Installation and Operation Manual
Underfloor Fan Powered Terminal Units
Model Series: 38F and 38S

Receiving Inspection

After unpacking the terminal unit, check it for shipping damage. If any shipping damage is found, report it immediately to the delivering carrier. Store units in a clean, dry location.

Caution: Do not use the inlet collar, damper shaft, airflow sensor, electrical conduit, or tubing as a handle to lift or move assembly. Damage to the air terminal unit or controls may result.

Mounting the unit

Units can be mounted directly on the sub-floor slab beneath the raised floor. If isolation from the slab is necessary, the unit can be placed on a rubber or cork pad. Isolator pads are available as an option from Nailor. Securing the unit to the floor slab is not required or recommended.

Access to the motor, blower and damper assembly is from the top of the unit. Ensure the area where the unit is to go is clear of cables, wire etc. Units are designed to fit between the floor pedestals. Position the unit so that there is no interference. Install the unit in a location that allows free access to the unit as well as all control components.

Duct Connections (38S Series and 39F Series with optional cooling/heating dampers)

Slip each inlet duct over the inlet collar of the terminal. Fasten and seal the connection by the method prescribed in the job specification. The diameter of the inlet duct in inches must be equal to the nominal size of the terminal inlet. The inlet collar of the terminal is 1/8" (3) smaller than the nominal duct size to allow it to fit inside the duct. (38S Series units with Diamond Flow Sensor only) **Important: Do not insert ductwork inside the inlet collar of the assembly.** For optimum performance, 2 to 3 equivalent diameters of straight duct should be installed prior to the inlet of the unit. All ducts should be installed in accordance with SMACNA guidelines. Rectangular heating damper inlets on 38F Series units when equipped are designed for a flanged or 's' slip connection. Rectangular discharge openings are designed for a flanged duct connection. A clear area around the opening has been left for screw penetration. Fasten and seal all connections by method prescribed in the job specification.

Minimum Access

Make appropriate accommodations for access panel removal. Units have removable full size top access panels. Specific control enclosure location is indicated on product submittals. Low voltage control enclosures have removable covers that are attached with sheet metal screws. High voltage controls enclosures have hinged access doors that open upwards for easy access. For clearances for full opening of hinged access doors, refer to project specifications, submittal sheets and NEC.

Important: These recommendations do not preclude NEC or local codes that may be in effect, which are the responsibility of the installing contractor.

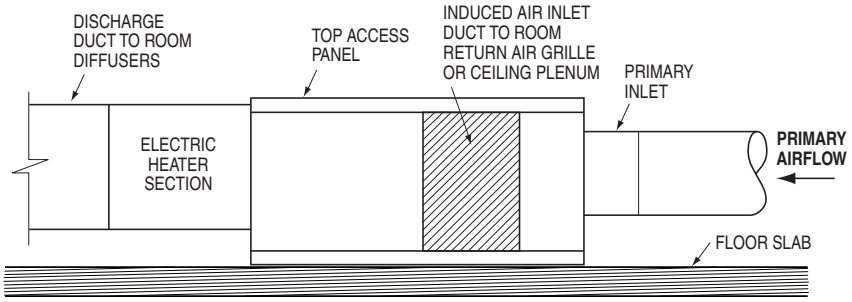


Figure 1: Model 38SE Fan Powered Terminal Unit with electric heat.

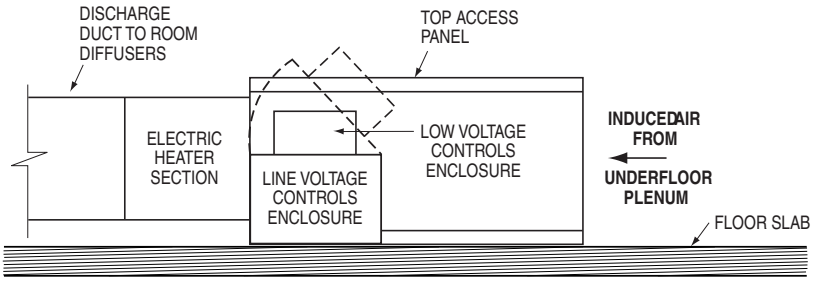


Figure 2: Model 38FE Fan Powered Booster Unit with electric heat.

