



TRANE®

Installation, Operation, and Maintenance

UniTrane Fan-Coil & Force Flo Air Conditioners 200 to 1,200 cfm



Models FC & FF
"ZO" and later design sequence

Low vertical models FCKB & FCLB:
"SO" and later design sequence



general information

About This Manual Literature Change History

Use this manual for UniTrane fan-coils and Force Flo cabinet heaters. This is the seventh revision of this manual. It provides specific installation, operation, and maintenance instructions for "ZO" and later design sequences for all models except low vertical, which are "SO" and later design sequences. For previous design sequence information, contact your local Trane representative.

Warnings and Cautions

Warnings and cautions appear at appropriate sections throughout this manual. Read these carefully.

WARNING

Indicates a potentially hazardous situation, which could result in death or serious injury if not avoided.

CAUTION

Indicates a potentially hazardous situation, which may result in minor or moderate injury if not avoided. Also, it may alert against unsafe practices.

CAUTION

Indicates a situation that may result in equipment or property-damage-only accidents.

WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

CAUTION

Use Copper Conductors Only!

Unit terminals are not designed to accept other type conductors. Failure to use copper conductors may result in equipment damage.

Common HVAC Acronyms

For convenience, a number of acronyms and abbreviations are used throughout this manual. These acronyms are alphabetically listed and defined below.

BAS = Building automation systems

cfm = Cubic-feet-per-minute

ewt = entering water temperature

F/A = Fresh air

HVAC = Heating, ventilation and air conditioning

I/O = Inputs/outputs

IOM= Installation, operation, and maintenance manual

LH = Left-hand

O/A = Outside air

R/A = Return air

RH = Right-hand

rpm = Revolutions-per-minute

S/A = Supply air

w.c. = Water column

ZSM = Zone sensor module

contents

Cross reference to related publications/information for UniTrane™ fan-coil & Force Flo™ equipment:

- *Rover™ Installation, Operation and Programming Guide, EMTX-SVX01D-EN*
- *Tracer™ ZN510 Unit Controller, CNT-IOP-1*
- *Tracer™ ZN520 Unit Controller, CNT-SVX04A-EN*
- *UniTrane™ Fan-Coil Catalog, UNT-PRC001-EN*
- *Force Flo™ Cabinet Heater Catalog, CAB-PRC001-EN*

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General

UniTrane fan-coil and Force Flo units are intended for single zone applications. These units have load capabilities of 200 to 1200 cfm. See Figure I-GI-1 for unit components. Fan-coil units are available as two-pipe, with or without electric heat (one hydronic circuit) or four-pipe (two hydronic circuits). Force-Flo units feature two-pipe hydronic, electric heat only, or steam only. Also, these units feature a variety of factory mounted piping packages.

Units with the three-speed fan switch only, are available with the switch mounted on the unit, or shipped separately, to be mounted in the occupied space. The unit mounted three-speed

switch option, can be ordered with a low voltage (24 volts AC) transformer and three fan speed relays. The ship separate three-speed switch option, only comes with a low voltage (24 volt AC) transformer and three fan speed relays.

The Tracer ZN010, ZN510, and ZN520 controllers are included inside the units control box assembly. These controllers utilize analog signals from a unit-mounted control device or from a control device mounted in the occupied space.

The controls interface option, includes a 24 volt AC transformer, and an interface terminal board. Controls provided by an external source, can be tied into the interface terminal board, utilizing 1/4" female spade connectors.

Model Number

Each UniTrane fan-coil and Force-Flo cabinet heater has a multiple character model number unique to that particular unit. To determine a unit's specific options, reference the model number on the unit nameplate on the fan scroll. The unit nameplate also identifies the serial number, sales order number, and installation and operating specifications.

Following is a complete description of the fan-coil model number. Each digit in the model number has a corresponding code that identifies specific unit options.

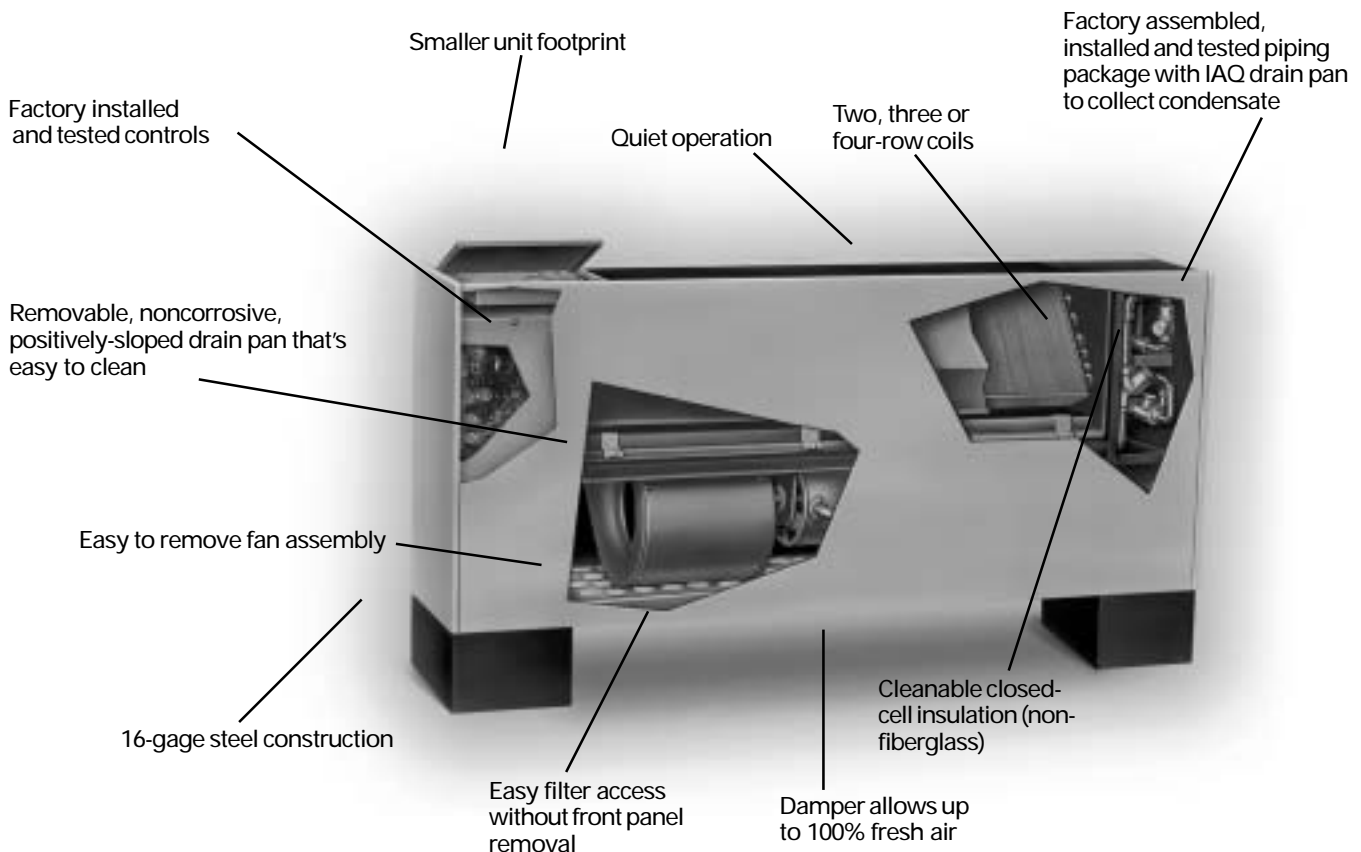


Figure I-GI-1. UniTrane fan-coil unit components. Vertical cabinet model is shown.



general information

Installation

Model Number Description

FC B B 020 1 C P0 A 0 G 1 0 A A 2 M 000 0 0 1 0 0 0 A A 000 000 0 0 0 0 A 0 0

1 5 10 15 20 25 30 35 40 44

Digits 1, 2 — unit type

FC = fan-coil
FF = force flo

Digit 3 — cabinet type

A = vertical concealed
B = vertical cabinet
C = horizontal concealed
D = horizontal cabinet
E = horizontal recessed
F = vertical wall hung
H = vertical recessed
J = vertical cabinet slope top
K = low vertical concealed
L = low vertical cabinet
M = inverted vertical cabinet
N = inverted vertical recessed

Digit 4 — development sequence "B"

Digits 5, 6, 7 — unit size

020 040 080
030 060 100
120

Digit 8 — unit voltage

1 = 115/60/1 4 = 230/60/1
2 = 208/60/1 9 = 220/50/1
3 = 277/60/1

Digit 9 — piping system/placement

A = no piping, RH, w/o aux drn pan
B = no piping, LH, w/o aux drn pan
C = no piping, RH, w/ aux drn pan
D = no piping, LH, w/ aux drn pan
E = no piping, RH, w/o aux drn pan, extended end pocket
F = no piping, LH, w/o aux drn pan, extended end pocket
G = no piping, RH, w/ aux drn pan, extended end pocket
H = no piping, LH, w/ aux drn pan, extended end pocket
J = piping package, RH
K = piping package, LH
L = piping package, RH, extd end pkt
M = piping package, LH, extd end pkt

Digits 10, 11 — design sequence

Digit 12 — inlets

A = front toe space
B = front bar grille
C = front stamped louver
D = bottom stamped louver
E = bottom toe space
F = back duct collar

G = back open return
H = back stamped louver

Digit 13 — fresh air damper

0 = none
A = manual, bottom opening
B = manual, back opening
C = manual, top opening
D = auto, 2-position, bottom opening
E = auto, 2-position, back opening
F = auto, 2-position, top opening
G = auto, economizer, bottom opening
H = auto, economizer, back opening
J = auto, economizer, top opening
K = no damper, bottom opening
L = no damper, back opening
M = no damper, top opening

Digit 14 — outlets

A = front duct collar
B = front bar grille
C = front stamped louver
D = front quad grille
G = top quad grille
H = top bar grille
J = top duct collar

Digit 15 — color

0 = no paint (concealed units only)
1 = deluxe beige 4 = driftwood grey
2 = soft dove 5 = stone grey
3 = cameo white 6 = rose mauve

Digit 16 — tamperproof locks/leveling feet

0 = none
A = locking panel
B = keylock access door
C = locking panel & keylock access door
D = leveling feet
F = locking panel w/ leveling feet
G = keylock panel, keylock access door w/ leveling feet

Digit 17 — motor

A = free discharge
B = high static

Digit 18 — coil

A = 2 row cooling/heating
B = 3 row cooling/heating
C = 4 row cooling/heating
D = 2 row cooling/1 row heating
E = 2 row cooling/2 row heating
F = 3 row cooling/1 row heating
G = 2 row cooling only
H = 3 row cooling only
J = 4 row cooling only
K = 2 row cooling/heating w/ elec heat

L = 3 row cooling/heating w/ elec heat
M = 4 row cooling/heating w/ elec heat
P = 2 row cooling/heating w/1 row heat
Q = 2 row cooling/heating w/2 row heat
R = 3 row cooling/heating w/1 row heat

Digit 19 — coil series

2 = 144 FPF

Digit 20 — coil air vent

A = automatic air vent
M = manual air vent

Digits 21, 22, 23 — electric heat (208V derate)

000 = no electric heat
010 = 1.0 kW (0.75 kW)
015 = 1.5 kW (1.1 kW)
020 = 2.0 kW (1.5 kW)
025 = 2.5 kW (1.9 kW)
030 = 3.0 kW (2.3 kW)
040 = 4.0 kW (3.0 kW)
050 = 5.0 kW (3.8 kW)
060 = 6.0 kW (4.5 kW)
070 = 7.0 kW (5.3 kW)
080 = 8.0 kW (6.0 kW)
100 = 10.0 kW

Digit 24 — reheat coil

0 = none B = hot water coil
A = steam coil

Digit 25 — disconnect switch

0 = none
D = disconnect switch

Digit 26 — filter

0 = none
1 = 1" throwaway filter
2 = 1" throwaway pleated media filter
3 = 1" throwaway, qty 2
4 = 1" throwaway pltd media, qty 2
5 = 1" throwaway, qty 3
6 = 1" throwaway pltd media, qty 3
7 = 1" throwaway, qty 4
8 = 1" throwaway pltd media, qty 4

Digit 27 — main control valve

0 = none
A = 2-way, 2-position, NO (30 psig)
B = 3-way, 2-position, NO (28 psig)
C = 2-way, 2-position, NC (30 psig)
D = 3-way, 2-position, NC (20 psig)
E = 2-way, 2-position, NO (50 psig)
F = 3-way, 2-position, NO (28 psig)
G = 2-way, 2-position, NC (50 psig)
H = 3-way, 2-position, NC (28 psig)



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J = 2-way, modulating, 0.7 Cv (50 psig)*
K = 3-way, modulating, 0.7 Cv (50 psig)*
L = 2-way, modulating, 1.1 Cv (60 psig)*
M = 3-way, modulating, 1.1 Cv (60 psig)*
N = 2-way, modulating, 2.3 Cv (60 psig)*
P = 3-way, modulating, 2.7 Cv (60 psig)*
Q = 2-way, modulating, 3.3 Cv (60 psig)*
R = 3-way, modulating, 3.8 Cv (60 psig)*
X = field-supplied, NO
Y = field-supplied, NC
Z = field-supplied 3-wire modulating

Digit 28 — auxiliary control valve

0 = none
A = 2-way, 2-position, NO (30 psig)
B = 3-way, 2-position, NC (28 psig)
C = 2-way, 2-position, NC (30 psig)
D = 3-way, 2-position, NC (20 psig)
E = 2-way, 2-position, NO (50 psig)
F = 3-way, 2-position, NO (28 psig)
G = 2-way, 2-position, NC (50 psig)
H = 3-way, 2-position, NC (28 psig)
J = 2-way, modulating, 0.6 Cv (60 psig)
K = 3-way, modulating, 0.6 Cv (60 psig)
L = 2-way, modulating, 1.1 Cv (60 psig)
M = 3-way, modulating, 1.1 Cv (60 psig)
N = 2-way, modulating, 2.3 Cv (60 psig)
P = 3-way, modulating, 2.7 Cv (60 psig)
Q = 2-way, modulating, 3.3 Cv (60 psig)
R = 3-way, modulating, 3.8 Cv (60 psig)
X = field-supplied, NO
Y = field-supplied, NC
Z = field-supplied 3-wire modulating

Digit 29 — piping packages

0 = none
A = basic ball valve S & R
B = basic ball valve S/man. crkt set
C = basic ball valve S & R w/auto crkt set
D = deluxe ball valve S & R
E = deluxe ball valve S/man. crkt set R
F = deluxe ball valve S & R w/auto crkt set

Digit 30 — control type

0 = none
A = fan speed switch
E = Tracer ZN010
F = Tracer ZN510

G = Tracer ZN520
H = CSTI

Digit 31 — control option

D = unit mtd fan mode, unit voltage,
K = wall mtd fan mode
V = unit mtd fan sp w/ setpnt
X = unit mtd fan sp w/ wall mtd setpnt
Y = unit mtd fan sp & wall mtd setpnt w/
comm.
Z = unit mtd fan sp, on/cancel, setpnt w/
comm.
1 = wall mtd on/cancel w/ comm.
2 = wall mtd fan speed, setpnt, on/cancel
w/ comm.
3 = unit mtd fan speed switch, low voltage
4 = wall mtd digital zone sensor, fan sp w/
setpnt, on/cancel, comm.
5 = wall mtd digital zone sensor, setpnt,
on/cancel, comm.

Digit 32 — IAQ options

0 = none
1 = dehumidification
4 = dehumidification w/sensor

Digit 33 — cntrl function #1

0 = w/o exhaust fan/damper or alarm

Digit 34 — cntrl function #2

0 = w/o occupant call or IAQ status

Digit 35 — control function #3

0 = none
1 = occ/unocc control
2 = condensate overflow detection
3 = occ/unocc & condensate overflow

Digit 36 — cntrl function #4

0 = none
1 = smoke input
2 = low temperature detection
3 = smoke input & low limit sensor

Digits 37, 38 — future cntrl functions

Digit 39 — projection panel/falseback

0 = none
A = 5/8" standard vertical recessed panel
B = 2" projection panel
C = 2.5" projection panel
D = 3" projection panel
E = 3.5" projection panel
F = 4" projection panel
G = 4.5" projection panel
H = 5" projection panel
J = 5.5" projection panel
K = 6" projection panel
L = 2" falseback
M = 3" falseback
N = 4" falseback
P = 5" falseback
Q = 6" falseback
R = 7" falseback
T = 8" falseback

Digit 40 — main autoflow gpm

A = 0.5	G = 3.0	N = 7.0
B = 0.75	H = 3.5	P = 8.0
C = 1.0	J = 4.0	Q = 9.0
D = 1.5	K = 4.5	R = 10.0
E = 2.0	L = 5.0	T = 11.0
F = 2.5	M = 6.0	U = 12.0

Digit 41 — auxiliary autoflow gpm

A = 0.5	F = 2.5	L = 5.0
B = 0.75	G = 3.0	M = 6.0
C = 1.0	H = 3.5	N = 7.0
D = 1.5	J = 4.0	P = 8.0
E = 2.0	K = 4.5	

Digit 42 — subbase

0 = none
A = 2" subbase
B = 3" subbase
C = 4" subbase
D = 5" subbase
E = 6" subbase
F = 7" subbase

