
INSTALLATION & OPERATION MANUAL

FAN POWERED CHILLED WATER (DOAS) TERMINAL UNIT MODEL: 33SZ



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General

Receiving Inspection Checklist

- Visually inspect unit for shipping damage before unwrapping any packaging material. Report any damage immediately to the delivering carrier.
- After unpacking the unit, check it again for shipping damage. If any shipping damage is found, report it immediately to the delivering carrier.
- Notify your local Nailor representative of damage and arrange for repair or replacement.
- Check that the unit is labeled as intended and deliver to appropriate site location.
- Store units in a clean, dry location.



Caution: Do not use the inlet collar, damper shaft, airflow sensor, electrical conduit, water coil extremities, drip pan, or tubing as a handle to lift or move assembly. Damage to the unit, unit accessories or controls may result.

Safety Precautions

- All person(s) involved in installation process shall be qualified according to all relevant local codes and standards.
- Beware of other building utilities and electrical wiring during installation process.
- The unit installed shall be used only as intended. Any unintended use shall therein result in immediate forfeiture of manufacturer assumed warranty, responsibility and liability of product and associated components. Contact your local Nailor representative for questions.



- Warning:** Make sure all electrical power to the unit has been disconnected and any capacitors fully discharged before servicing. Failure to do so could result in injury or death.

- During brazing process, make sure to protect any surrounding flammable materials, using barriers where applicable and always have a fire extinguisher accessible.



Caution: Any improper product handling, installation, servicing, or operation resulting in personal injury and property damage shall void any manufacturer assumed legal responsibility.

Installation

Supporting the Assembly

Suspend the unit from the building structure in the horizontal plane and ensure the unit is level to guarantee proper performance. Be careful not to obstruct all the access panels with support channels or straps. When requested, unit is supplied with field mounted hanger brackets for use with hanger rod up to 3/8" (9.5) dia. Hanger brackets or straps should be screwed to the top corner posts, unit casing sides or alternatively onto the inlet and outlet ends of the unit if the top corner posts are not accessible. Note that low profile unit do not contain corner posts.



Caution: Nailor 33SZ units are too heavy to suspend with the ductwork and must be independently supported.

Nailor recommends attaching straps or screws into the 16 gauge frame (corner posts) of the size 40 and 50 units when possible and into the inlet, outlet or side panels of the size 30 unit.

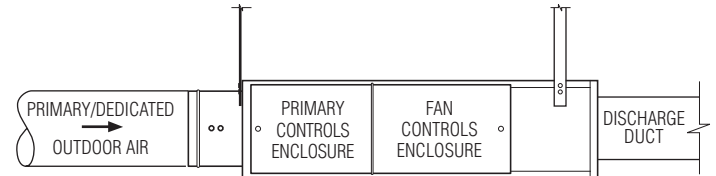


Figure 1: Fan Powered Chilled Water Terminal Unit Support Using Hanger Steps (Model 33SZ unit size 30 illustrated).

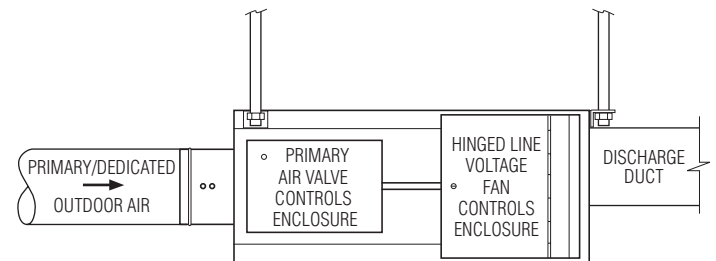


Figure 1: Fan Powered Chilled Water Terminal Unit Support Using Hanger Steps Brackets and Rods (Model 33SZ unit size 40/50 illustrated).

Duct Connections

All ducts should be installed in accordance with SMACNA guidelines. 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. 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. Rectangular discharge opening is 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. If unit is to be installed in **hard ceiling/wall application**, refer to Nailor 33SZ submittals for specific dimensions before installing to assure there is access to the unit and components after installation is complete. Nailor 33SZ units have access panels on the top and bottom. For low voltage control enclosure access, a minimum of 18" (457) is recommended. 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 access panels that are equipped with hinges. For clearances for full opening of hinged access doors, refer to project specifications, submittal sheets and NEC.



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

Field Wiring

All field wiring must comply with NEC and local codes. Disconnect switches are optional. Wiring diagrams can be found on labels affixed to the exterior/interior of the control box enclosure. 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 120 VAC on units with 480 or 208 VAC 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. See appendix A for calculation details.