Field Wiring

All field wiring must comply with NEC and local codes. Disconnect switches are optional. Also, electrical, control, and piping diagrams can be found on labels affixed to the exterior/interior of the control enclosure box. Unless specifically requested by customer, all units are wired for a single point connection to the fan and electric heater (if present). All electric heaters will be staged per specification. Motors rated for 277 or 120VAC on units with 480 or 208VAC ratings respectively are always connected between the neutral and L1 terminals. The installing electrician should rotate the incoming electric service by phase to help balance the building electric load.

Fuse size designates the size of the internal fuse if it is supplied. Maximum Overcurrent Protection (MOP) designates the largest breaker or fuse in the electrical service panel that can be used to protect the unit.

ELECTRICAL SUGGESTIONS AND REQUIREMENTS:

1. Provide a safety disconnect per NEC 424-19, 20, 21
2. Disconnect the power supply before wiring or servicing unit. If a disconnect switch is present, it should be in the OFF position while making power connections or repairs.
3. All units with electric heat should have copper wires sized for 125% of Nameplate Amperage.
4. Follow wiring diagrams and instructions mounted on the unit. 480V/3 phase heaters, for example, require a neutral wire in addition to the full sized ground wire. NEC 424-15 and 250 also require that all units be grounded.
5. All units with perimeter linear electric heat (PLCH-E/PULS-E) shall be connected using electrical wire whips that plug into the fan power unit on one end and the perimeter heater on the other (purchased thru Nailor). Multiple perimeter heaters (1-6 typically up to a total of 4.4 kW Max) can be easily connected in parallel "daisy-chained" side by side using multiple wire whips. Heaters may also each be individually wired back to the fan power terminal unit. See fan power unit electrical nameplate for MCA/MOP ratings based on the total capacity (kW) of all perimeter heaters intended to be connected to that particular unit.

Control Start-up and Operation

Your local Nailor Representative can provide detailed information about start-up and operating procedures for Nailor's digital, analog, and pneumatic controls. For specific information on controls provided by other manufacturers contact the control manufacturer's local or national office. This applies whether the controls were factory or field installed.

Note: Digital controllers may use specific communication addresses based on Building Management Systems, Architecture and original engineering drawings. Installing the terminal in a location other than that noted on the label may result in excessive start-up labor.

Primary Air Damper and Fan Adjustment

Before starting the fan motor, make sure duct system is free of foreign objects, and filters are installed where required.

(1) Start motor and let it run-in at least 15 minutes. During run-in, check ductwork connections for leaks and repair if necessary.

(2) All Nailor fan powered VAV terminal units incorporating PSC motors use a solid state SCR speed controller to adjust motor speed and consequently air volume. Speed controllers have built-in maximum and minimum stops as detailed on the fan performance pages in the Nailor VAV Terminal Unit catalog. Turning the manual fan speed control counterclockwise will increase the fan speed; clockwise will decrease speed. The fan speed control is located on the side of the motor controls enclosure.

(3) For 38S series units with primary air inlet damper, set the unit to full cooling. Adjust and set primary maximum cfm by measuring the airflow with a manometer attached between the gauge ports in the pneumatic tube leading to the high and low sides of the inlet air pick-up. A chart is attached to the side of the unit showing airflow vs. pressure for different inlet sizes. Adjust and set remote balancing dampers, if present. Do not worry about airflow at this time; just proportion the outlets with the dampers. Be sure to leave the dampers in the most possible open position. This will generate the minimum noise level. Adjust the fan speed control until the required CFM is obtained (by measuring the air quantity at the room outlets or by zeroing the induction air if primary and fan match). Fan should be adjusted with primary air at maximum set point to ensure that no supply air is discharged at the induction port. Recheck the fan and primary airflows when the damper is reset to the minimum set point.