Digit 43 — recessed flange

0 = none
A = recessed flange

Digit 44 — wall boxes

0 = none
A = anodized wall box



general
information

Installation

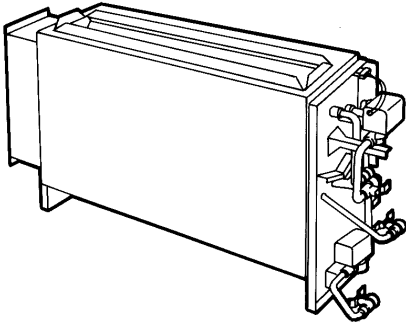
Table I-GI-1. Fan-coil component data

unit size	02	03	04	06	08	10	12
Coil Data							
Face Area — Ft ² (cm ²)	0.8 (743)	0.8 (743)	1.1 (1020)	1.6 (1490)	2.1 (1950)	3.2 (2970)	3.2 (2970)
LxDxH — In. (cm)							
2-Row	15x1.7x8 (38x4x20)	15x1.7x8 (38x4x20)	20x1.7x8 (51x4x20)	29.5x1.7x8 (75x4x20)	38x1.7x8 (97x4x20)	57x1.7x8 (145x4x20)	57x1.7x8 (145x4x20)
3-Row	15x2.6x8 (38x7x20)	15x2.6x8 (38x7x20)	20x2.6x8 (51x7x20)	29.5x2.6x8 (75x7x20)	38x2.6x8 (97x7x20)	57x2.6x8 (145x7x20)	57x2.6x8 (145x7x20)
4-Row	15x3.5x8 (38x9x20)	15x3.5x8 (38x9x20)	20x3.5x8 (51x9x20)	29.5x3.5x8 (75x9x20)	38x3.5x8 (97x9x20)	57x3.5x8 (145x9x20)	57x3.5x8 (145x9x20)
Volume — Gal. (Liters)							
1-Row (Heat)	.06 (.23)	.06 (.23)	.08 (.30)	.11 (.42)	.14 (.53)	.21 (.79)	.21 (.79)
2-Row	.12 (.45)	.12 (.45)	.15 (.57)	.22 (.83)	.28 (1.06)	.42 (1.59)	.42 (1.59)
3-Row	.18 (.68)	.18 (.68)	.23 (.87)	.33 (1.25)	.42 (1.59)	.62 (2.35)	.62 (2.35)
4-Row	.24 (.91)	.24 (.91)	.30 (1.14)	.44 (1.67)	.56 (2.12)	.83 (3.14)	.83 (3.14)
Fins/Ft (cm)							
2-Row	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)
3-Row	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)
4-Row	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)	144 (4.7)
Reheat Coil Data (1-Row)							
Hot Water or Steam							
Face Area — Ft ² (cm ²)	0.6 (557)	0.6 (557)	0.8 (743)	1.2 (1120)	1.6 (1490)	2.4 (2230)	2.4 (2230)
LxDxH — In. (cm)	15x1.5x6 (38x4x15)	15x1.5x6 (38x4x15)	20x1.5x6 (51x4x15)	29.5x1.5x6 (75x4x15)	38x1.5x6 (97x4x15)	57x1.5x6 (145x4x15)	57x1.5x6 (145x4x15)
Volume — Gal. (Liters)	.12 (.45)	.12 (.45)	.15 (.57)	.22 (.83)	.28 (1.06)	.42 (1.59)	.42 (1.59)
Fins/Ft (cm)	48 (1.6)	48 (1.6)	48 (1.6)	48 (1.6)	48 (1.6)	48 (1.6)	48 (1.6)
Fan/Motor Data							
Fan Quantity	1	1	1	2	2	3	3
Size — Dia" x Width" (cm)	6.31x4 (16x10)	6.31x6.5 (16x17)	6.31x7.5 (16x19)	6.31x6.5 (16x17)	6.31x7.5 (16x19)	(1) 6.31x7.5 (16x19)	6.31x7.5 (16x19)
Size — Dia" x Width" (cm)						(2) 6.31x6.5 (16x6.5)	
Motor Quantity	1	1	1	1	1	2	2
Filter Data							
1" (cm) TA and PI. Media							
Quantity	1	1	1	1	1	1	1
Size — In. (cm)	8 ⁷ / ₈ x 19 ¹ / ₈ (23x49)	8 ⁷ / ₈ x 19 ¹ / ₈ (23x49)	8 ⁷ / ₈ x 24 ¹ / ₈ (23x61)	8 ⁷ / ₈ x 33 ⁵ / ₈ (23x85)	8 ⁷ / ₈ x 42 ¹ / ₈ (23x107)	8 ⁷ / ₈ x 61 ¹ / ₈ (23x155)	8 ⁷ / ₈ x 61 ¹ / ₈ (23x155)
1" Fresh Air Filter (only on cabinet styles D, E, and H with bottom return and fresh air opening)							
Quantity	1	1	1	1	1	1	1
Size — In. (cm)	5 ¹ / ₂ x 19 ¹ / ₈ (14 x 49)	5 ¹ / ₂ x 19 ¹ / ₈ (14 x 61)	5 ¹ / ₂ x 24 ¹ / ₈ (14 x 85)	5 ¹ / ₂ x 33 ⁵ / ₈ (14 x 107)	5 ¹ / ₂ x 42 ¹ / ₈ (14 x 156)	5 ¹ / ₂ x 61 ¹ / ₈ (14 x 156)	5 ¹ / ₂ x 61 ¹ / ₈

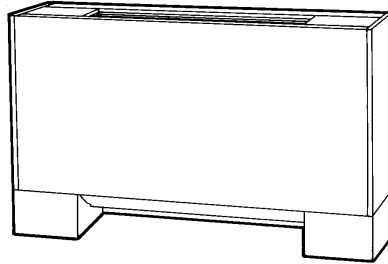
Table I-GI-2. Low vertical fan-coil component data

unit size	03	04	06
Coil Data			
Face Area — Ft ² (cm ²)	1.1 (1020)	1.6 (1490)	2.1 (1950)
LxDxH — In. (cm)			
2-Row	20x1.7x8 (51x4x20)	29.5x1.7x8 (75x4x20)	38x1.7x8 (97x4x20)
3-Row	20x2.6x8 (51x7x20)	29.5x2.6x8 (75x7x20)	38x2.6x8 (97x7x20)
Volume — Gal. (Liters)			
1-Row (Heat)	.08 (.30)	.11 (.42)	.14 (.53)
2-Row	.15 (.57)	.22 (.83)	.28 (1.06)
3-Row	.23 (.87)	.33 (1.25)	.42 (1.59)
Fins/Ft			
2-Row	144 (4.7)	144 (4.7)	144 (4.7)
3-Row	144 (4.7)	144 (4.7)	144 (4.7)
Fan/Motor Data			
Fan Quantity	1	1	1
Size — Dia" x Width" (cm)	5x23 (13x59)	5x32 (13x83)	5x41 (13x105)
Motor Quantity	1	1	1
Filter Data			
1" (2.5 cm) TA			
Quantity	1	1	1
Size — In. (cm)	8 ⁷ / ₈ x24 ¹ / ₈ (23x61)	8 ⁷ / ₈ x33 ⁵ / ₈ (23x85)	8 ⁷ / ₈ x 42 ¹ / ₈ (23x107)

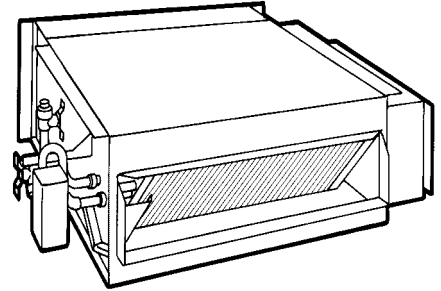
Available Models



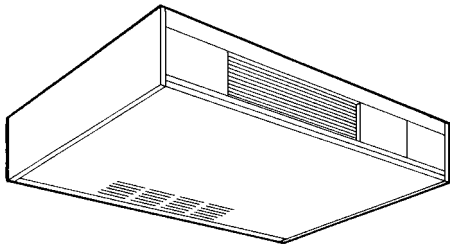
model A vertical concealed



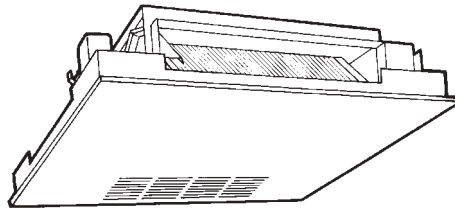
model B vertical cabinet



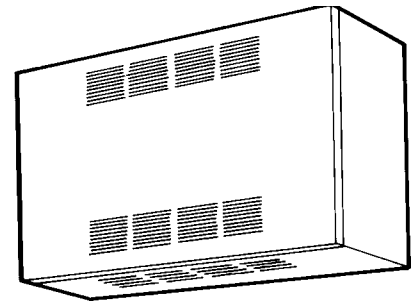
model C horizontal concealed



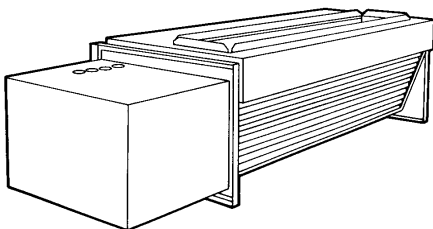
model D horizontal cabinet



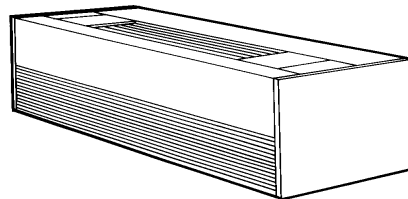
model E horizontal recessed



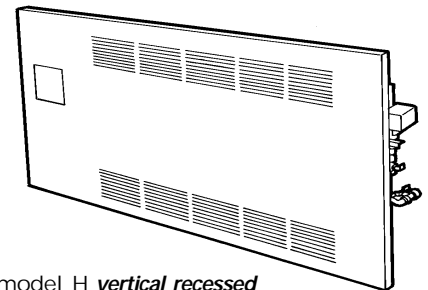
model F wall hung cabinet



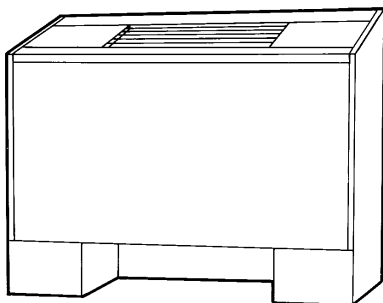
model L low vertical concealed



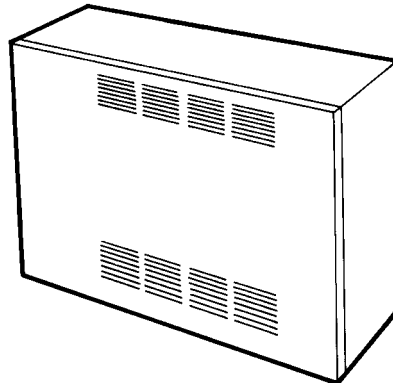
model K low vertical cabinet



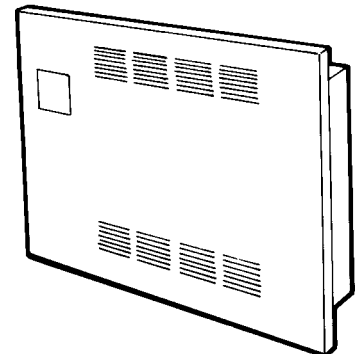
model H vertical recessed



model J slope-top cabinet



*model M inverted vertical cabinet
(Force Flo only)*

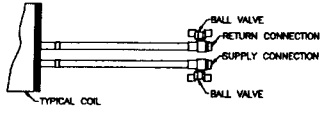
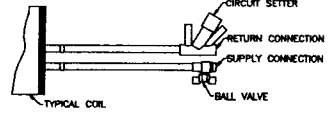
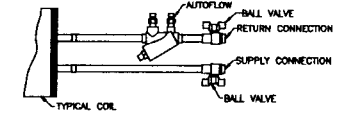
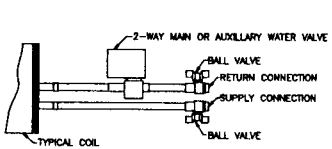
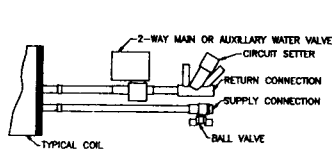
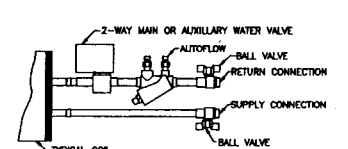
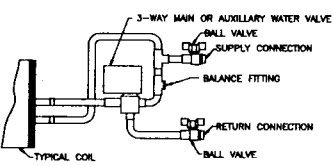
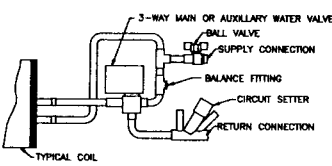
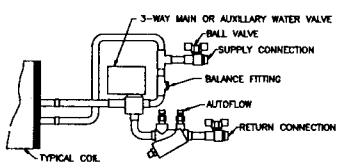
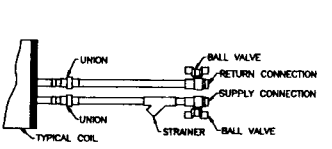
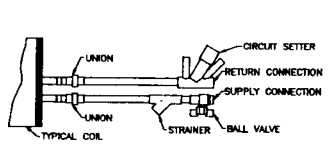
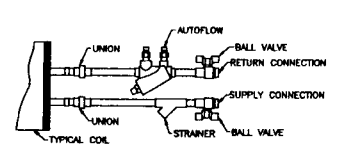
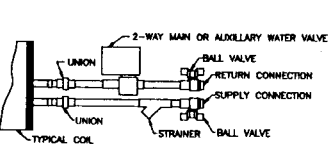
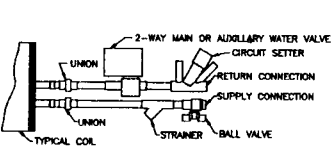
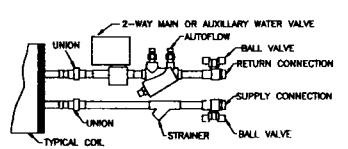
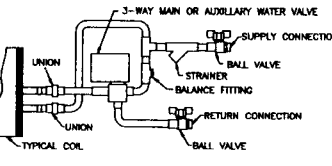
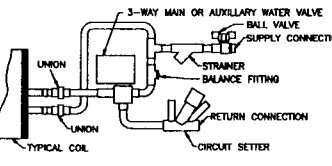
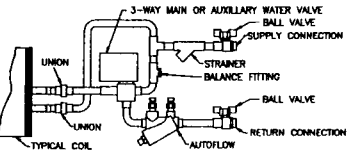


*model N inverted vertical recessed
(Force Flo only)*

Installation

general information

Factory-Installed Piping Packages

Digits 27,28 Main/Aux. Control Valve BASIC	Digit 29		
	Basic (A)	Circuit Setter (B)	
None 0			
2-Way A, C, E, G, J, L, N, Q			
3-Way B, D, F, H, K, M, P, R			
DELUXE	(D)	(E)	(F)
None 0			
2-Way A, C, E, G, J, L, N, Q			
3-Way B, D, F, H, K, M, P, R			

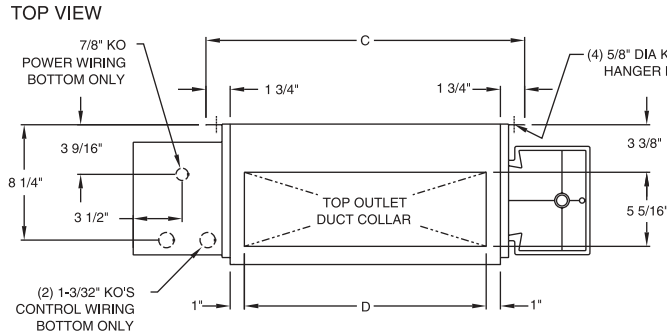
Note: This figure shows piping package components and basic arrangement. It is not an accurate pictorial of what factory-installed piping packages look like.

Installation

dimensions & weights

Vertical Concealed, Model A

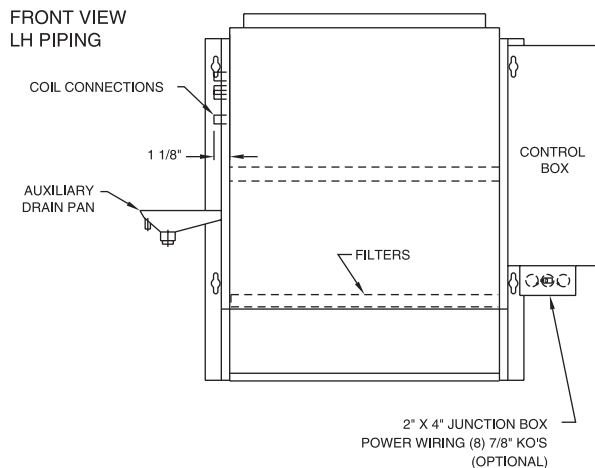
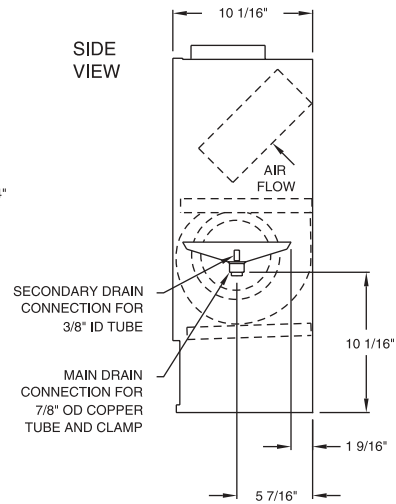
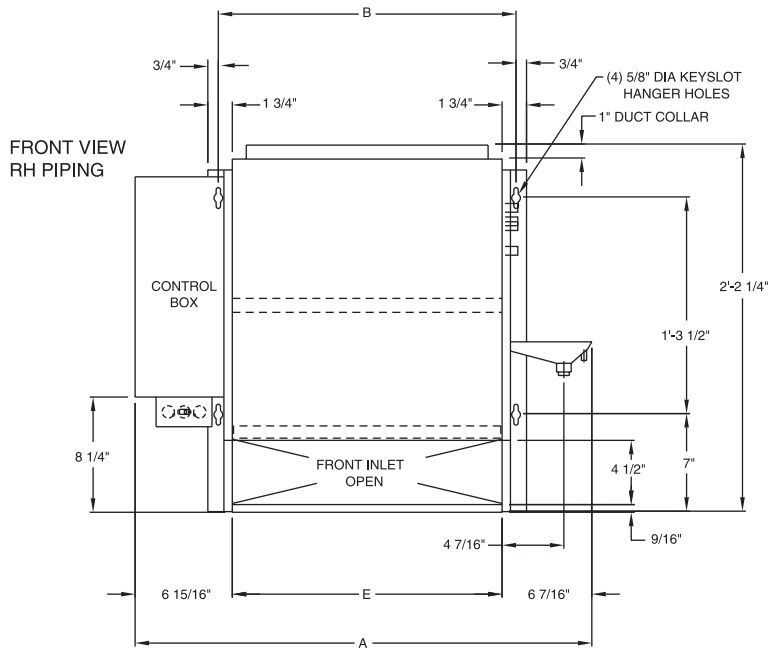
Vertical Concealed Unit Dimensions & weights, in-lbs.