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 minimum circuit ampacity (MCA). See appendix A for calculation details.
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.

Water Pipe Connections

Exercise extreme caution during "sweating" or brazing process of coil piping to avoid applying excessive heat to components associated with valve package. This could cause irreversible damage, requiring immediate replacement of parts. Make sure valves are in full open position during brazing process. Heat can be dissipated more effectively by wrapping a wet towel around the valve body during the brazing process.

Make sure final piping configuration does not interfere with sensible cooling coil and integral drip pan. Remove any residual air pockets from inside the coil through available air vents. Once the coil has been pressure tested, insulate piping and components as required to prevent potential condensation issues.

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:

- a. If filters are required, make sure they are installed as intended.
- b. Make sure duct system is clear of all debris and foreign objects.
- c. Ensure unit enclosure, blower housing and blower wheel are free of any debris and foreign objects.

Starting the fan motor:

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 33SZ units are equipped with ECM motors. Set the primary air dampers as described in (3). Set the fan as described on page one of the IOM for EPIC Fan Volume Controller with (Genteq EON) ECM Motor, found in the IOM section at www.nailor.com. Proportion the 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.
3. 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). 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.

Maintenance Procedures



Warning: Electrical Hazard!

Before Servicing, disconnect all sources of electrical power, including the complete discharge of any electric current stored in capacitors included in the wiring structure. Practice good lockout/tagout procedures to prevent energizing of the unit during servicing. Failure to comply with previous statements could yield personal injury or even result in death.

Fan and Motor

Nailor 33SZ 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.

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.
- b. Readjust fan speed control on control card.
- c. Discharge static pressure may be incorrect. Check balancing dampers.
- d. Confirm signal from the motor card to the motor by measuring the plug at the motor.

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

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 33SZ 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.

Label Example



FAN COIL (UNITE TERMINALE @
TERMINAL UNIT VENTILATEUR INTEGRÉ)

DATE (DATE) : **5-Jun-2015** **SERIAL NO. (NO. DE SÉRIE)** : **481059-2.01**
MODEL (MODÈLE) : **D33SZE** **TAG NO. (NO. D'ÉTIQUETTE)** :
UNIT SIZE - INLET SIZE : **40-06** **VOLTAGE (VOLTAGE)** : **480**
(DIAMÈTRE D'ENTRÉE) **PHASE (PHASE)** : **3**
CONTROL VOLTAGE : **24** **STAGES (ÉTAPES)** : **1**
(VOLTAGE DE CONTRÔLE) **HZ. (HZ)** : **50/60**
CONTROL SEQUENCE : **NB** **WATTS** : **560**
(SEQUENCE DE CONTRÔLE) **MOTOR VOLTAGE** : **277**
VOLT AMP (VOLT-AMPÈRE) : (VOLTAGE DU MOTEUR)
HOT WATER COIL ROWS : **MOTOR AMP** : **4.2**
(NOMBRE DE RANGÉES SERPENTIN EAU CHAUDE) (AMPÉRAGE DU MOTEUR)
CHILLED WATER COIL ROW : **2**
(NOMBRE DE RANGÉES SERPENTIN EAU RÉFRIGÉRÉE)

	KW/WATTS			AMPS (AMPÈRES)			AMPACITY (AMPACITÉE)			MAX. OVERCURRENT PROTECTION (RESISTANCE DES FUSIBLE MAX.)		INTERNAL FUSE SIZE (IF SUPPLIED)
	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)	3.0	3.0	3.0	3.6	3.6	3.6	4.5	4.5	4.5	15	15	15
MOTOR (MOTEUR)	560			4.2			5.2					15.0
TOTAL (TOTALE)				7.8			9.8					

EACH ELEMENT RATED @ **1.0** KW @ **277** VAC. AWG. MIN WIRE SIZE (MIN DIAMÈTRE DE FIL) : **14**
(CHAQUE ELEMENT CLASSIFIER A) MIN. HEATING CFM (MIN. PCM) : **210**

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 MÉTALLIQUE QUI CONVIENT AU MOINS 75 °C
L1 EST COLORÉ NOIRE, L2 EST BLEU, L3 EST ROUGE.
LES FILS DE CONTRÔLE SONT IDENTIFIÉS COMME MARQUÉS.
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) : _____
MAX FAN CLG / MIN Bande Morte (CFM) : _____
MAX FAN HTG (CFM) : _____

