

If “pre-load” setting requires adjustment, follow the procedure listed on the next page. Otherwise, skip these steps.

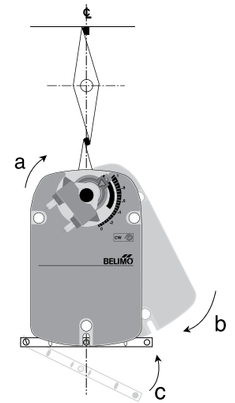


FIGURE 25 Standard mounting of optional motorized exhaust actuator

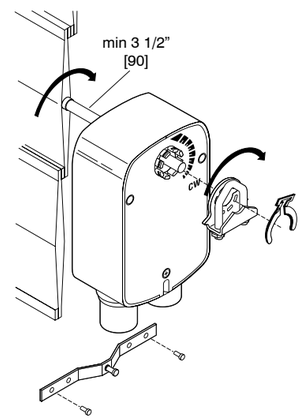


FIGURE 26

FIGURE 20.

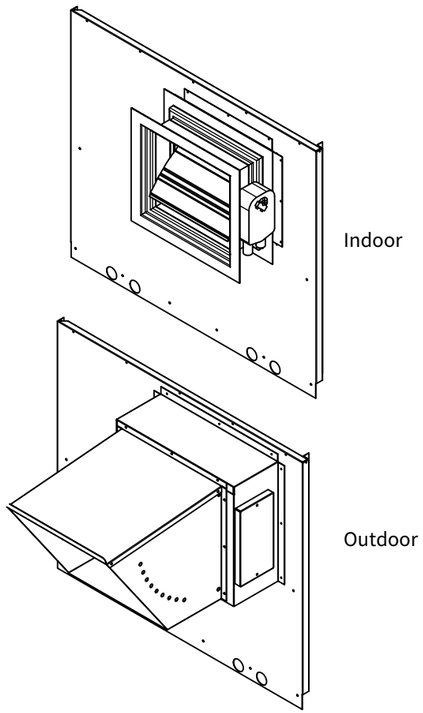


FIGURE 27. Optional motorized exhaust damper.

“PRE-LOAD” SETTING ADJUSTMENT

1) For outdoor applications, remove cover over the actuator accessible from the rear of the unit.

2) Remove the screw from one end of the mounting bracket and pivot it away from the actuator.

3) Loosen the universal clamp and, making sure not to move the damper shaft, rotate the actuator approximately 5 degrees in the direction which would open the damper.

4) Tighten the universal clamp to the shaft.

5) Rotate the actuator to apply pressure to the damper seals (see **B** in **FIGURE 25**) and re-engage the anti-rotation strap (see **C** in **FIGURE 25**).

6) Tighten all fasteners.

7) You have now confirmed or adjusted correct the fully closed position of the damper.

COILS

Heating and cooling coils function at peak efficiency when clean and free of foreign matter. Frequent visual inspections should be made, and any built up dirt and foreign matter should be removed. A fin comb may be required to remove matter entangled in fins or coils (See **FIGURE 28**), but flushing with water under normal local pressure will remove most particulates.

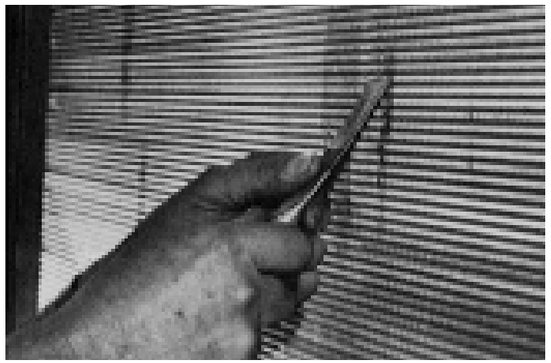


FIGURE 28. A fin comb may be used to remove matter entangled in fins, as well as to straighten fins. But normally flushing coils with water under normal pressure will remove most matter.

- An acid or alkaline coil cleaner is recommended every one or two years, depending on the degree of oxidation, to thoroughly clean and brighten coils and fins.

- Local water conditions may make it necessary to treat chilled water systems, hot water systems and steam systems to control corrosion, sludge and/or metal oxides. In some water supplies, scale removers and inhibitors may also be required.

- Cooling coils — if water in the system will be exposed to outdoor temperatures that are below freezing, either drain the system before temperatures dip below 32˚F, or add glycol to the system to prevent freezing.

HOW TO MEASURE, ASSEMBLE AND INSTALL POWERTWIST PLUS™ V-BELTS

MEASURING THE BELT

- Pull belt tight around sheaves to check hand tight length, overlapping the last two tabs with two holes in matching links as shown in **FIGURE 28**.