Unit Size	02-03	04	06	08	10-12
A	2'-8 11/16"	3'-1 11/16"	3'-11 3/16"	4'-7 11/16"	6'-2 11/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	1'-10 13/16"	2'-3 13/16"	3'-1 5/16"	3'-9 13/16"	5'-4 13/16"
D	1'-5 5/16"	1'-10 5/16"	2'-7 13/16"	3'-4 5/16"	4'-11 5/16"
E	1'-7 5/16"	2'-0 5/16"	2'-9 13/16"	3'-6 5/16"	5'-1 5/16"
operating weight	81	109	139	147	200
shipping weight	68	96	123	131	182

Notes:

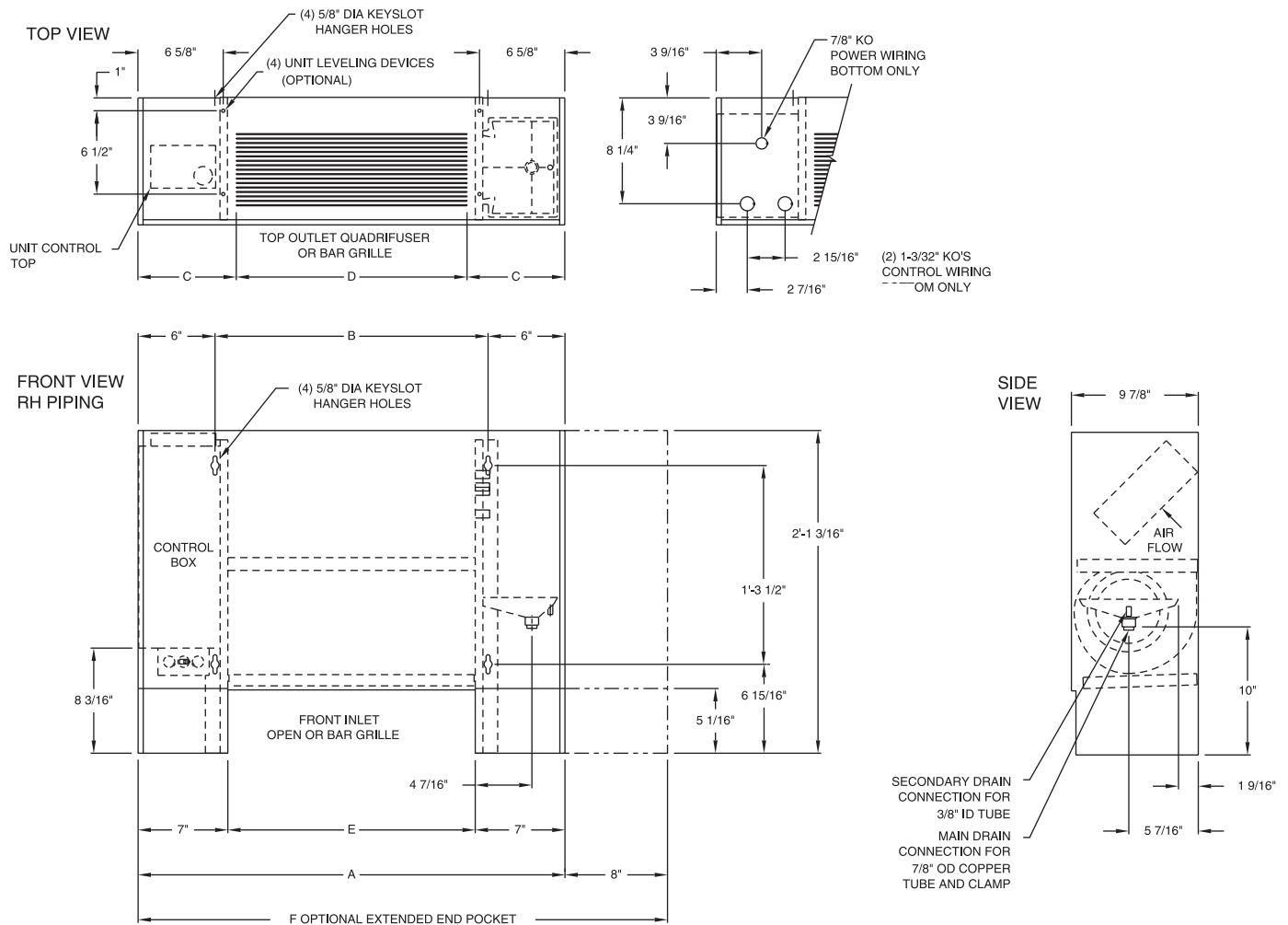
1. Coil connections are always on the drain pan side and opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See fresh air opening dimensions on pages 23-24.



Installation

dimensions & weights

Vertical Cabinet, Model B



Vertical Cabinet Unit Dimensions, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-9 5/16"	3'-2 5/16"	3'-11 3/16"	4'-8 5/16"	6'-3 5/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 3/16"	3'-8 5/16"	5'-3 5/16"
C	7 5/8"	7 1/8"	8 7/8"	7 1/8"	7 5/8"
D	1'-6"	2'-0"	2'-6"	3'-6"	5'-0"
E	1'-7 5/16"	2'-0 5/16"	2'-9 13/16"	3'-6 5/16"	5'-1 5/16"
F	3'-5 5/16"	3'-10 5/16"	4'-7 3/16"	5'-4 5/16"	6'-11 5/16"
operating weight	97	125	155	164	218
shipping weight	84	112	139	148	200

Notes:

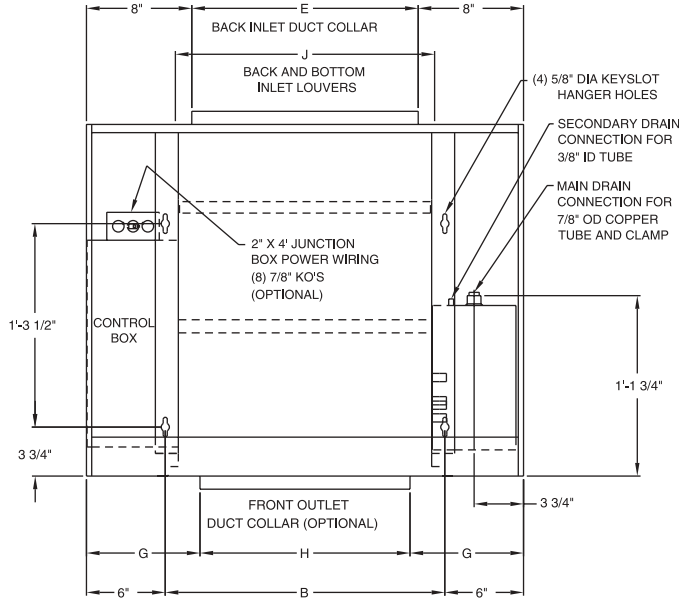
1. Coil connections are always on the drain pan side and opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.

Installation

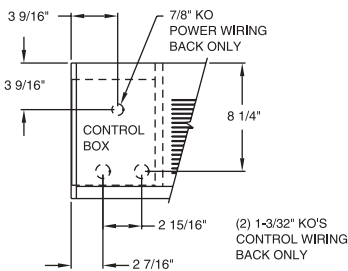
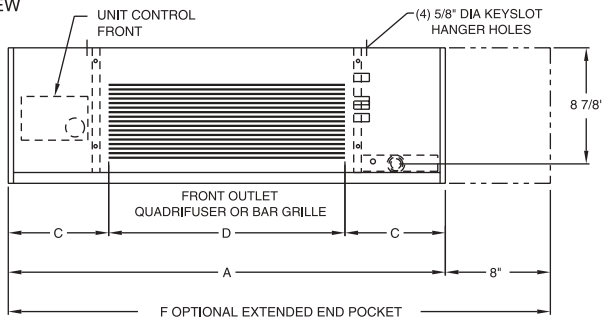
dimensions & weights

Horizontal Cabinet, Model D

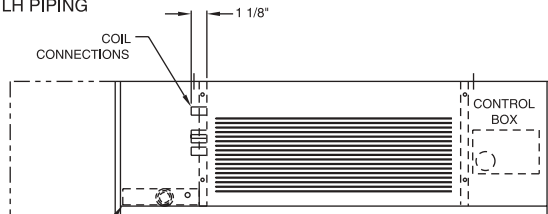
TOP VIEW



FRONT VIEW
RH PIPING



FRONT VIEW
LH PIPING



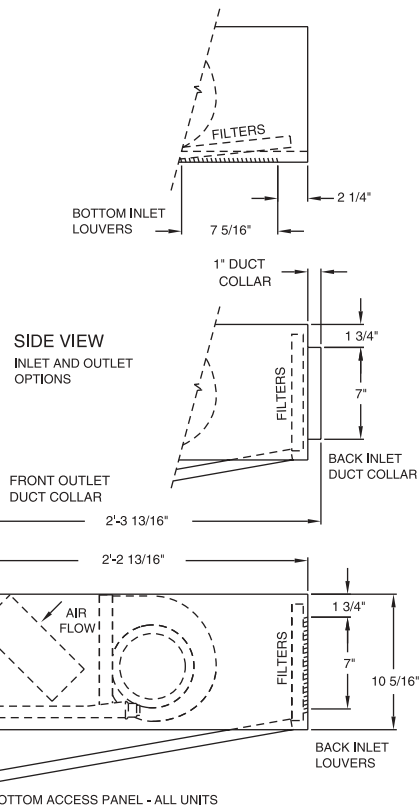
UNIT-SVX07A-EN

Horizontal Cabinet Unit Dimensions, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-9 5/16"	3'-2 5/16"	3'-11 3/16"	4'-8 5/16"	6'-3 5/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	7 5/8"	7 1/8"	8 1/8"	7 1/8"	7 5/8"
D	1'-6"	2'-0"	2'-6"	3'-6"	5'-0"
E	1'-5 1/4"	1'-10 1/4"	2'-7 3/4"	3'-4 1/4"	4'-11 1/4"
F	3'-5 5/16"	3'-10 5/16"	4'-7 3/16"	5'-4 5/16"	6'-11 5/16"
G	8 5/8"	8 1/8"	9 1/8"	8 1/8"	8 5/8"
H	1'-4"	1'-10"	2'-4"	3'-4"	4'-10"
J	1'-7 3/4"	1'-11 3/4"	2'-7 3/4"	3'-3 3/4"	4'-11 3/4"
operating weight	97	125	155	164	218
shipping weight	84	112	139	148	200

Notes:

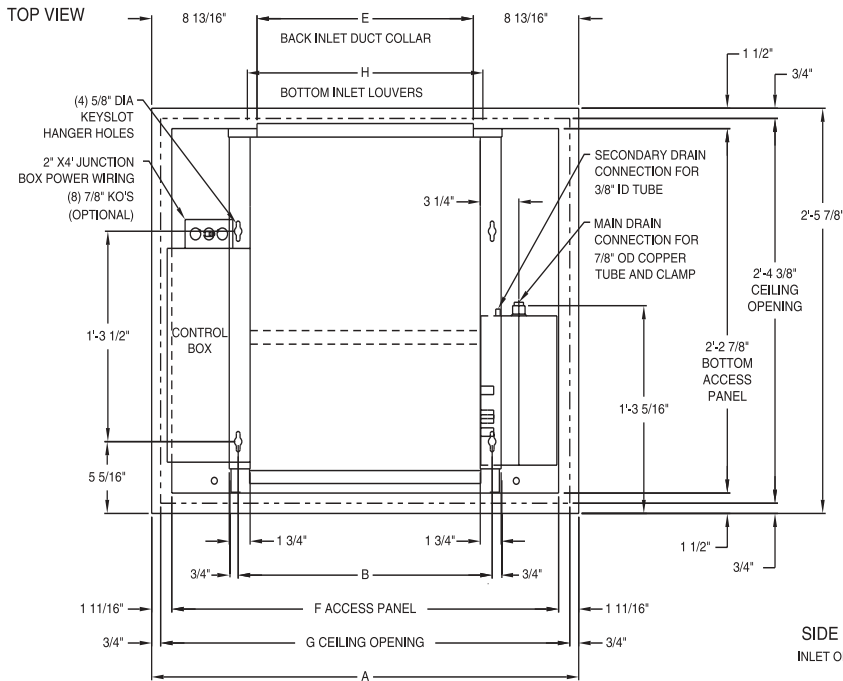
1. Coil connections are always on the drain pan side and opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.



Installation

dimensions & weights

Horizontal Recessed, Model E

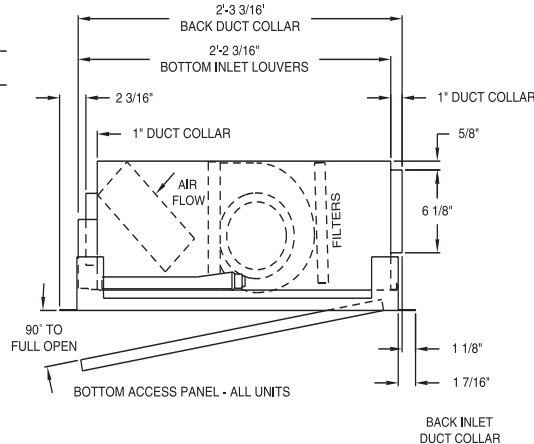
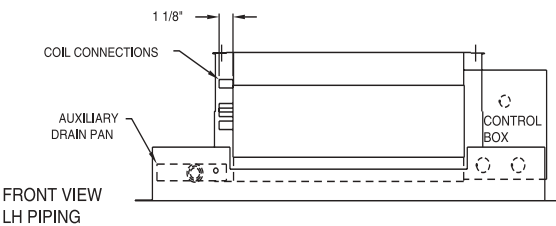
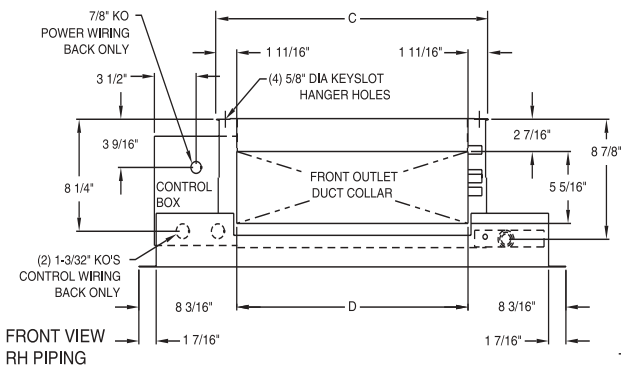
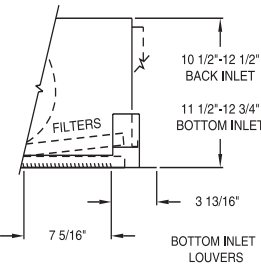


Horizontal Recessed Unit Dimensions, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-11 13/16"	3'-4 13/16"	4'-2 5/16"	4'-10 13/16"	6'-5 13/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	1'-10 13/16"	2'-3 13/16"	3'-1 5/16"	3'-9 13/16"	5'-4 13/16"
D	1'-7 3/8"	2'-0 3/8"	2'-9 7/8"	3'-6 3/8"	5'-1 3/8"
E	1'-6 1/8"	1'-11 1/8"	2'-8 5/8"	3'-5 1/8"	5'-0 1/8"
F	2'-8 7/16"	3'-1 7/16"	3'-10 15/16"	4'-7 7/16"	6'-2 7/16"
G	2'-10 5/16"	3'-3 5/16"	4'-0 13/16"	4'-9 5/16"	6'-4 5/16"
H	1'-7 3/4"	1'-11 3/4"	2'-7 3/4"	3'-3 3/4"	4'-11 3/4"
operating weight	78	88	128	139	253
shipping weight	68	78	118	129	243

- Notes:
1. Coil connections are always on the drain pan side and opposite the control box.
 2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
 3. All duct collar dimensions are to the outside of the collar.
 4. See pages 23-24 for fresh air opening dimensions.

SIDE VIEW INLET OPTIONS

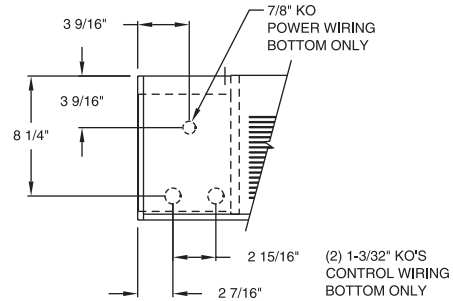
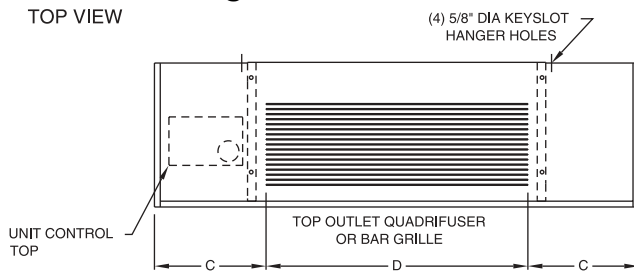


Installation

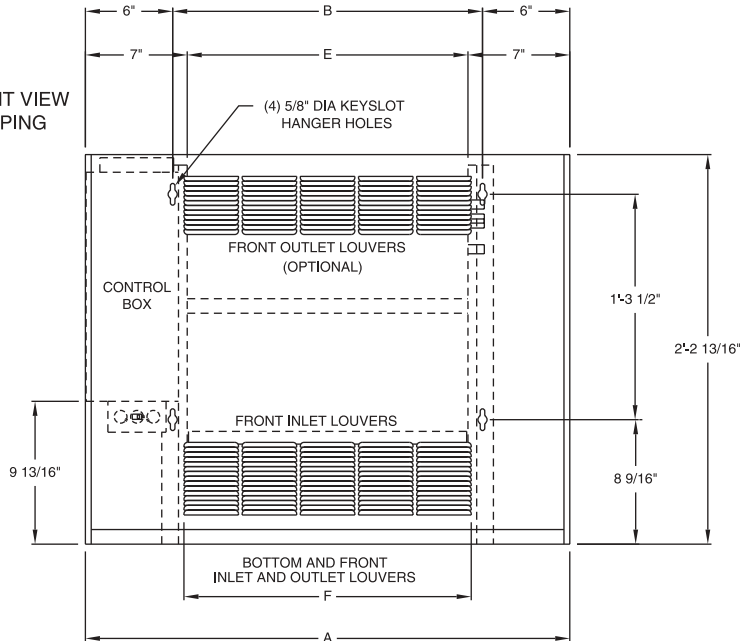
dimensions & weights

Vertical Wall Hung Cabinet, Model F

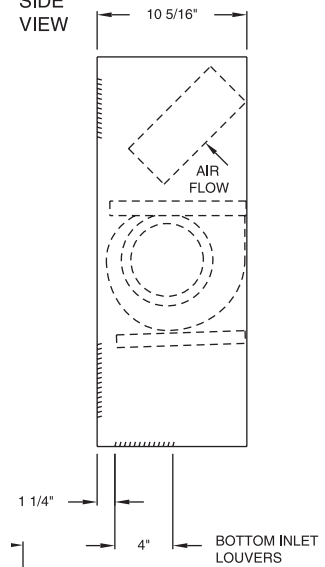
TOP VIEW



FRONT VIEW
RH PIPING

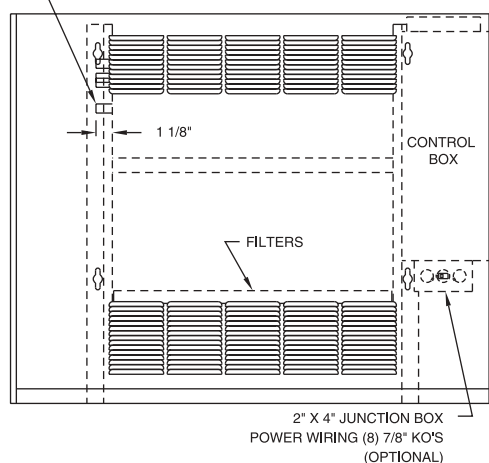


SIDE VIEW



FRONT VIEW
LH PIPING

COIL CONNECTIONS



Vertical wall hung cabinet unit dimensions & weights, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-9 5/16"	3'-2 5/16"	3'-11 13/16"	4'-8 5/16"	6'-3 5/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	7 5/8"	7 1/8"	8 7/8"	7 1/8"	7 5/8"
D	1'-6"	2'-0"	2'-6"	3'-6"	5'-0"
E	1'-7 5/16"	2'-0 5/16"	2'-9 13/16"	3'-6 5/16"	5'-1 5/16"
F	1'-7 3/4"	1'-11 3/4"	2'-7 3/4"	3'-3 3/4"	4'-11 3/4"
operating weight	97	125	155	164	218
shipping weight	84	112	139	148	200

Notes:

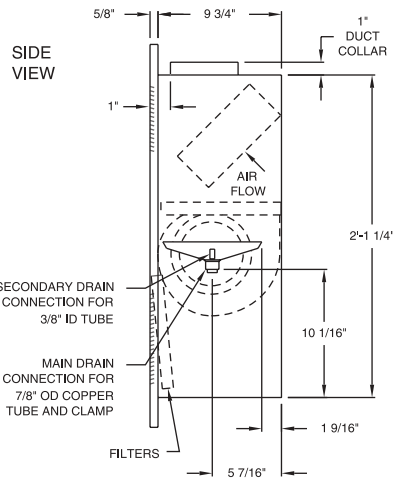
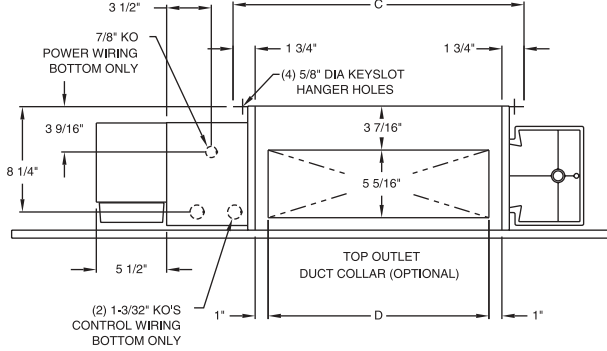
1. Coil connections are always on the side opposite the control box.
2. Coil connections are 1/2" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.