(4) For units equipped with ECM motors, set the primary air dampers as described in (3). Set the fan as described on the ECM MOTORS IOM, page 1. Proportion the remote balancing dampers after the fan is set. Remember to adjust the dampers so that they are in the most open condition after proportioning. This will generate the minimum noise.

Maintenance Procedures

Fan and Motor

Nailor fan powered terminal units are equipped with permanently lubricated motors. Inspect fan and motor assembly for dust and dirt as often as dictated by operating environment. Clean assembly if necessary.

If fan motor does not run, do the following:

a. Check for free rotation of blower wheel. Make sure no foreign objects are in fan. Look for signs of freight or job site damage.
b. Check power supply. Disconnects should be in the "ON" position. Optional fusing should also be inspected. Check transformer for proper output.
c. Check for proper control signals and relay function.

Fan motor runs but emits excessive noise:

a. Maximum airflow may be too high, or discharge static pressure may be incorrect.
b. Blower may have clearance problems. Make sure all components are securely attached.
c. Verify integrity of ductwork. Leaks or loose connections could cause noise. Check for rattling diffusers or rattling or incorrectly adjusted balancing dampers.

Fan motor runs, but airflow too low:

a. May be due to ductwork restrictions, dirty air filters, or clogged water coils.
b. Readjust fan speed control.
c. Discharge static pressure may be incorrect. Check balancing dampers.

If repair or replacement is required:

Disconnect all power before servicing. Motor and fan should be removed as an assembly. Remove the four hex nuts from the mounting lugs holding the fan assembly to the discharge panel, and remove the assembly through any convenient access panel. Do not allow assembly to hang from wiring. If removing motor from blower, first loosen the set screw holding the blower wheel to the motor shaft. Remove the three screws holding the motor to the fan housing, and slide motor and fan housing apart.

To put the assembly back together, reverse the procedure. Be sure to align the blower set screw with the flat section of motor shaft.

Note: Over-tightening motor mounting screws may crush isolation bushing, causing excessive fan noise.

Primary Air Damper Replacement

Nailor's primary air valve assembly is not repairable. The entire assembly should be replaced if it is damaged.

Labels

Each fan-powered unit is shipped with a nameplate label affixed to the control casing. Principle nameplate data on the label typically include Order-Serial number, Model number, Unit size, Motor horsepower, Amperage, MOP, Heater (if present) data, Supply Voltage, and Airflows. Also provided are calibration, airflow, as well as other labels as necessary. We suggest that you read all labels before beginning installation. If you have any questions, please contact your local Nailor Representative. Their phone numbers can be found on our website at www.nailor.com.

Nameplate Label

Nailor® Industries Inc.

FAN POWERED TERMINAL UNIT — **(UNITE TERMINALE @ VENTILATEUR INTEGRÉ)**

DATE *(DATE)*	:	**8-Apr-2009**	**SERIAL NO.** *(NO. DE SÉRIE)*	:	**315436-1.01**
MODEL (MODÈLE)	:	**D38FE**	**TAG NO.** *(NO. DÈTIQUETTE)*	:	**UFPTU-7-1-2**
UNIT SIZE-INLET SIZE *(DIAMETRE D'ENTRÉE)*	:	**6**	**VOLTAGE** *(VOLTAGE)*	:	**277**
			PHASE *(PHASE)*	:	**1**
CONTROL VOLTAGE (*VOLTAGE DE CONTRÔLE)*	:	**24**	**STAGES** *(ÉTAPES)*	:	**1**
			HZ. *(HZ)*	:	**50/60**
CONTROL SEQUENCE *(SEQUENCE DE CONTRÔLE)*	:	**FIC**	**WATTS** *(WATTS)*	:	**890**
			MOTOR VOLTAGE *(VOLTAGE DU MOTEUR)*	:	**227**
VOLT *(VOLT-AMPÈRE)*	:	**50**			
HOT WATER COIL ROWS *(NOMBRE DE RANGÉES SERPENTIN EAU CAUDE)*	:		**MOTOR AMP** *(AMPERAGE DU MOTEUR)*	:	**5.0**
CHILLED WATER COIL ROWS *(NOMBRE DE RANGÉES SERPENTIN EAU RÉFRIGERÉÉ)*	:		**N/A**		