MAX FAN CLG / MIN DEADBAND (L/S) : _____
MAX FAN CLG / MIN Bande Morte (L/S) : _____
MAX FAN HTG (L/S) : _____

Model Series 33SZ Replacement Parts

Unit Size	Fan Size	Fan Part No.	HP	EON Motor Part No.
30	11 x 4R	H1-2427	1/2	H1-2269U
40	9 x 7R	H1-0900	1/2	H1-2269
50	10 x 10T	H1-0903	3/4	H1-2270

Unit Size	Inlet Size	Primary Damper Valve Part No.	Diamond Flow Sensor	Diamond Flow Sensor Part No.
10, 30, 40, 50	4"	VH1-1119	3/16" O.D. tube	V1104
10, 30, 40, 50	5"	VH1-1119	3/16" O.D. tube	V1105
10, 30, 40, 50	6"	VH1-1119	3/16" O.D. tube	V1106
30, 40, 50	8"	VH1-1107	3/16" O.D. tube	V1108
40, 50	10"		3/16" O.D. tube	V1110
40, 50	12"		3/16" O.D. tube	V1112

Unit Size	Filter Type	Filter Part No.
30	1" Throwaway	H1-2506
	2" Merv 8	H1-2507
	2" Merv 13	H1-2508
40	1" Throwaway	H1-2509
	2" Merv 8	H1-2510
	2" Merv 13	H1-2511
50	1" Throwaway	H1-2512
	2" Merv 8	H1-2513
	2" Merv 13	H1-2514

Airflow Switch	Part No.
AFS	H1-235
AFS Probe, 4"	H1-242
AFS Probe, 8"	H1-245
EON Control Cards	Part No.
EPIC™ Single Motor Card	H1-2272
EPIC™ Single Motor Card w/ Fan Status & Electric Heat Relays	H1-2272A

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

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

Appendix A – MCA and MOP Calculations

Minimum Circuit Ampacity

$$\text{MCA} = 1.25 \times (\text{Load 1} + \text{Load 2} + \text{Load 3} + \text{Load 4})$$

Maximum Overcurrent Protection

$$\text{MOP} = (2.25 \times \text{load 1}) + \text{load 2} + \text{load 3} + \text{load 4}$$

If the calculated MOP does not equal the standard current rating of an overcurrent protective device (typically even multiples of 5), then the marked MOP is the next lower standard rating.

Exceptions:

1. The marked MOP will be the next higher standard rating than the computed value, if the next lower standard rating is less than 125 percent of the current rating of an electric heater load when such heater is involved.
2. If the computed value for MOP is less than the MCA, then the marked MOP is increased to the largest MOP appropriate for the MCA.
3. If the MCA does not correspond to a standard protective device rating, the next higher standard rating of the protective device will be marked if this rating does not exceed 800 A.

For Nailor Fan Powered Terminal Units and Fan Powered Chilled Water Terminal Units, **Load 1** is the largest motor current, **Load 2** is the sum of all other motor currents, and **Load 3** is the heater current. **Load 4** is used for other loads greater than 1.0 ampere and can be considered zero for most standard products.

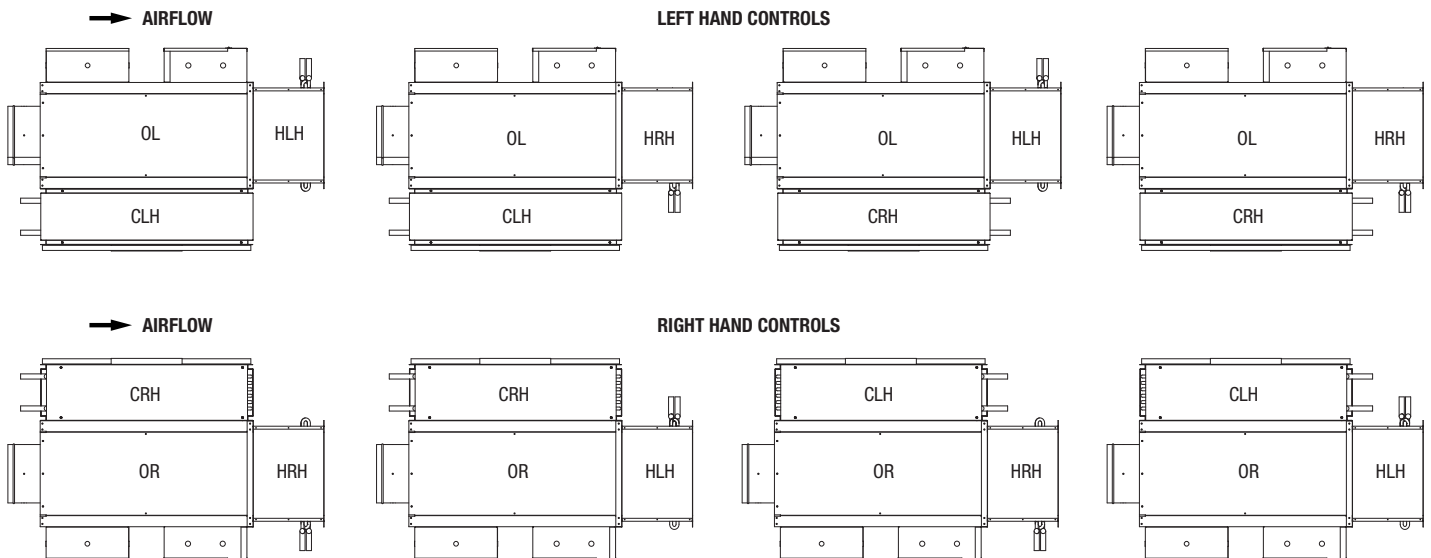
For Nailor Variable Air Volume Units, **Load 1** and **Load 2** are considered zero.