Installation

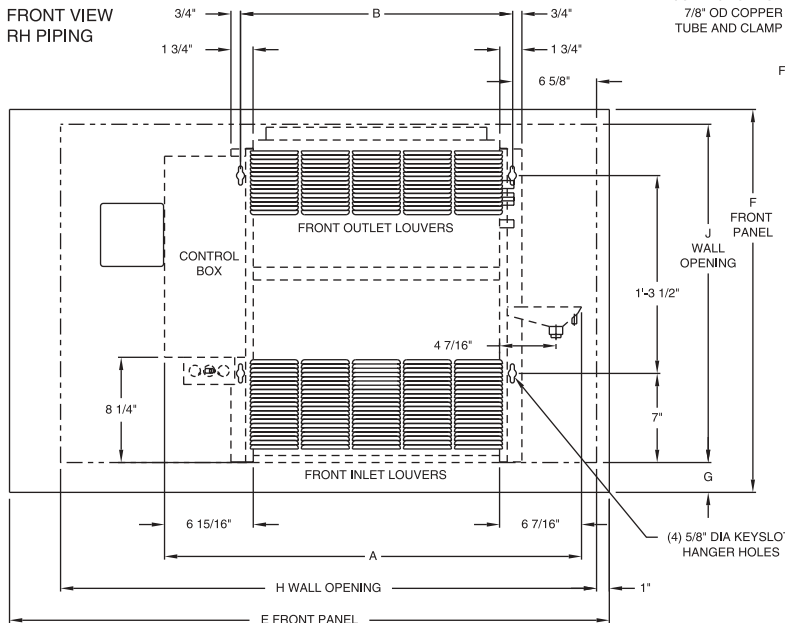
dimensions & weights

Vertical Recessed, Model H

TOP VIEW



FRONT VIEW
RH PIPING



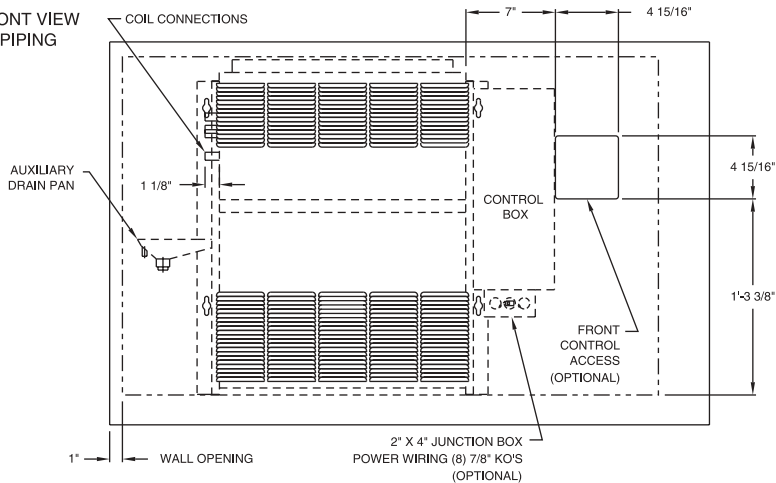
Vertical Recessed Unit Dimensions, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-8 11/16"	3'-1 11/16"	3'-11 3/16"	4'-7 11/16"	6'-2 11/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	1'-10 13/16"	2'-3 13/16"	3'-1 5/16"	3'-9 13/16"	5'-4 13/16"
D	1'-5 5/16"	1'-10 5/16"	2'-7 13/16"	3'-4 5/16"	4'-11 5/16"
E	3'-11"	4'-3"	5'-3"	5'-5 1/2"	7'-5 1/2"
F	2'-6"	2'-6"	2'-6"	2'-9 1/2"	2'-9 1/2"
G	2 3/8"	2 3/8"	2 3/8"	4 1/8"	4 1/8"
H	3'-6"	4'-0"	4'-9"	5'-3"	7'-3"
J	2'-2 1/2"	2'-2 1/2"	2'-2 1/2"	2'-3 1/2"	2'-3 1/2"
operating weight	78	88	128	139	253
shipping weight	68	78	118	129	243

Notes:

1. Coil connections are always on the drain pan side and opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.
5. Dimension 'G' refers to the required minimum distance between the finished floor, and the bottom of the unit.

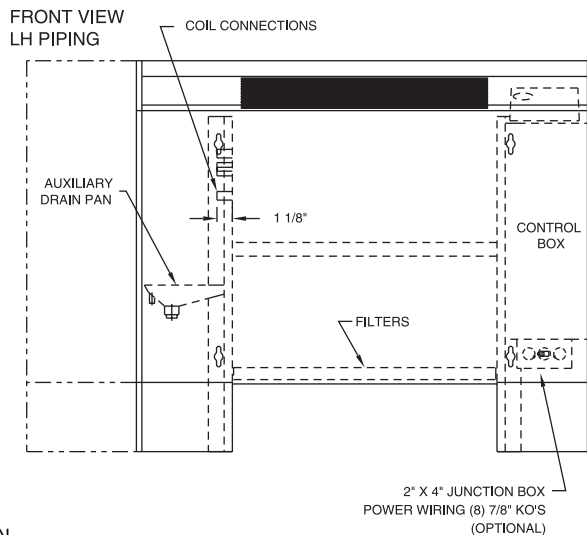
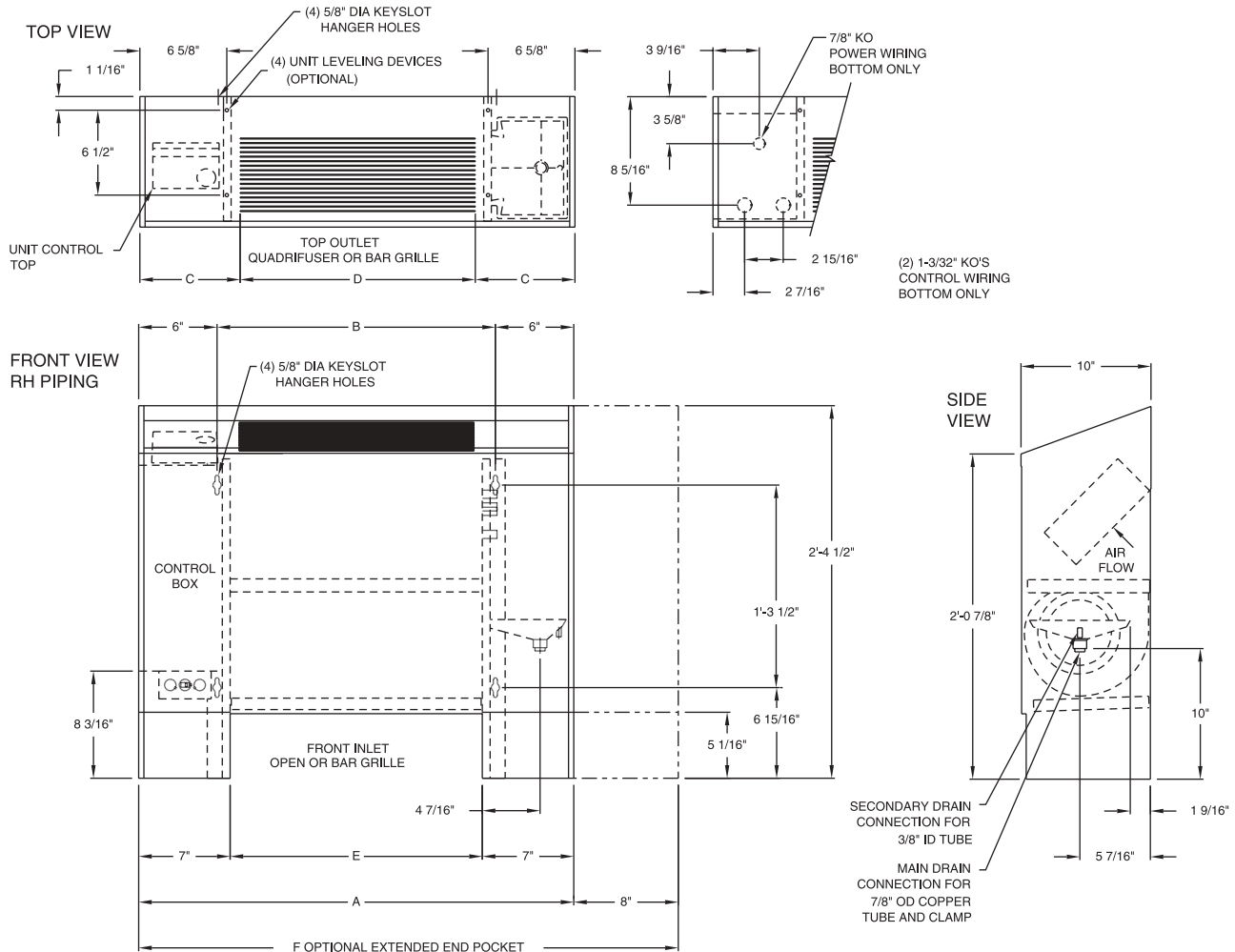
FRONT VIEW
LH PIPING



Installation

dimensions & weights

Vertical Slope Top, Model J



Vertical Slope Top Unit Dimensions, in-lbs.

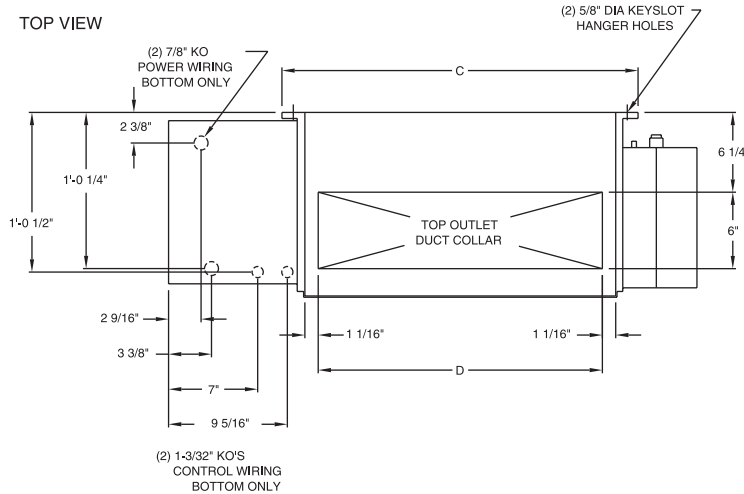
unit size	02-03	04	06	08	10-12
A	2'-9 5/16"	3'-2 5/16"	3'-11 13/16"	4'-8 5/16"	6'-3 5/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	7 5/8"	7 1/8"	8 7/8"	7 1/8"	7 5/8"
D	1'-6"	2'-0"	2'-6"	3'-6"	5'-0"
E	1'-7 5/16"	2'-0 5/16"	2'-9 13/16"	3'-6 5/16"	5'-1 5/16"
F	3'-5 5/16"	3'-10 5/16"	4'-7 13/16"	5'-4 5/16"	6'-11 5/16"
operating weight	97	125	155	164	218
shipping weight	84	112	139	148	200

- Notes:
1. Coil connections are always on the drain pan side and opposite the control box.
 2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
 3. All duct collar dimensions are to the outside of the collar.
 4. See pages 23-24 for fresh air opening dimensions.

Installation

dimensions & weights

Low Vertical Concealed, Model K

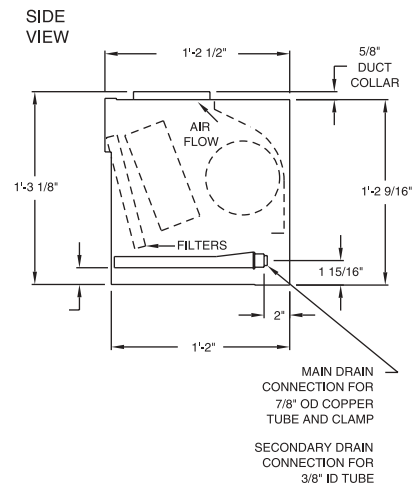
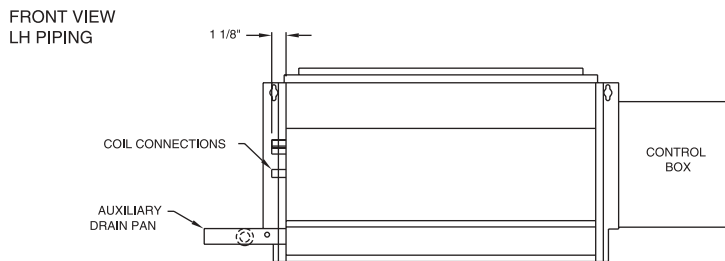
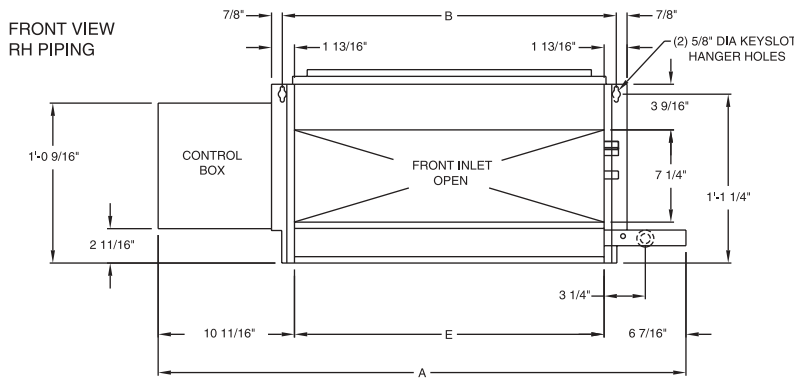


Low Vertical Concealed Unit Dimensions, in-lbs.

unit size	03	04	06
A	3'-5 7/16"	4'-2 15/16"	4'-11 7/16"
B	2'-2 1/4"	2'-11 3/4"	3'-8 1/4"
C	2'-3 15/16"	3'-0 13/16"	3'-9 15/16"
D	1'-10 5/16"	2'-7 13/16"	3'-4 3/16"
E	2'-0 1/4"	2'-9 3/4"	3'-6 1/4"
operating weight	109	139	147
shipping weight	96	123	131

Notes:

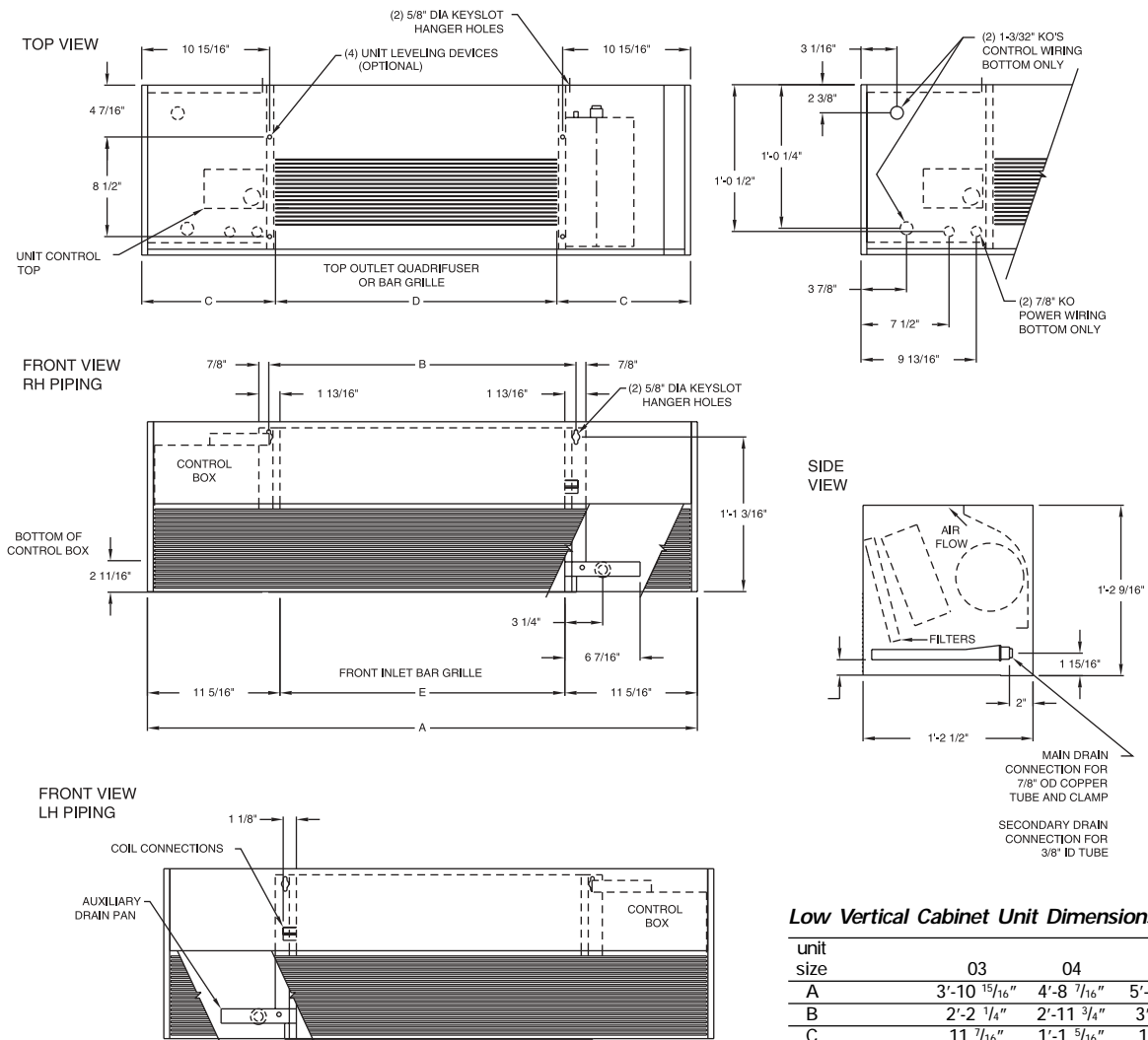
1. Coil connections are always on the drain pan side and opposite the control box.
2. Coil connections are 5/8" O.D. sweat.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.