	KW/HP			AMPS (AMPÈRES)			AMPACITY (AMPACITÉE)			MAX. OVERCURRENT PROTECTION (RESISTANCE DES FUSIBLE MAX.)		MOTOR FUSE SIZE (MOTEUR FUSIBLE)
	TOTAL (TOTALE)	EACH CIR. (CHAQUE CIRCUIT)	EACH STG. (CHAQUE ÉTAPE)	TOTAL (TOTALE)	EACH CIR. (CHAQUE CIRCUIT)	EACH STG. (CHAQUE ÉTAPE)	TOTAL (TOTALE)	EACH CIR. (CHAQUE CIRCUIT)	EACH STG. (CHAQUE ÉTAPE)	TOTAL (TOTALE)	EACH CIR. (CHAQUE CIRCUIT)	
HEATER (CHAUFFAGE)	4	4	4.00	14.44	14.44	14.44	18.05	18.05	18.05	30	30	N/A
MOTOR (MOTEUR)	890			5.9			7.38					15
TOTAL (TOTALE)				20.34			25.43					N/A

EACH ELEMENT RATED @ **2** KW @ **277** VAC. — AWG. MIN WIRE SIZE (MIN DIAMETRE DE FIL) : 10
(CHAQUE ELEMENT CLASSIFIER A) — MIN. HEATING CFM (MIN. PCM) : 280.00

USE WIRE SUITABLE FOR AT LEAST 75°C
L1 IS COLOR CODED BLACK , L2 IS BLUE, L3 IS RED, CONTROL WIRES CODED AS MARKED,
USE COPPER CONDUCTORS ONLY.

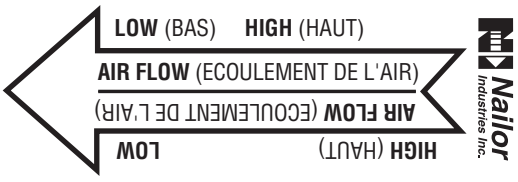
UTILISER UN FIL METALIQUE QUI CONVIENT AU MOIN 75°C
L1 EST COLORÉ NOIRE, L2 EST BLUE , L3 EST ROUGE,
LES FILS DE CONTRÔLE SON INDENTIFIÉE COMME MARQUE,
UTILISÉ DES CONDUCTEURS DE CUIVRE SEULEMENT.

USE CLASS K, RK1, A2D OR A6D FUSE OR HACR BREAKERS. — *UTILISÉ DES FUSIBLES CLASS K, RK1, A2D, OU A6D OU HACR DISJONCTEURS.*