Load 3 is the heater current **Load 4** is used for other loads greater than 1.0 ampere and can be considered zero for most standard products.

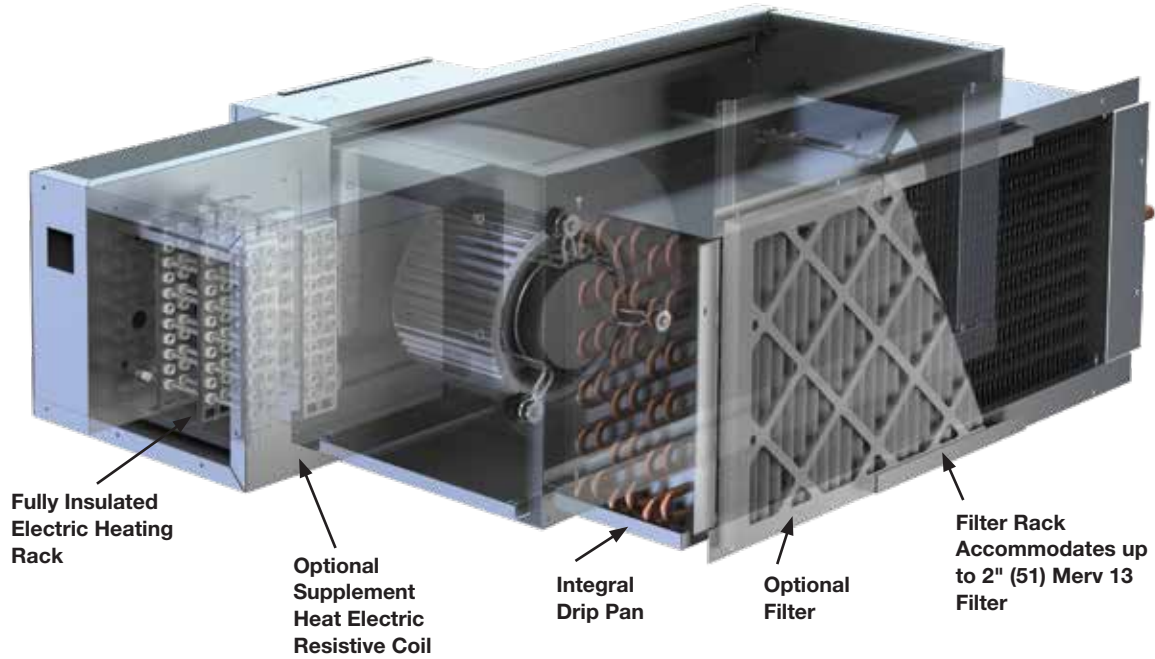
(Motor currents are determined by product application test in accordance with UL 1995 and may not be the same as the motor manufacturer's FLA marking.)

All formulae, definitions, and exceptions are cited from Underwriters Laboratories Inc. Standard for Safety for Heating and Cooling Equipment, UL 1995 Fourth Edition (Sec. 37.14, 37.15) CAN/CSA-C22.2 No. 236 Fourth Edition

Model 33SZ • Orientations



Model 33SZE • Size 40-50



Model 33SZW • Size 40-50