Installation

dimensions & weights

Low Vertical Cabinet, Model L

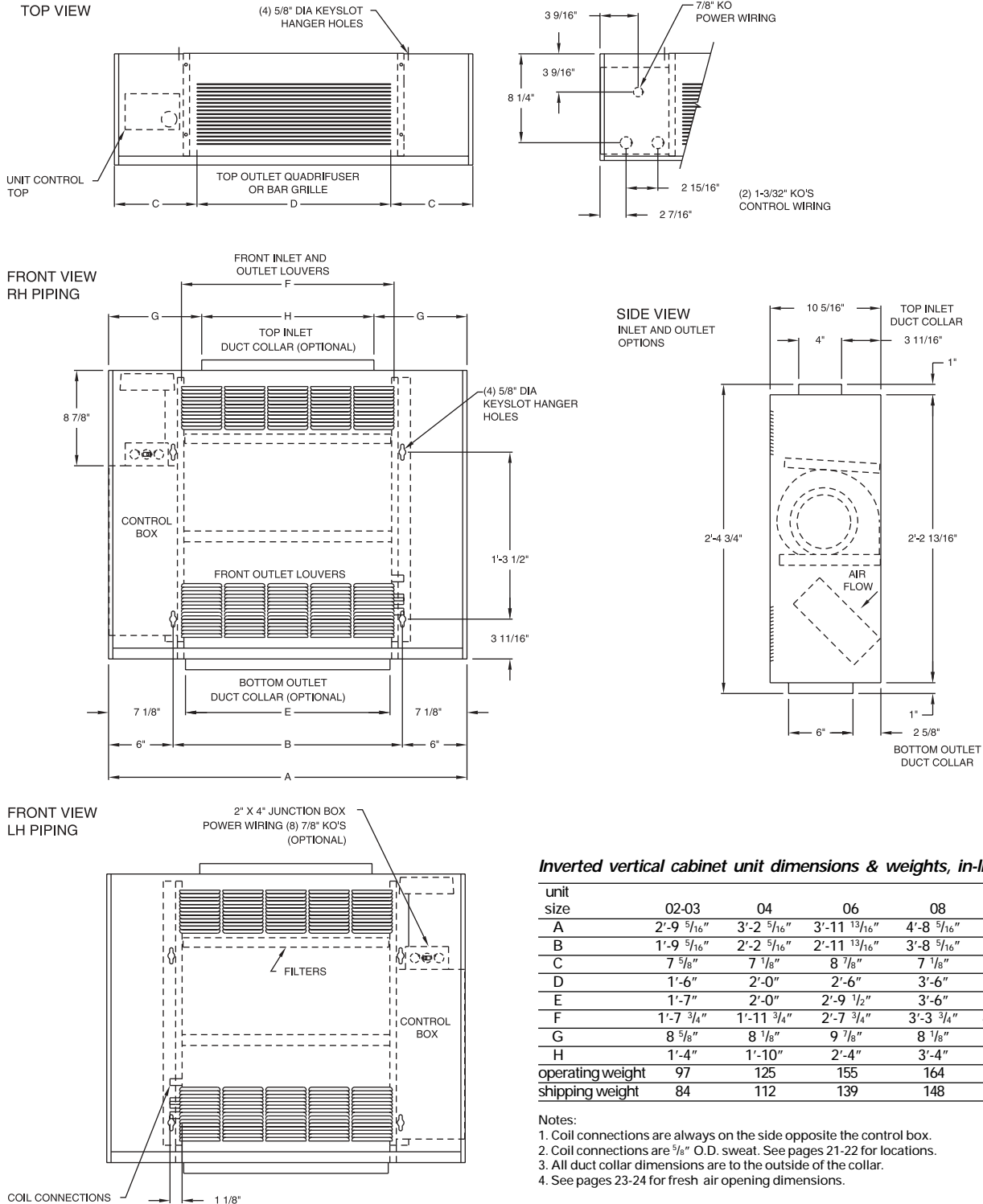


- Notes:
1. Coil connections are always on the drain pan side and opposite the control box.
 2. Coil connections are 3/8" O.D. sweat.
 3. All duct collar dimensions are to the outside of the collar.
 4. See pages 23-24 for fresh air opening dimensions.

Installation

dimensions & weights

Inverted Vertical Cabinet, Model M



Inverted vertical cabinet unit dimensions & weights, in-lbs.

unit size	02-03	04	06	08	10-12
A	2'-9 5/16"	3'-2 5/16"	3'-11 13/16"	4'-8 5/16"	6'-3 5/16"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	7 5/8"	7 1/8"	8 7/8"	7 1/8"	7 5/8"
D	1'-6"	2'-0"	2'-6"	3'-6"	5'-0"
E	1'-7"	2'-0"	2'-9 1/2"	3'-6"	5'-1"
F	1'-7 3/4"	1'-11 3/4"	2'-7 3/4"	3'-3 3/4"	4'-11 3/4"
G	8 5/8"	8 1/8"	9 7/8"	8 1/8"	8 5/8"
H	1'-4"	1'-10"	2'-4"	3'-4"	4'-10"
operating weight	97	125	155	164	218
shipping weight	84	112	139	148	200

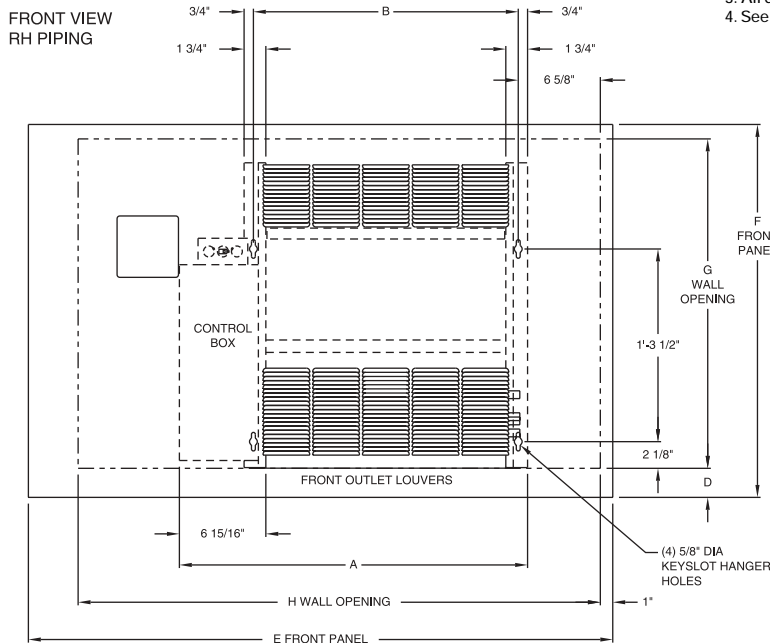
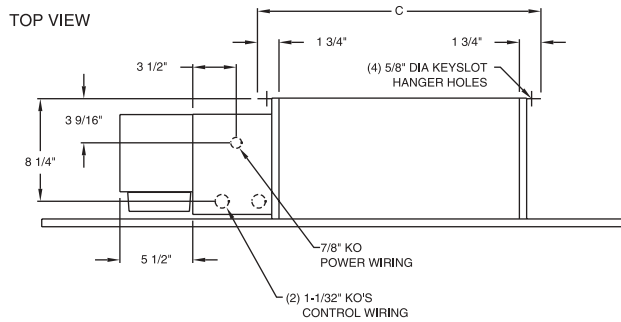
Notes:

1. Coil connections are always on the side opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.

Installation

dimensions & weights

Inverted Vertical Recessed, Model N

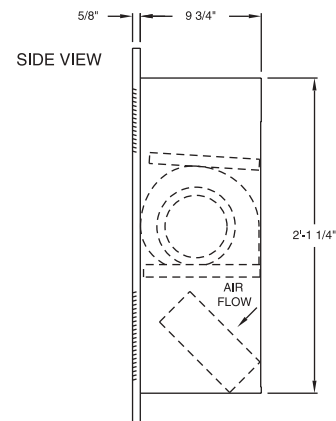


Inverted vertical recessed unit dimensions & weights, in-lbs.

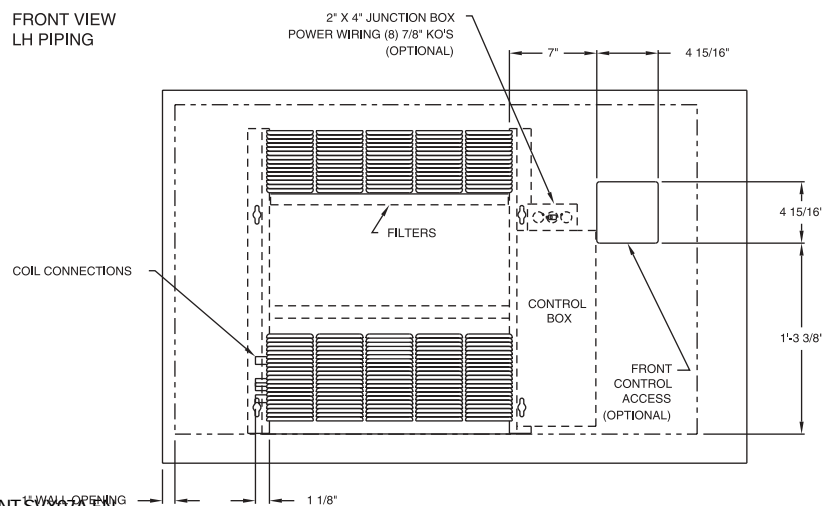
unit size	02-03	04	06	08	10-12
A	2'-3 7/8"	2'-8 7/8"	3'-6 3/8"	4'-2 7/8"	5'-9 7/8"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"
C	1'-10 13/16"	2'-3 13/16"	3'-1 5/16"	3'-9 13/16"	5'-4 13/16"
D	2 3/8"	2 3/8"	2 3/8"	4 1/8"	4 1/8"
E	3'-11"	4'-3"	5'-3"	5'-5 1/2"	7'-5 1/2"
F	2'-6"	2'-6"	2'-6"	2'-9 1/2"	2'-9 1/2"
G	2'-2 1/2"	2'-2 1/2"	2'-2 1/2"	2'-3 1/2"	2'-3 1/2"
H	3'-6"	4'-0"	4'-9"	5'-3"	7'-3"
operating weight	78	88	128	139	253
shipping weight	68	78	118	129	243

Notes:

1. Coil connections are always on the side opposite the control box.
2. Coil connections are 5/8" O.D. sweat. See pages 21-22 for locations.
3. All duct collar dimensions are to the outside of the collar.
4. See pages 23-24 for fresh air opening dimensions.



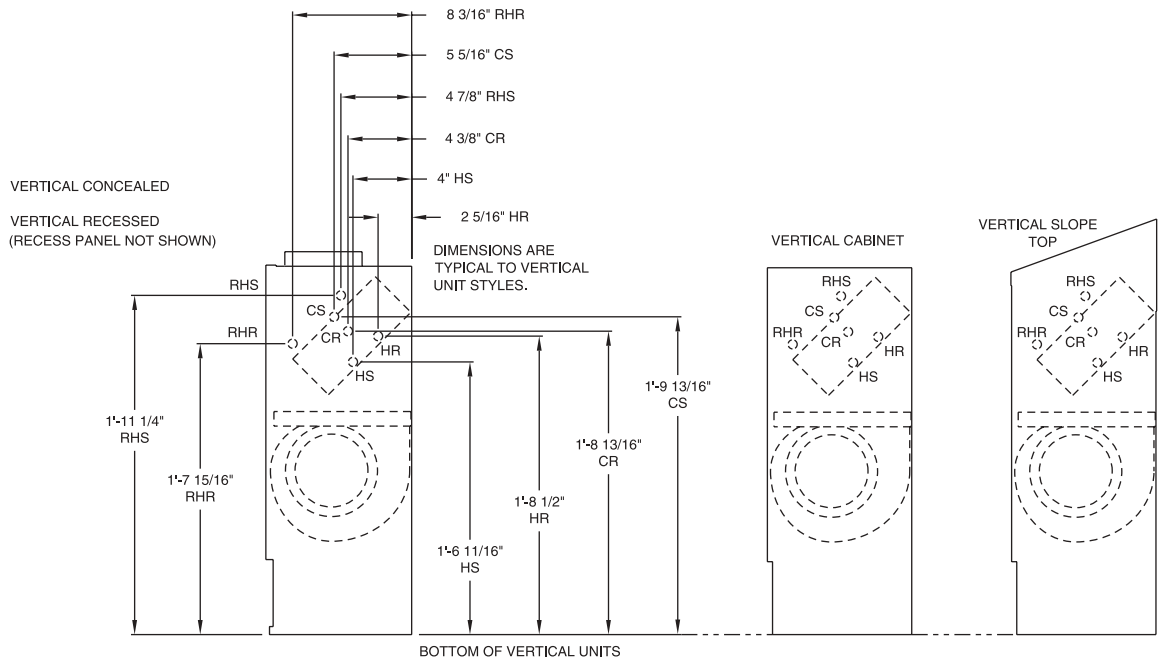
Dimension 'D' refers to the required minimum distance between the finished floor, and the bottom of the unit.



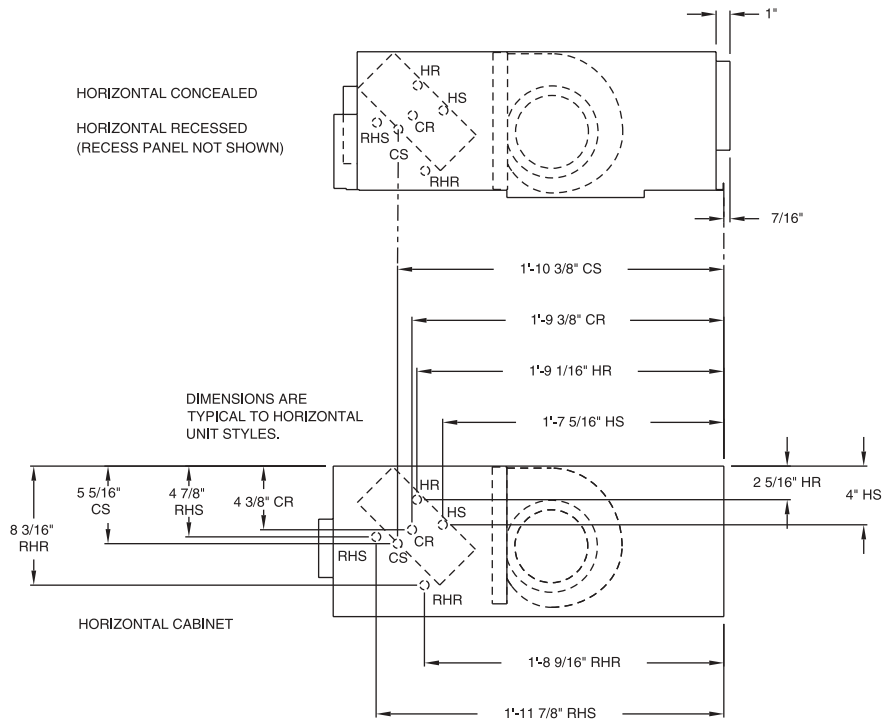
Installation

dimensions & weights

Fan-Coil Coil Connections Vertical Units



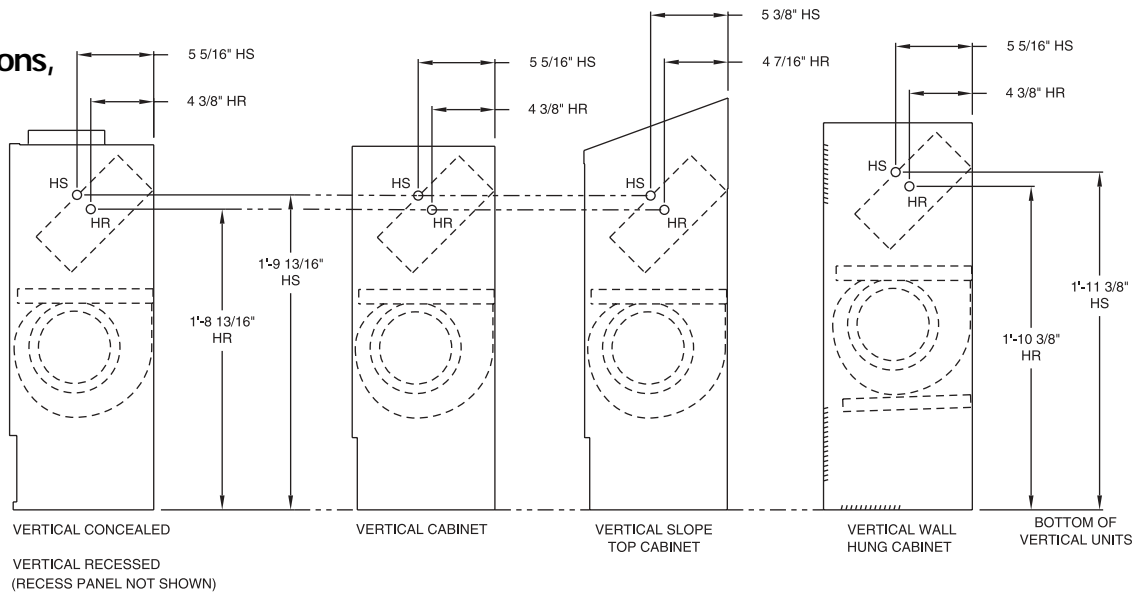
Fan-Coil Coil Connections Horizontal Units