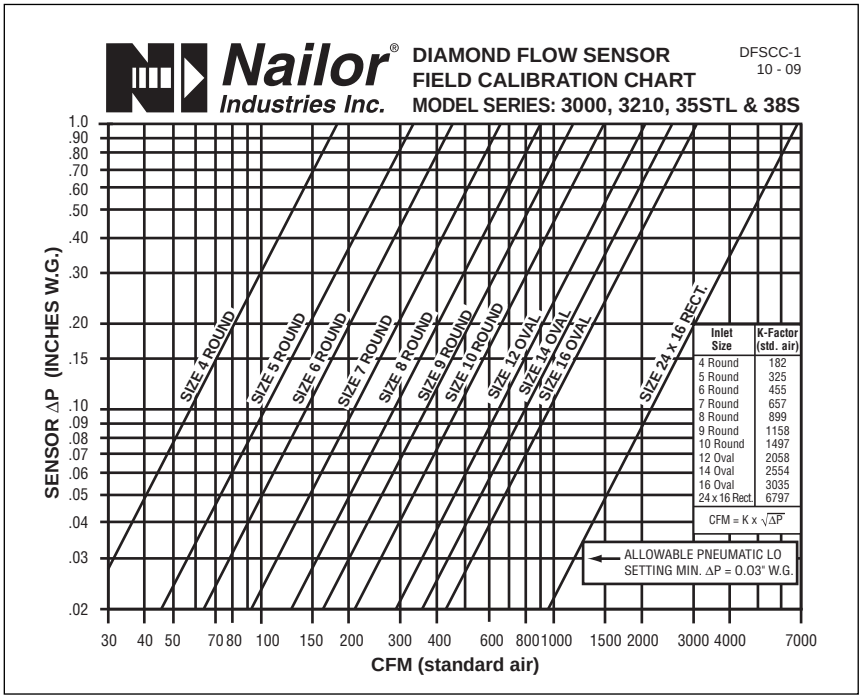
MAX FAN CLG / MIN DEADBAND (CFM) : 1300 / 400
MAX VENTILATEUR CLG/MIN BANDE MORTE (PCM):
MAX FAN HTG (CFM) : 1420
MAX VENTILATEUR HTG (PCM):

MAX FAN CLG / MIN DEADBAND (L/S) : 613 / 189
MAX VENTILATEUR CLG/MIN BANDE MORTE (L/S):
MAX FAN HTG (L/S) : 462
MAX VENTILATEUR HTG (L/S):

Airflow Direction (affixed to inlet collar)