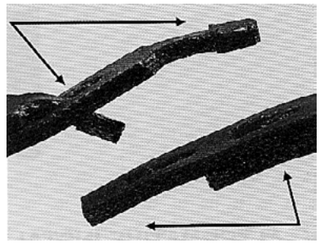


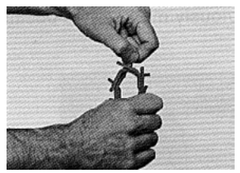
FIGURE 28. Measuring the V-Belt

- Count the number of links and remove one link for every 24 of O/3L, A/4L and B/5L sections and one link for every 20 of C section.

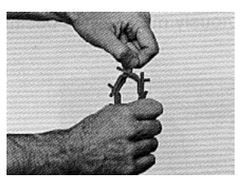
- This gives the correct installed belt length and will ensure optimum belt tension when running.

NOTE: Every tenth link is designated with an arrow. For multiple belt drives, ensure that each belt has the same number of links.

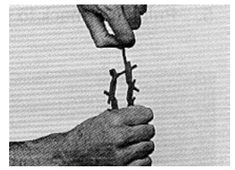
DISASSEMBLY



1) Hold belt upside down. Bend back as far as possible: hold with one hand. Twist one tab 90° parallel with slot.



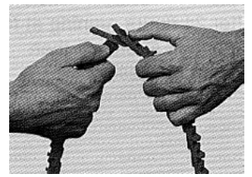
2) Pull end of link over tab.



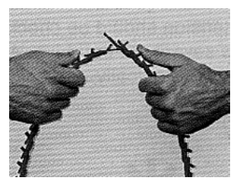
3) Rotate belt end with tab 90°.

4) Pull belt end through two links.

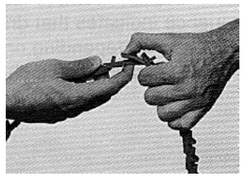
ASSEMBLY



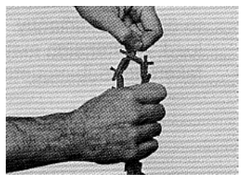
1) Hold belt with tabs pointing outward.



2) Place end tab through two links at once.



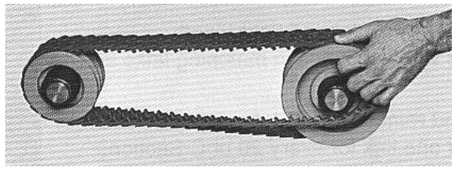
3) Flex belt further and insert second tab through end link by twisting tab with thumb.



4) Ensure tab returns to position across belt. Reverse belt so tabs run inside.

NOTE: Turn belt inside out (as shown above) to ensure easy assembly and disassembly.

INSTALLATION



1) Turn belt with tabs to the inside before installing.

2) Determine direction of drive rotation.

3) Align belt directional arrow with drive rotation.

4) Fit belt in nearest groove of smaller sheave.

5) Roll belt onto larger sheave, turning the drive slowly. Belt may seem very tight; this is okay. DO NOT jog motor.

6) Check to see all tabs are still in their correct position and are not twisted out of alignment.

For multiple belt drives, work belt from groove to groove. On particularly wide drives, it may be easier to install half the belts from the inboard side and half from the outboard. **NOTE:** With drive ratios around 1:1, it may be necessary to add back one link to allow belts to be rolled on. This does not apply if using **ALTERNATIVE INSTALLATION METHOD**.

ALTERNATIVE INSTALLATION METHOD

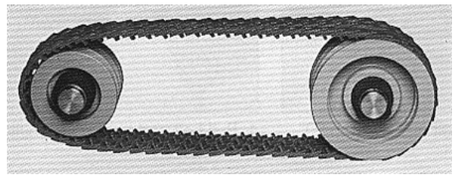
1) Set motor to mid-position of adjustment range and mark base clearly.

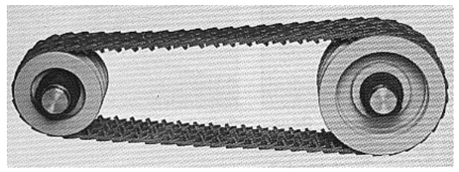
2) Determine required belt length as in “Measuring Belt Length.”

3) Push motor forward to minimum center distance.

4) Install belts as in “Installation.”

5) Pull motor back to previously marked mid-position.





RETENSIONING

Like all high performance V-belts, PowerTwist Plus™ V-Belts require the maintenance of correct drive tension to operate efficiently. Experience indicates that drive tension should be checked after 24 hours running at full load. A retension may be necessary depending on the severity of the drive. Any initial belt stretch is then taken up. Subsequently, belt tension should be checked periodically and adjusted when necessary.

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