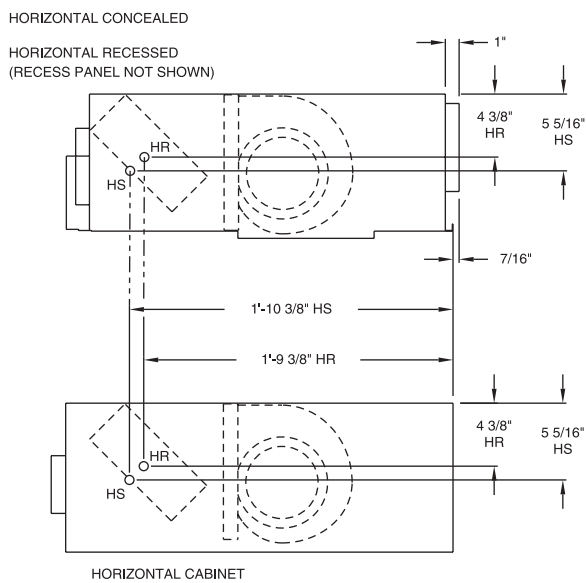
Installation

dimensions & weights

Force Flo Coil Connections, Vertical Units

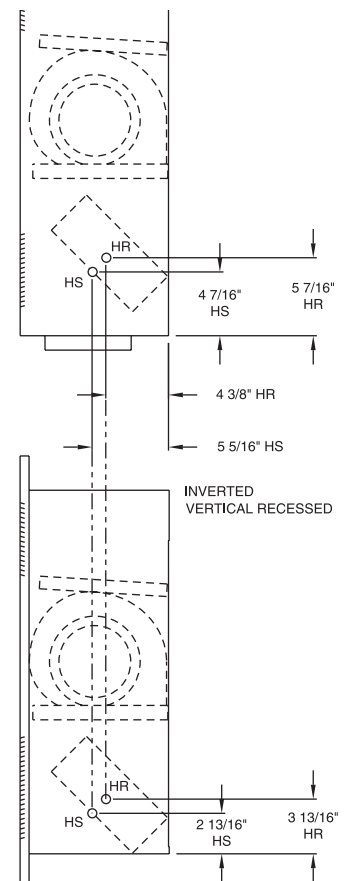


Force Flo Coil Connections, Horizontal Units



HR - Hot Water Return
 HS - Hot Water Supply

Force Flo Coil Connections, Inverted Units

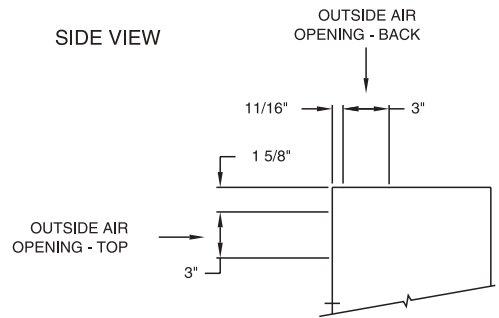
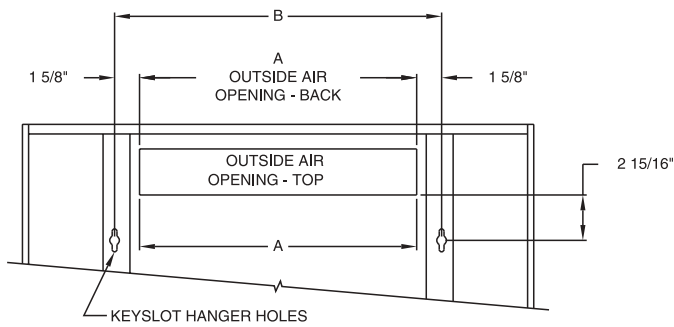
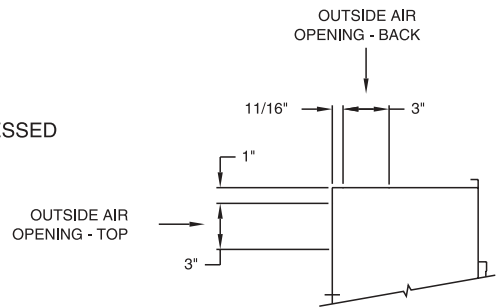
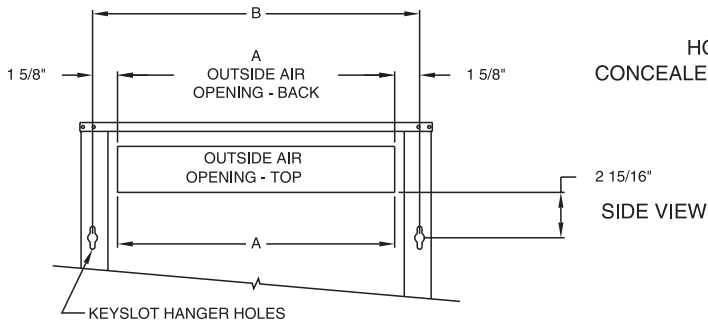




Installation

dimensions & weights

Fresh Air Opening Locations Horizontal Units Models C, D, and E



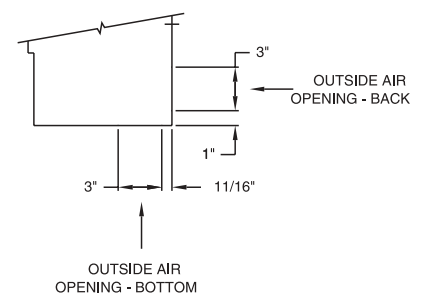
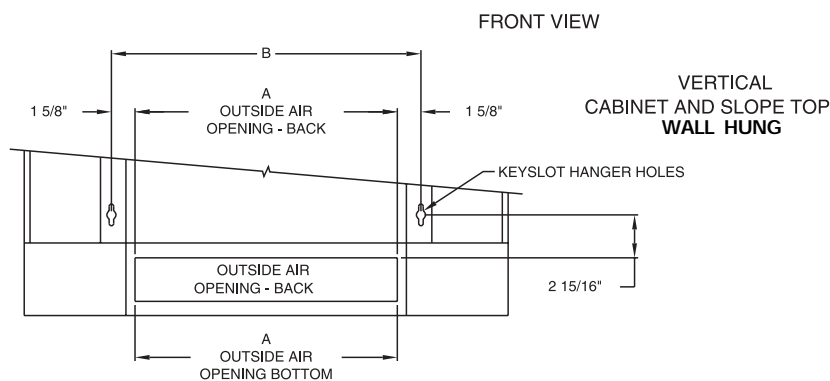
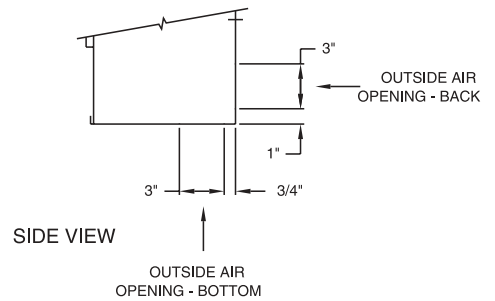
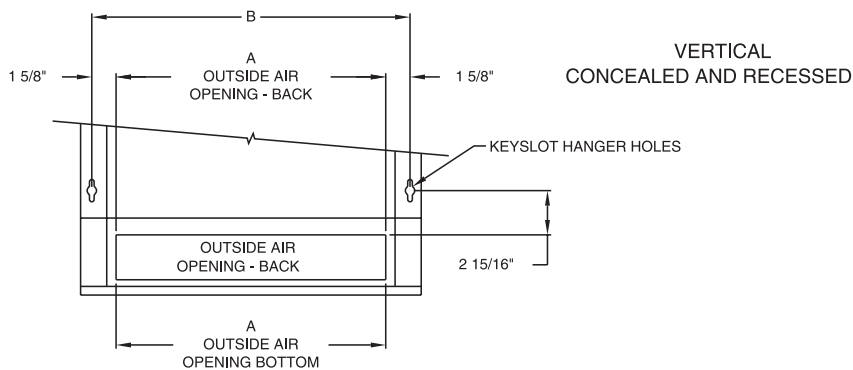
Fresh Air Opening Dimensions, Horizontal Units

Unit Size	02-03	04	06	08	10-12
A	1'-6"	1'-11"	2'-8 1/2"	3'-5"	5'-0"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"

Installation

dimensions & weights

Fresh Air Opening Locations Vertical Units Models A, B, F, & J



Fresh Air Opening Dimensions, Vertical Units

Unit Size	02-03	04	06	08	10-12
A	1'-6"	1'-11"	2'-8 1/2"	3'-5"	5'-0"
B	1'-9 5/16"	2'-2 5/16"	2'-11 13/16"	3'-8 5/16"	5'-3 5/16"

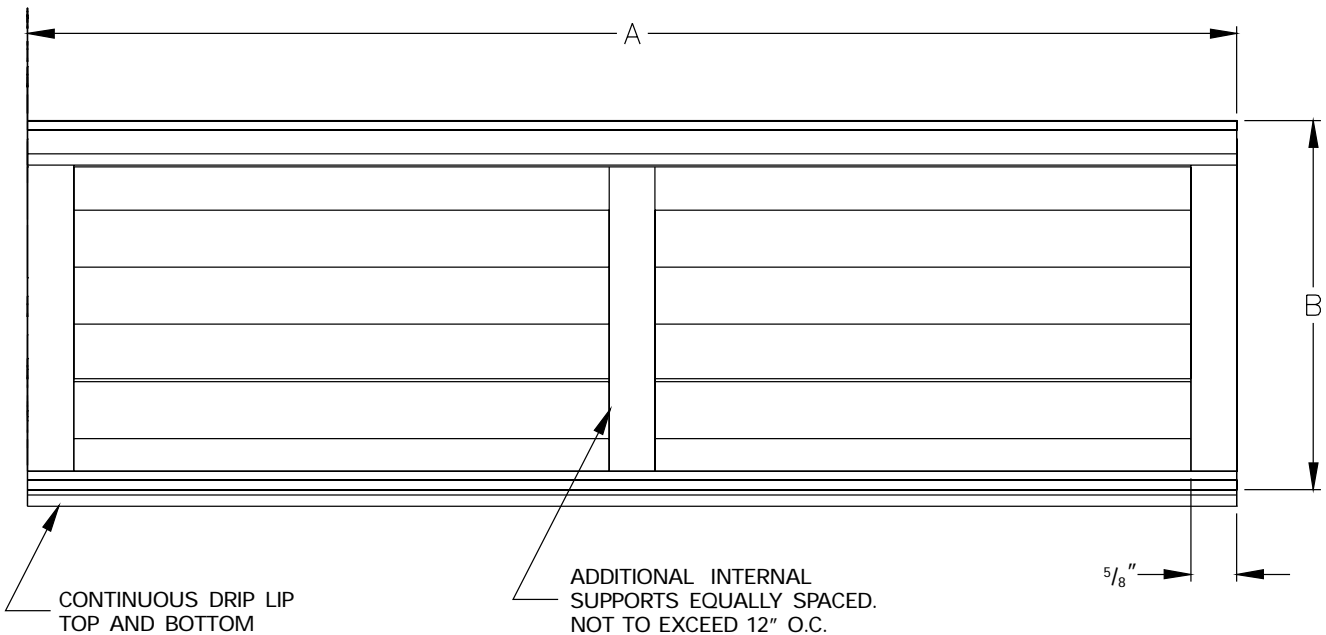
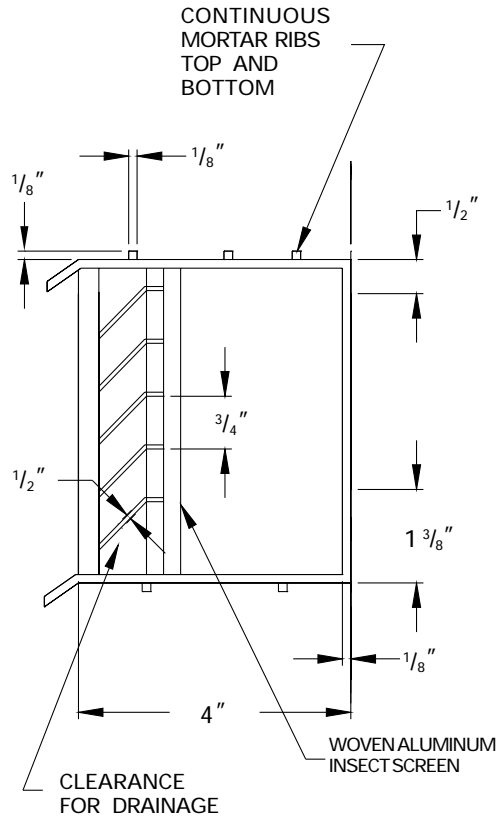
Installation

dimensions & weights

Wall Box

Wall Box Dimensions

Unit Size Ref. Only	Dimensions A x B	Internal Supports
02 - 03	24 ³ / ₈ x 4 ³ / ₄	1
04	24 ³ / ₈ x 7 ¹ / ₂	1
06	33 ¹ / ₈ x 7 ¹ / ₂	2
08	37 ¹ / ₂ x 7 ¹ / ₂	3
10 - 12	58 ¹ / ₄ x 7 ¹ / ₂	4



Installation

dimensions & weights

Projection Panel

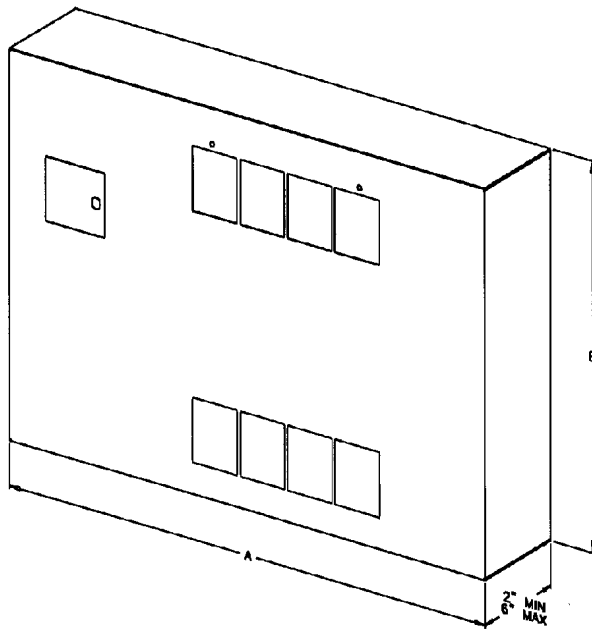
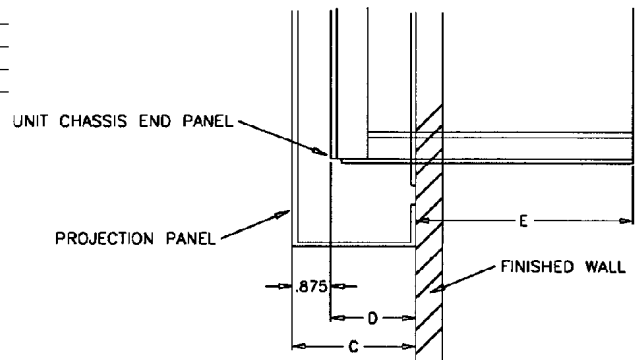
Projection Panel Dimensions

Unit Size	02-03	04	06	08	10-12
A	3'-11"	4'-3"	5'-3"	5'-5 1/2"	7'-5 1/2"
B	2'-6"	2'-6"	2'-6"	2'-9 1/2"	2'-9 1/2"

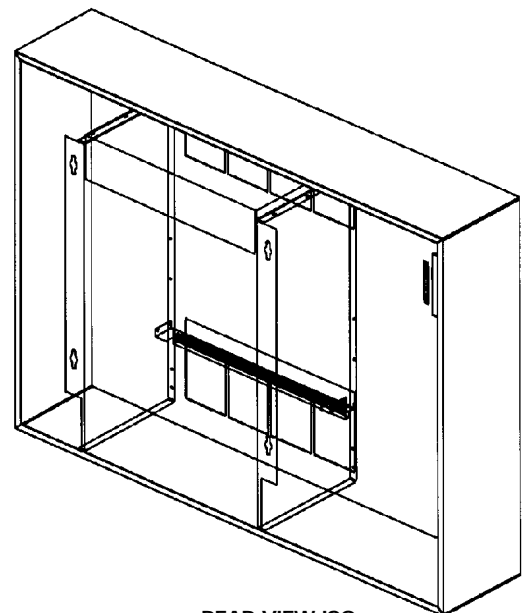
Projection Panel, All Unit Sizes

C	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"
D	1 1/8"	1 5/8"	2 1/8"	2 5/8"	3 1/8"	3 5/8"	4 1/8"	4 5/8"	5 1/8"
E	8 5/8"	8 1/8"	7 5/8"	7 1/8"	6 5/8"	6 1/8"	5 5/8"	5 1/8"	4 5/8"

UNIT TO WALL — TOP VIEW



FRONT VIEW ISO



REAR VIEW ISO



Installation

pre-installation considerations

WARNING

Hazardous Voltage w/Capacitors!
Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Receiving and Handling

Upon delivery, inspect all components for possible shipping damage. See the Receiving Checklist section for detailed instructions. Trane recommends leaving units and accessories in their shipping packages/skids for protection and ease of handling until installation.

Shipping Package

UniTrane fan-coil and Force Flo cabinet heaters ship in individual cartons for handling and storage ease. Each carton has tagging information such as the model number, sales order number, serial number, unit size, piping connections, and unit style to help properly locate the unit in the floor plan. If specified, the unit will ship with tagging designated by the customer.

Receiving Checklist

Complete the following checklist immediately after receiving unit shipment to detect possible shipping damage.

- Inspect individual cartons before accepting. Check for rattles, bent carton corners, or other visible indications of shipping damage.

- If a unit appears damaged, inspect it immediately before accepting the shipment. Manually rotate the fan wheel to ensure it turns freely. Make specific notations concerning the damage on the freight bill. Do not refuse delivery.
- Inspect the unit for concealed damage before it is stored and as soon as possible after delivery. Report concealed damage to the freight line within the allotted time after delivery. Check with the carrier for their allotted time to submit a claim.
- Do not move damaged material from the receiving location. It is the receiver's responsibility to provide reasonable evidence that concealed damage did not occur after delivery.
- Do not continue unpacking the shipment if it appears damaged. Retain all internal packing, cartons, and crate. Take photos of damaged material.
- Notify the carrier's terminal of the damage immediately by phone and mail. Request an immediate joint inspection of the damage by the carrier and consignee.
- Notify your Trane representative of the damage and arrange for repair. Have the carrier inspect the damage before making any repairs to the unit.
- Compare the electrical data on the unit nameplate with the ordering and shipping information to verify the correct unit is received.

Jobsite Storage

This unit is intended for indoor use only. Store the unit indoors to protect the unit from damage due to the elements. If indoor storage is not possible, make the following provisions for outdoor storage:

1. Place the unit(s) on a dry surface or raised off the ground to assure adequate air circulation beneath unit and to assure that no portion of the unit contacts standing water at any time.
2. **Cover the entire unit with a canvas tarp only. Do not** use clear, black or plastic tarps as they may cause excessive moisture condensation and equipment damage.

Installation Preparation

Before installing the unit, consider the following unit location recommendations to ensure proper unit operation.

1. Clearances: Allow adequate service and code clearances as recommended in "Service Access" section. Position the unit and skid assembly in its final location.
2. Structural support: Ensure the structural support is strong enough to adequately support the unit. The installer is responsible for supply support rods for installation of ceiling units.
3. Level: Verify the floor or foundation is level. Shim or repair as necessary. To ensure proper unit operation, install the unit level (zero tolerance) in both horizontal axes. Failure to level the unit properly can result in condensate management problems, such as standing water inside the unit.
4. Condensate line & piping: Consider coil piping and condensate drain requirements. Verify condensate line is continuously pitched 1 inch per 10 feet of condensate line run to adequately drain condensate.
5. Wall & ceiling openings: Vertical recessed/concealed units require wall/ceiling openings. Refer to submittal for specific dimensions before attempting to install. Horizontal recessed/concealed units must meet the requirements of the National Fire Protection Association (NFPA) Standard 90A or 90B concerning the use of concealed ceiling spaces as return air plenums. Refer to the submittal for specific dimensions of ceiling openings.
6. Exterior: Touch up painted panels if necessary. If panels need paint, sanding is not necessary. However, clean the surface of any oil, grease, or dirt residue so the paint will adhere. Purchase factory approved touch up epoxy paint from your local Trane Service Parts Center and apply.

Installation

pre-installation considerations

Service Access

Service access is available from the front on vertical units and from the bottom on horizontal units. Cabinet and recessed units have removable front or bottom panels to allow access into the unit. See Figure I-PC-1 for recommended service and operating clearances.

Units have either right or left hand piping. Reference piping locations by facing the front of the unit (airflow discharges from the front). The control panel is always on the end opposite the piping.

The fan board assembly and main drain pan are easily removable for cleaning. See the "Maintenance" section for more details on servicing.

Pre-Installation Checklist

Complete the following checklist before beginning unit installation.