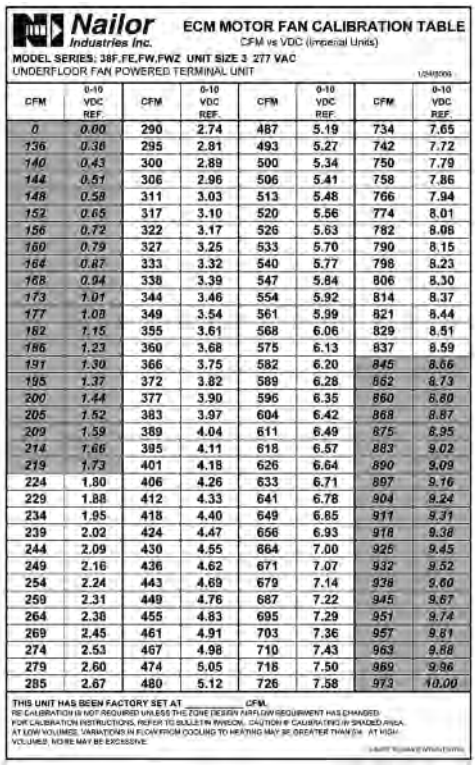


Sample Diamond Flow Sensor Calibration Label



Application charts for ECM motors

A. Sample VDC vs. CFM Chart

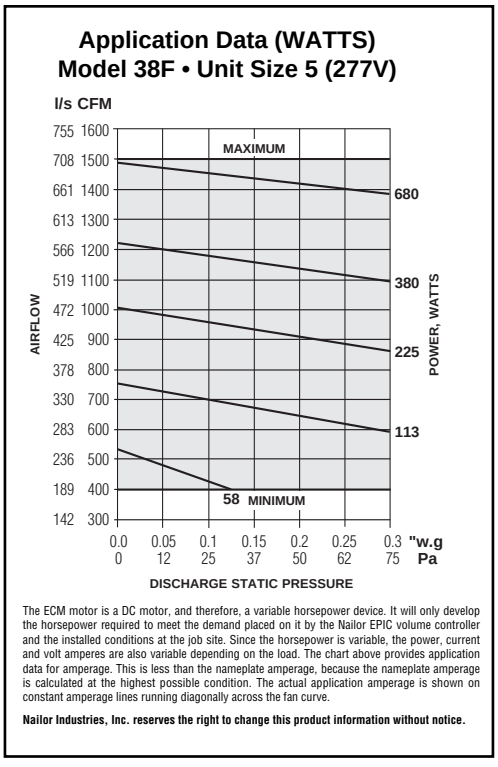


Nailor Industries Inc. — ECM MOTOR FAN CALIBRATION TABLE
CFM vs VDC (Imperial Units)
MODEL SERIES: 38F,FE,FW,FWZ UNIT SIZE 3 277 VAC
UNDERFLOOR FAN POWERED TERMINAL UNIT

CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.
0	0.00	290	2.74	487	5.19	734	7.65
136	0.38	295	2.81	493	5.27	742	7.72
140	0.43	300	2.89	500	5.34	750	7.79
144	0.51	306	2.96	506	5.41	758	7.86
148	0.58	311	3.03	513	5.48	766	7.94
152	0.65	317	3.10	520	5.56	774	8.01
156	0.72	322	3.17	526	5.63	782	8.08
160	0.79	327	3.25	533	5.70	790	8.15
164	0.87	333	3.32	540	5.77	798	8.23
168	0.94	338	3.39	547	5.84	806	8.30
173	1.01	344	3.46	554	5.92	814	8.37
177	1.08	349	3.54	561	5.99	821	8.44
182	1.15	355	3.61	568	6.06	829	8.51
186	1.23	360	3.68	575	6.13	837	8.59
191	1.30	366	3.75	582	6.20	845	8.66
195	1.37	372	3.82	589	6.28	852	8.73
200	1.44	377	3.90	596	6.35	860	8.80
205	1.52	383	3.97	604	6.42	868	8.87
209	1.59	389	4.04	611	6.49	875	8.95
214	1.66	395	4.11	618	6.57	883	9.02
219	1.73	401	4.18	626	6.64	890	9.09
224	1.80	406	4.26	633	6.71	897	9.16
229	1.88	412	4.33	641	6.78	904	9.24
234	1.95	418	4.40	649	6.85	911	9.31
239	2.02	424	4.47	656	6.93	918	9.38
244	2.09	430	4.55	664	7.00	925	9.45
249	2.16	436	4.62	671	7.07	932	9.52
254	2.24	443	4.69	679	7.14	938	9.60
259	2.31	449	4.76	687	7.22	945	9.67
264	2.38	455	4.83	695	7.29	951	9.74
269	2.45	461	4.91	703	7.36	957	9.81
274	2.53	467	4.98	710	7.43	963	9.88
279	2.60	474	5.05	718	7.50	969	9.96
285	2.67	480	5.12	726	7.58	973	10.00

THIS UNIT HAS BEEN FACTORY SET AT ____ CFM.
RE-CALIBRATION IS NOT REQUIRED UNLESS THE ZONE DESIGN AIRFLOW REQUIREMENT HAS CHANGED.
FOR CALIBRATION INSTRUCTIONS, REFER TO BULLETIN RWSON. CAUTION IF CALIBRATING IN SHADED AREA.
AT LOW VOLUMES, VARIATIONS IN FLOW FROM COOLING TO HEATING MAY BE GREATER THAN 5% AT HIGH VOLUMES, NOISE MAY BE EXCESSIVE.

B. Sample Application AMP/CFM Chart



The ECM motor is a DC motor, and therefore, a variable horsepower device. It will only develop the horsepower required to meet the demand placed on it by the Nailor EPIC volume controller and the installed conditions at the job site. Since the horsepower is variable, the power, current and volt amperes are also variable depending on the load. The chart above provides application data for amperage. This is less than the nameplate amperage, because the nameplate amperage is calculated at the highest possible condition. The actual application amperage is shown on constant amperage lines running diagonally across the fan curve.