- Verify the unit size and tagging with the unit nameplate.
- Make certain the floor or foundation is level, solid, and sufficient to support the unit and accessory weights. See the Dimensions and Weights section. Level or repair the floor before positioning the unit if necessary.
- Allow minimum recommended clearances for routine maintenance and service. Refer to unit submittals for dimensions.
- Allow one and one half fan diameters above the unit before the discharge ductwork makes any turns.

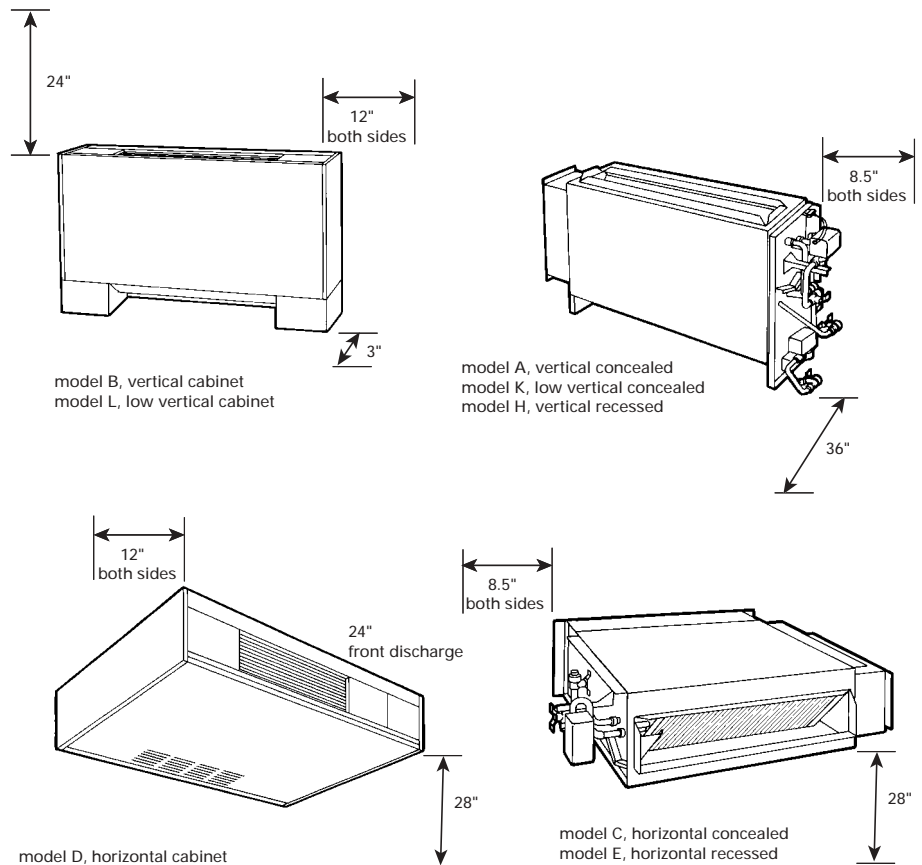


Figure I-PC-1. Recommended service clearances



Installation

Duct Connections

Install all air ducts according to National Fire Protection Association standards for the Installation of Air Conditioning and Ventilating Systems (NFPA 90A and 90B). Install all air ducts according to the National Fire Protection Association standards for the "Installation of Air Conditioning and Ventilation Systems other than Residence Type (NFPA 90A) and Residence Type Warm Air Heating and Air Conditioning Systems (NFPA 90B).

⚠ WARNING Hazardous Voltage w/Capacitors! Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

The unit's airflow configuration varies dependent on the model and options ordered. A one-inch duct collar is provided on units with a ducted return and/or discharge to attach ductwork to the unit.

Trane recommends using galvanized sheet metal ductwork with fan-coil and cabinet heater units. Slide the sheet metal duct over the duct collar flange of the unit, seal the joint and fasten with sheet metal screws.

Note: Do not run screws through the removable front panel on concealed units.

Ductwork Recommendations

Follow the general recommendations listed below when installing ductwork for the unit.

1. Discharge ductwork should run in a straight line, unchanged in size or direction, for a minimum equivalent distance of three fan diameters from the unit (approximately 20 inches).
2. When making duct turns and transitions avoid sharp turns and use proportional splits, turning vanes, and air scoops when necessary.
3. When possible, construct, and orient supply ductwork turns in the same direction as the fan rotation.

Piping Considerations

Hydronic Coil Piping

Before installing field piping to the coil, consider the following.

- All coil connections are $\frac{5}{8}$ -inch O.D. (or $\frac{1}{2}$ -inch nominal) female copper connections.
- The supply and return piping should not interfere with the auxiliary drain pan or condensate line. See "Connecting the Condensate Drain" section for more detailed information.
- The installer must provide adequate piping system filtration and water treatment.
- Exterior condensate may be an issue (fan-coils only) if field piping does not have a control valve. Refer to the supply and return header locations in the "Dimensions and Weights" section.

Note: When using a field supplied piping package in a fan-coil unit, allow sufficient room to install the auxiliary drain pan. In addition, piping package must not extend over edges of auxiliary drain pan.

Connecting field piping to coil

1. Remove the auxiliary drain pan, if it is in place, to prevent exposure to dripping solder or excessive temperatures.
2. Slide a $\frac{1}{2}$ -inch sweat connection coupling (installer provided) onto the coil headers.

Note: For vertical fan-coil units, push the main condensate drain hose and overflow condensate drain hose through the inside of the chassis end panel to prevent them from getting burned when making sweat connections. Be sure to pull the hoses back through and route to the auxiliary drain pan when the end panel has cooled.

3. Solder the joint using bridgit lead-free solder (ASTM B32-89) to provide a watertight connection. Avoid overheating factory soldered joints when soldering field connections to the coil to prevent leakage from occurring.
4. Insulate all piping to coil connections as necessary after connections are complete.

Note: Maintain a minimum distance of one foot between the reduction fitting for the $\frac{1}{2}$ -inch diameter line and the fan-coil unit piping connections.

5. Install the optional auxiliary drain pan, which ships in the accessory packet.

Installation

Water Piping Connections to Factory-Installed Piping Package

Before installing water piping supply and return lines to factory piping package, note the following items.

- All piping connections are $\frac{5}{8}$ -inch O.D. ($\frac{1}{2}$ -inch nominal) female copper connections.
- The fan-coil supply and return piping should not interfere with the auxiliary drain pan or condensate line. See "Connecting the Condensate Drain" section for more information.
- The installer must provide adequate piping system filtration and water treatment.
- If the unit has a factory deluxe piping package, the piping includes a strainer with a 20-mesh size screen, which allows minimal protection from debris. Therefore, clean the strainer regularly.

Note: Maintain a minimum distance of one foot between the reduction fitting for the $\frac{1}{2}$ -inch diameter line and the fan-coil piping connections.

1. The factory piping package ships with brackets to adequately support the piping during shipment. Remove these brackets before connecting water piping to the unit.
2. Close the piping end valves to the fully open position to prevent damage to the valve seat during brazing.
3. Remove the auxiliary drain pan, if it is in place, to prevent exposure to dripping solder or excessive temperatures.
4. Solder water piping connections to supply and return end connections. Avoid overheating factory soldered joints to prevent the possibility of leakage.
5. Insulate fan-coil piping to auxiliary drain pan connections and any piping that is not above the auxiliary drain pan.

Condensate Drain

1. De-burr the pipe end before making the connection to the drain pan.
2. Connect a $\frac{7}{8}$ -inch O.D. copper pipe or tube, with a 0.20 inch wall thickness, to the auxiliary drain pan. This should be a mechanical connection that allows easy removal of the auxiliary drain pan when servicing the piping end pocket.

3. Slide the copper pipe over the drain pan nipple and tighten the collar on the pipe with a hose clamp (installer supplied).

Maintain a continuous drain line pitch of one inch per ten feet of drain line run to provide adequate condensate drainage. Extend the drain line straight from the drain pan a minimum distance of six inches before making any turns. The installer must provide proper support for the drain line to prevent undue stress on the auxiliary drain pan.

Install a secondary overflow drain line if necessary by punching out the overflow drain nipple on the auxiliary drain pan. Next, place a $\frac{3}{8}$ -inch inside diameter flexible plastic tube over the nipple and secure with a field supplied hose clamp.

Note: The installer is responsible for adequately insulating field piping. See the "External Insulating Requirements" section for more information.

Condensate Overflow Detection Device

The condensate overflow detection device is an option on fan-coil units with either a Tracer ZN010, ZN510, ZN520 or the customer-supplied control interface. The float switch, mounting bracket, and coiled leads ship attached inside the piping end pocket of the unit. Install the switch by placing the hole or slot in the bracket over the condensate overflow drain (of the auxiliary drain pan) with the switch float extending over the pan. Secure the drain pan by attaching the pan's bracket with the factory provided clip. See Figures I-MR-1 and I-MR-2.



Figure I-MR-1. Condensate float switch installed in horizontal auxiliary drain pan.

Automatic Changeover Sensor

Two-pipe changeover units with either the Tracer ZN010, ZN510, and ZN520 controls have an automatic changeover sensor that determines heating or cooling mode based on the supply water temperature. On units with a factory piping package, the factory straps the changeover sensor to the piping supply water pipe. See Figure I-MR-3 and I-MR-4.

If the unit does not have a factory piping package, the factory attaches the sensor and coiled lead wires to the piping side end panel. The installer should attach the sensor parallel to and in direct contact with the supply water pipe.

Note: The installer is responsible to ensure the changeover sensor is installed in a location that can sense active water temperature. Otherwise, the unit may fail to sense the correct operating mode and disable temperature control.

When using field supplied three-way valves, install the changeover sensor upstream of the valve on the supply water pipe. When using field supplied two-way control valves, install the changeover sensor in a location that will detect active water temperature. **The unit must always be able to sense the correct system water temperature, regardless of the control valve position.**

Note: The maximum length of the automatic changeover wire cannot exceed ten feet from the control panel. If the sensor extends beyond the unit chassis, use shielded conductors to eliminate radio frequency interference (RFI).



Figure I-MR-2. Condensate float switch installed in vertical auxiliary drain pan.

Installation

mechanical requirements



Figure I-MR-3. Attach the changeover sensor to the entering water pipe as shown for changeover to work properly



Figure I-MR-4. Close-up view of the changeover sensor



Figure I-MR-5. Manual coil air vent with set screw

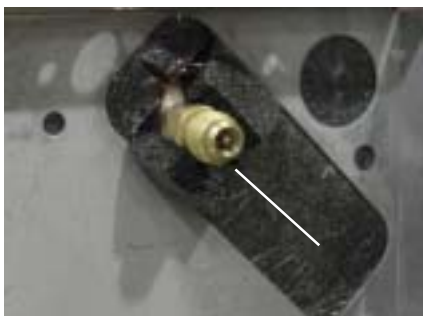


Figure I-MR-6. Manual coil air vent with Shradler fitting

Automatic Electric Heat Lockout Switch

Two-pipe fan-coil units with auxiliary electric heat have an automatic electric heat lockout switch that disengages the electric heat when hydronic heat enables. If the unit has a factory piping package and electric heat, the factory attaches the switch to the supply water pipe. When the lockout switch detects the supply water temperature above 95°F, it disengages the electric heat. This eliminates electric heat and hydronic heat working simultaneously.

If the fan-coil unit does not have a factory piping package, the switch and coiled lead wires ship inside the piping side end panel. The installer should position the lockout switch on the supply water line of the unit by sliding its spring connector over the pipe. See I-MR-7.

Venting the Hydronic Coil

The hydronic coil contains a vent, either manual or automatic, to release air from the unit. This vent is not sufficient for venting the water piping system in the building.

The coil air vent is on the piping side, above the coil connections on the unit. See Figure I-MR-5 and I-MR-6. Perform the following steps to vent the coil after installing the unit.

1. Pressurize the building piping system with water and vent any trapped air at system vents.
2. For units with manual air vents, back the set screw out to expel air from the unit and then re-tighten the set screw.

The automatic air vent should require no adjustment for the coil to vent. However, if the coil does not vent immediately, unscrew the outer portion of the fitting to expel air from the port.

If debris has become trapped in the vent, completely remove the outer portion of the fitting and clean.



Figure I-MR-7. Electric heat lock out switch installed

External Insulating Requirements

Insulate and vapor seal surfaces colder than surrounding air dew-point a to prevent unplanned condensation. Trane recommends field-insulation of the following areas to prevent potential condensate problems:

1. Supply and return water piping connections
2. Condensate drain lines and connections
3. Fresh air intake duct connections
4. Discharge duct connections
5. Wall boxes

Installation

Balancing The Manual Circuit Setter Valve

The manual circuit setter valve is an optional end valve supplied on the return pipe of the factory piping package. The valve allows the operator to regulate water flow through the hydronic coil, balance the water flow through the unit with other units in the piping system, and serves as a shutoff or end valve. See Figure I-MR-8.

Follow the procedure below to set maximum water flow through the coil.

1. Establish water flow through the coil.
Perform an open override of the valve if the control valve is closed to the coil, either manually or by Tracer.

If the piping package has two-position, normally closed valves: Drive open the valve using a 24V signal.

If the piping package has two-position, normally open valves: Manually drive open the valve by removing power to the valve.

If the piping package has modulating valves: To manually drive the valve open, depress the button stem on top of the valve and push the lever located on the side of the valve to the full open position.

2. For presetting, use the appropriate valve curve shown in Chart I-MR-1 on page 34 to determine which setting is necessary to achieve the appropriate pressure drop. The "M" line is the appropriate line.
3. Carefully remove the Schrader pressure port connection caps on the manual circuit setter, since they will be at the same temperature as the pipeline.
4. Bleed all air from the hoses and meter before reading the pressure drop. Refer to the gauge operating instructions.

5. Adjust the circuit setter valve by turning the valve stem until the appropriate pressure drop is achieved.
6. After achieving the proper setting, slightly loosen the two socket head cap screws and rotate the memory stop around until it touches the back side of the indicator. Then tighten the screws to securely set the open memory position. The memory stop indicates the last set open position.
7. If using a three-way valve: close the control valve to the coil, with the differential pressure meter still connected. This will divert flow to the bypass side of a three-way valve.

Adjust the balancing fitting to obtain the same pressure drop across the circuit setter valve as in step two when the control valve was open to the coil.



Figure I-MR-8. Manual circuit setter valve



Figure I-MR-9. Automatic circuit setter valve



Figure I-MR-10. Automatic circuit setter valve



Installation

mechanical requirements

Note: Instructions for using this chart are on the previous page. For the manual circuit setter provided with the fan-coil or Force Flo, use the 'M' line for reference.

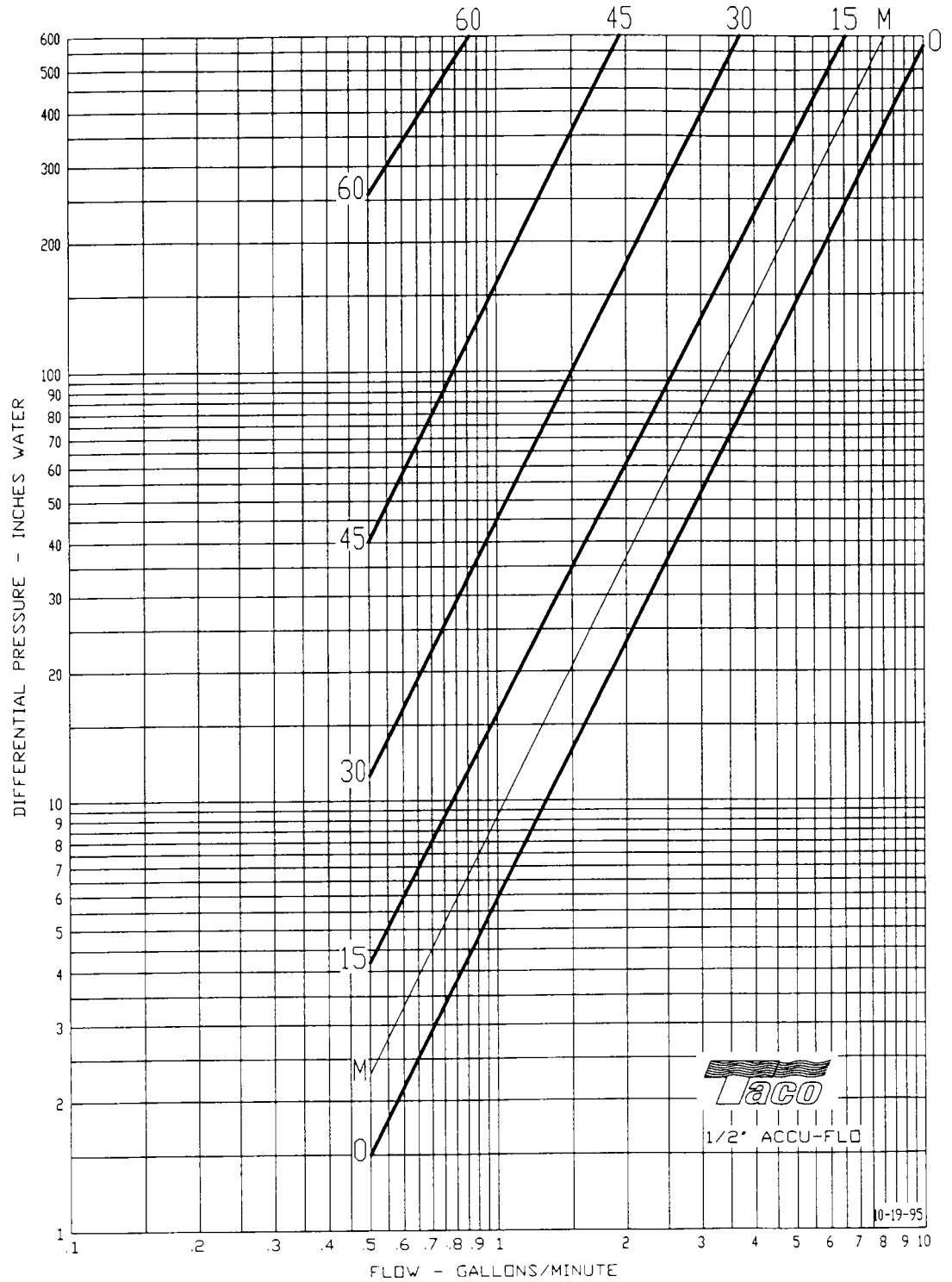


Chart I-MR-1. Manual circuit setter valve, differential pressure vs. flow

Installation

mechanical requirements

Steam Piping

CAUTION

Coil Damage!

In all steam coil installations, the condensate return connections must be at the low point of the coil to ensure condensate flows freely from the coil at all times. Failure to do so may cause physical coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion.

1. Make piping connections to the steam coil as shown in Figure I-MR-11. Cap the unused connection.
2. The coil is already pitched within the unit to provide proper pitch to drain condensate out of the coil. Verify that the unit has been properly leveled.
3. Install a 1/2-inch, 15-degree swing check vacuum breaker in the unused condensate return tapping as close as possible to the coil.
4. Vent the vacuum breaker line to atmosphere or connect it into the return main at the discharge side of the steam trap.
5. Pitch all steam supply and return mains down a minimum of one inch per ten feet in the direction of flow.
6. Do not drain the steam mains or take-off through the coils. Drain the mains ahead of the coils through a steam trap to the return line.
7. Overhead returns require one psig of pressure at the steam trap discharge for each two-foot elevation to ensure continuous condensate removal.
8. Proper steam trap selection and installation is necessary for satisfactory coil performance and service life. For installation, use the following steps:
 - a. Position the steam trap discharge at least 12 inches below the condensate return connection. This provides sufficient hydrostatic head pressure to overcome trap losses and ensure complete condensate removal.