Nailor Industries, Inc. reserves the right to change this product information without notice.

Replacement Parts

Induced Air Filters

Model	Unit Size	Filter Size	Part No. 1" Throwaway	Part No. 1" MERV 7
38S	1	7 x 10	VH1-1077	Contact Factory
3	10 x 18	VH1-0203	VH1-1699	
5	14 x 16	VH1-0196	Contact Factory	
38F	1	7 x 19	VH1-1882	VH1-1813
	3, 3S	10 x 18	VH1-0203	VH1-1699
	5	15 x 20	Contact Factory	VH1-1705
	6	10 x 42	VH1-1902	VH1-1701
	33 (2)	10 x 19	VH1-1894	VH1-1814

Disconnect Switches

	PartNo.
Toggle, 1P, 25A, 600V	VH1-212
Toggle, 3P, 30A, 600V	VH1-211
Toggle, 3P, 60A, 600V	VH1-213

Transformers

208 / 240 / 24V, 50VA	VH1-685
277 / 24V, 50VA	VH1-674
277 / 24V, 40VA	VH1-675
480 / 24V, 50VA	VH1-686
120 / 208 / 240 / 480V, 75VA	VH1-689

Diamond Flow Sensor

Inlet Size		Part No.
4"	3/16" O.D. tube	V1104
5"	3/16" O.D. tube	V1105
6"	3/16" O.D. tube	V1106
8"	3/16" O.D. tube	V1108
10"	3/16" O.D. tube	V1110
12"	3/16" O.D. tube	V1112
14"	3/16" O.D. tube	V1114

Fan Relays

	Part No.
1 Pole, 24V	H1-666

Airflow Switch

	Part No.
AFS	H1-235
AFS Probe, 4"	H1-242
AFS Probe, 8"	H1-245

Model with ECM Motors	Unit Size	HP	Part No. 120V	Part No. 240V	Part No. 277V	Part No. Blower Assembly
38S	1	1/3	VH1-0046B	VH1-0046B	VH1-0045B	VH1-907B, VH1-907A2 (RH) VH1-907, VH1-907A (LH)
	3	1/3	VH1-0046B	VH1-0046B	VH1-0045B	VH1-906
	5	3/4	VH1-0045A	VH1-0045A	VH1-0045	VH1-905A
38F	1	1/3	VH1-0046B	VH1-0046B	VH1-0045B	VH1-907B, VH1-907A2 (RH) VH1-907, VH1-907A (LH)
	3, 3S	1/3	VH1-0046B	VH1-0046B	VH1-0045B	VH1-906
	3H	1/2	VH1-0046A	VH1-0046A	VH1-0046	VH1-906
	5	3/4	VH1-0045A	VH1-0045A	VH1-0045	VH1-905A
	6	2@1/3	VH1-0046B (2)	VH1-0046B (2)	VH1-0045B (2)	VH1-906
	6H	2@1/2	VH1-0046A (2)	VH1-0046A (2)	VH1-0046 (2)	VH1-906
	33	2@1/3	VH1-0046B (2)	VH1-0046B (2)	VH1-0045B (2)	VH1-906

Fan Motor Fuses

	Part No.
250V, 15A	VH1-320
250V, 20A	VH1-321
600V, 15A	VH1-329
600V, 3A	VH1-0011
600V, 5A	VH1-965
600V, 8A	VH1-967

Pneumatic FR Tubing (1/4" O.D.)

	Part No.
Black	VB3-066
Blue stripe	VB3-068
Red stripe	VB3-067

Tee For Sensor Tap

	Part No.
Barbed, 1/8"	VB3-058

Cap For Sensor Tap

	Part No.
Rubber, for 1/8" Tee	VB3-059

Primary Damper Valve

Model Series 38S Inlet size	Part No.
4", 5", 6"	VH1-1119
8"	VH1-1120
10"	VH1-1121
12"	VH1-1109
14"	VH1-1110