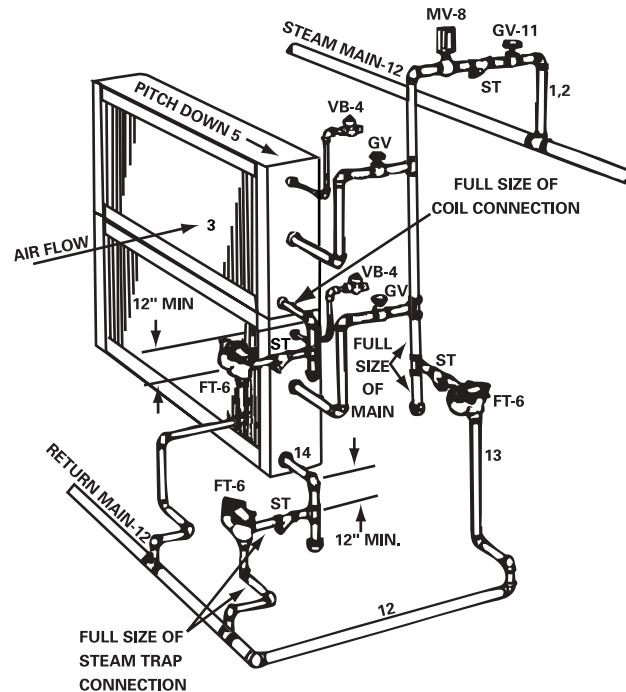


Figure I-MR-2. Typical Piping for Steam Coils

Code of System Components in Piping Diagram

FT	Float and thermostatic steam trap
BT	Bucket steam trap
GV	Gate valve
OV	Automatic two-position (on-off) control valve
TV	Automatic three-way control valve
VB	Vacuum breaker
CV	Check valve
ST	Strainer
AV	Automatic or manual air vent

- b. Trane recommends using flat and thermostatic traps because of gravity drain and continuous discharge operation.
- c. Use float and thermostatic traps with atmospheric pressure gravity condensate return, with automatic controls or where the possibility of low pressure supply steam exists.
- d. Always install strainers as close as possible to the trap inlet side. Reference Figure I-MR-10 for an example of a properly piped steam coil.

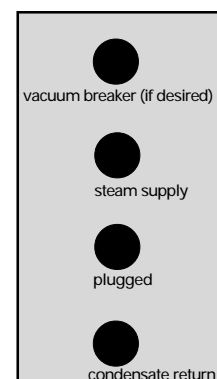


Figure I-MR-11. Main steam coil connection diagram



Installation

Unit Wiring Diagrams

Specific unit wiring diagrams are provided inside each unit and can be easily removed for reference. Use these diagrams for connections or trouble analysis. Wiring diagrams are attached on the inside of the front panel of vertical cabinet & recessed models and on the fan and motor panel of vertical concealed & all horizontal models.

Supply Power Wiring

WARNING

Hazardous Voltage w/Capacitors! Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Refer to the unit nameplate to obtain the minimum circuit ampacity (MCA) and maximum fuse size (MFS) or maximum circuit breaker (MCB) to properly size field supply wiring and fuses or circuit breakers.

Refer to the unit operating voltage listed on the unit wiring schematic, submittal, or nameplate. Reference the wiring schematic for specific wiring connections.

CAUTION

Use Copper Conductors Only! Unit terminals are not designed to accept other type conductors. Failure to use copper conductors may result in equipment damage.

Note: All field wiring should conform to NEC and all applicable state and local code requirements. The control panel box is always on the end opposite the piping connections. Access the control box by removing the two screws that secure the front cover. This will allow the panel to be removed, to provide access to the electrical components.

WARNING

Hazardous Electrical Shorts! Insulate all power wire from sheet metal ground. Failure to do so may cause electrical shorts that could result in death or serious injury.

If the unit does not have a disconnect switch, the power leads and capped ground wire are inside the control panel.

If the unit has a disconnect switch, the power leads are wired to the junction box switch on the control panel. Pull the capped ground wire into the junction box.

Electrical Grounding Restrictions

All sensor and input circuits are normally at or near ground (common) potential. When wiring sensors and other input devices to the Tracer controller, avoid creating ground loops with grounded conductors external to the unit control circuit. Ground loops can affect the measurement accuracy of the controller.

CAUTION

Equipment Damage! Unit transformer IT1 provides power to fan-coil unit only. Field connections to the transformer IT1 may create immediate or premature unit component failure.

All input/output circuits (except isolated relay contacts and optically isolated inputs) assume a grounded source, either a ground wire at the supply transformer to control panel chassis, or an installer supplied ground.

Wall Mounted Control Interconnection Wiring

The installer must provide interconnection wiring to connect wall mounted devices such as a fan mode switch or zone sensor module.

Refer to the unit wiring schematic for specific wiring details and point-to-point wiring connections. Dashed lines indicate field wiring on the unit wiring schematics. All interconnection wiring must conform to NEC Class 2 wiring requirements and any state and local requirements.

Refer to Table I-ER-1 for the wire size range and maximum wiring distance for each device.

Recommendation: Do not bundle or run interconnection wiring in parallel with or in the same conduit with any high-voltage wires (110V or greater). Exposure of interconnection wiring to high voltage wiring, inductive loads, or RF transmitters may cause radio frequency interference (RFI). In addition, improper separation may cause electrical noise problems. Therefore, use shielded wire (Beldon 83559/83562 or equivalent) in applications that require a high degree of noise immunity. Connect the shield to the chassis ground and tape at the other end.

Table I-ER-1. Maximum wiring distances for low voltage controls, ft.

device	wire size	range
fan speed switch	14 - 22 AWG	500
zone sensor	16 - 22 AWG	200

Note: Do not connect any sensor or input circuit to an external ground connection.



Installation

electrical requirements

Table I-ER-2. Low vertical free discharge motors, 115 volt

size	FLA	HP (kW)	RPM	
			H	M
03	0.7	.03 (0)	H	1090
			M	770
			L	560
04	0.8	.03 (0)	H	1090
			M	750
			L	560
06	1.1	.03 (0)	H	1115
			M	760
			L	560

Note:
Actual rpm will vary with application and configuration.

Table I-ER-3. Decimal to fractional HP (kW) conversion

FC	Decimal	Fraction
02	.03	1/30
	.07	1/15
03	.04	1/25
	.05	1/20
	.08	1/12
04	.05	1/20
	.06	1/16
	.10	1/10
	.13	1/8
06	.07	1/15
	.12	1/8
	.16	1/6
	.24	1/4
08	.12	1/8
	.13	1/8
	.24	1/4
10	.05	1/20
	.07	1/15
	.12	1/8
	.16	1/6
12	.10	1/10
	.13	1/8
	.24	1/4
	.24	1/4

low vertical
03, 04, 06

Note:
Values for fractional HP's (kW's) are approximate values and not necessarily the actual HP (kW).

Table I-ER-4. Free discharge motors on units with two-row, electric, or steam coils

unit size	115 volt		208-230 volt		277-480 volt		rpm		
	FLA	hp (kW)	FLA	hp (kW)	FLA	hp (kW)	H	M	L
02	0.6	.03 (.02)	0.3	.03 (.02)	0.2	.03 (.02)	980	840	655
03	0.7	.04 (.02)	0.4	.04 (.02)	0.3	.04 (.02)	980	780	580
04	0.9	.05 (.04)	0.5	.05 (.04)	0.4	.05 (.04)	1050	780	580
06	1.2	.07 (.05)	0.6	.07 (.05)	0.5	.07 (.05)	1030	780	580
08	1.4	.12 (.09)	0.9	.12 (.09)	0.6	.12 (.09)	1080	800	600
10	0.9	.05 (.04)	0.5	.05 (.04)	0.4	.05 (.04)	1050	780	580
	1.2	.07 (.05)	0.6	.07 (.05)	0.5	.07 (.05)	1030	780	580
12	0.9	.05 (.04)	0.5	.05 (.04)	0.4	.05 (.04)	1050	780	580
	1.4	.12 (.09)	0.9	.12 (.09)	0.6	.12 (.09)	1080	800	600

Table I-ER-5. High static motors on units with two-row, electric, or steam coils

unit size	115 volt		208-230 volt		277-480 volt		rpm		
	FLA	hp (kW)	FLA	hp (kW)	FLA	hp (kW)	H	M	L
02	1.1	.07 (.05)	0.6	.07 (.05)	0.5	.07 (.05)	1480	1110	865
03	1.4	.08 (.06)	0.7	.08 (.06)	0.6	.08 (.06)	1400	1175	860
04	1.6	.10 (.07)	0.8	.10 (.07)	0.7	.10 (.07)	1475	1315	1070
06	2.6	.16 (.12)	1.2	.16 (.12)	1.0	.16 (.12)	1400	1070	855
08	3.4	.24 (.18)	1.4	.24 (.18)	1.1	.24 (.18)	1475	1285	975
10	1.6	.10 (.07)	0.8	.10 (.07)	0.7	.10 (.07)	1475	1315	1070
	2.6	.16 (.12)	1.2	.16 (.12)	1.0	.16 (.12)	1400	1070	855
12	1.6	.10 (.07)	0.5	.10 (.07)	0.7	.10 (.12)	1475	1315	1240
	3.4	.24 (.18)	0.9	.24 (.18)	1.1	.24 (.18)	1475	1285	975

Table I-ER-6. Free discharge motors on units with three and four-row coils

unit size	115 volt		208-230 volt		277-480 volt		rpm		
	FLA	hp (kW)	FLA	hp (kW)	FLA	hp (kW)	H	M	L
02	0.6	.03 (.02)	0.3	.03 (.02)	0.2	.03 (.02)	980	840	655
03	0.8	.05 (.04)	0.5	.05 (.04)	0.4	.05 (.04)	1080	800	600
04	1.0	.06 (.04)	0.6	.06 (.04)	0.5	.06 (.04)	1080	800	600
06	1.4	.12 (.09)	0.9	.12 (.09)	0.6	.12 (.09)	1080	800	600
08	1.7	.13 (.10)	1.0	.13 (.10)	0.8	.13 (.10)	1080	800	600
10	1.0	.06 (.04)	0.6	.06 (.04)	0.5	.06 (.04)	1080	800	600
	1.4	.12 (.09)	0.9	.12 (.09)	0.6	.12 (.09)	1080	800	600
12	1.0	.06 (.04)	0.6	.06 (.04)	0.5	.06 (.04)	1080	800	600
	1.7	.13 (.10)	1.0	.13 (.10)	0.8	.13 (.10)	1080	800	600

Table I-ER-7. High static motors on units with three and four-row coils

unit size	115 volt		208-230 volt		277-480 volt		rpm		
	FLA	hp (kW)	FLA	hp (kW)	FLA	hp (kW)	H	M	L
02	1.1	.07 (.05)	0.6	.07 (.05)	0.5	.07 (.05)	1480	1110	865
03	1.3	.08 (.06)	0.7	.08 (.06)	0.5	.08 (.06)	1500	1355	1110
04	2.1	.13 (.10)	0.9	.13 (.10)	0.7	.13 (.10)	1580	1375	1240
06	3.4	.24 (.18)	1.4	.24 (.18)	1.1	.24 (.18)	1475	1285	975
08	3.4	.24 (.18)	1.4	.24 (.18)	1.1	.24 (.18)	1475	1285	975
10	2.1	.13 (.10)	0.9	.13 (.10)	0.7	.13 (.10)	1580	1375	1240
	3.4	.24 (.18)	1.4	.24 (.18)	1.1	.24 (.18)	1475	1285	975
12	2.1	.13 (.10)	0.9	.13 (.10)	0.7	.13 (.10)	1580	1375	1240
	3.4	.24 (.18)	1.4	.24 (.18)	1.1	.24 (.18)	1475	1285	975

Note: Actual rpm will vary with application and configuration. Size 10 & 12 units have two motors.



Installation electrical requirements

Table I-ER-8. Fan-coil electric heat kW

Unit Size	Unit Voltage	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
02	115	1.0	1.5	2.0								
	230	1.0	1.5	2.0								
	277	1.0	1.5	2.0								
	208	0.8	1.1	1.5	1.9							
03	115	1.0	1.5	2.0	2.5							
	230	1.0	1.5	2.0	2.5							
	277	1.0	1.5	2.0	2.5							
	208	0.8	1.1	1.5	1.9	2.3						
04	115			2.0	2.5	3.0						
	230			2.0	2.5	3.0						
	277			2.0	2.5	3.0						
	208			1.5	1.9	2.3	3.0					
06	115			2.0		3.0						
	230			2.0		3.0	4.0	5.0	6.0			
	277			2.0		3.0	4.0	5.0	6.0			
	208			1.5		2.3	3.0	3.8	4.5	5.3		
08	115			2.0		3.0						
	230			2.0		3.0	4.0	5.0	6.0	7.0		
	277			2.0		3.0	4.0	5.0	6.0	7.0		
	208			1.5		2.3	3.0	3.8	4.5	5.3	6.0	
10	115					3.0						
	230					3.0	4.0	5.0	6.0	7.0	8.0	
	277					3.0	4.0	5.0	6.0	7.0	8.0	
	208					2.3	3.0	3.8	4.5	5.3	6.0	
12	115					3.0						
	230					3.0	4.0	5.0	6.0	7.0	8.0	10.0
	277					3.0	4.0	5.0	6.0	7.0	8.0	10.0
	208					2.3	3.0	3.8	4.5	5.3	6.0	

Table I-ER-9. Electric heat kW, low vertical fan-coils

unit size	unit voltage	kW	kW	kW	kW
03	115	1.0	1.5	2.0	
04	115	1.0	1.5	2.0	2.5
06	115	1.0	1.5	2.0	2.5

Low vertical units are only available with electric heat in combination with the two-row cooling coil.

Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS) Calculations for Fan-Coils with Single Phase Electric Heat

Heater amps = (heater kW x 1000)/heater voltage

Note: Use 120V heater voltage for 115V units. Use 240V heater voltage for 230V units.

MCA = 1.25 x (heater amps + all motor FLAs)

MFS or HACR type circuit breaker = (2.25 x largest motor FLA) + second motor FLA + heater amps (if applicable)

HACR (heating, air-conditioning and refrigeration) type circuit breakers are required in the branch circuit wiring for all fan-coils with electric heat.

Select a standard fuse size or HACR type circuit breaker equal to the MCA. Use the next larger standard size if the MCA does not equal a standard size.

Standard fuse sizes are: 15, 20, 25, 30, 35, 40, 45, 50, 60 amps

Fan-coil electric heat MBh = (heater kW) (3.413)



electrical requirements

Installation

Table I-ER-10. Force Flo single-stage, max kW electric heat

unit size	volts	hz	phase	wires	heater kW	heater amps/ph
02	208	60	1	2	2.25	10.9
	240		1	2	3.0	12.5
	277		1	2	3.0	10.9
	208		3	3	2.25	6.3
	240		3	3	3.0	7.3
	480		3	4	3.0	3.7
03	208	60	1	2	4.5	21.7
	240		1	2	6.0	25.0
	277		1	2	6.0	21.7
	208		3	3	4.5	12.6
	240		3	3	6.0	14.5
	480		3	4	6.0	7.3
04	208	60	1	2	5.7	27.5
	240		1	2	7.5	31.3
	277		1	2	7.5	27.1
	208		3	3	5.7	15.9
	240		3	3	7.5	18.1
	480		3	4	7.5	9.1
06	208	60	1	2	7.9	38.0
	240		1	2	10.5	43.8
	277		1	2	10.5	38.0
	208		3	3	7.9	21.9
	240		3	3	10.5	25.3
	480		3	4	10.5	12.7

Note: All data based on individual units. Electric heat will operate only with fan at high speed.

Table I-ER-11. Force Flo single stage, low kW electric heat

unit size	voltage	# wires	kW	amps/ph	kW	amps/ph	kW	amps/ph
02	208/60/1	2	0.75	3.7	1.5	7.3		
	240/60/1	2	1.0	4.2	2.0	8.4		
	277/60/1	2	1.0	3.7	2.0	7.3		
03	208/60/1	2	2.25	10.9				
	240/60/1	2	3.0	12.5				
	277/60/1	2	3.0	10.9				
	208/60/3	3	2.25	6.3				
	240/60/3	3	3.0	7.3				
	480/60/3	4	3.0	3.7				
04	208/60/1	2	2.25	10.9				
	240/60/1	2	3.0	12.5				
	277/60/1	2	3.0	10.9				
	208/60/3	3	2.25	6.3				
	240/60/3	3	3.0	7.3				
	480/60/3	4	3.0	3.7				
06	208/60/1	2	2.25	10.9	3.3	15.9		
	240/60/1	2	3.0	12.5	4.5	18.8		
	277/60/1	2	3.0	10.9	4.5	16.3		
	208/60/3	3	2.25	6.3	3.3	9.2		
	240/60/3	3	3.0	7.3	4.5	10.9		
	480/60/3	4	3.0	3.7	4.5	5.5		
08	208/60/1	2	2.25	10.9	3.3	15.9	4.5	21.7
	240/60/1	2	3.0	12.5	4.5	18.8	6.0	25.0
	277/60/1	2	3.0	10.9	4.5	16.3	6.0	21.7
	208/60/3	3	2.25	6.3	3.3	9.2	4.5	12.5
	240/60/3	3	3.0	7.3	4.5	10.9	6.0	14.5
	480/60/3	4	3.0	3.7	4.5	5.5	6.0	7.3
10	208/60/1	2	2.25	10.9	3.3	15.9	5.7	27.5
	240/60/1	2	3.0	12.5	4.5	18.8	7.5	31.3
	277/60/1	2	3.0	10.9	4.5	16.3	7.5	27.1
	208/60/3	3	2.25	6.3	3.3	9.2	5.7	15.9
	240/60/3	3	3.0	7.3	4.5	10.9	7.5	18.1
	480/60/3	4	3.0	3.7	4.5	5.5	7.5	9.1
12	208/60/1	2	2.25	10.9	3.3	15.9	6.6	31.8
	240/60/1	2	3.0	12.5	4.5	18.8	9.0	37.5
	277/60/1	2	3.0	10.9	4.5	16.3	9.0	32.5
	208/60/3	3	2.25	6.3	3.3	9.2	6.6	18.4
	240/60/3	3	3.0	7.3	4.5	10.9	9.0	21.7
	480/60/3	4	3.0	3.7	4.5	5.5	9.0	10.9

Note: All data based on individual units. Electric heat will operate only with fan at high speed.



Installation

electrical requirements

Table I-ER-12. Force Flo 2-stage electric heat

unit size	volts	hz	phase	wires	1st stage kW	total kW	total amps/ph
02	208	60	1	2	0.75	2.25	10.9
	240		1	2	1.0	3.0	12.5
	277		1	2	1.0	3.0	10.9
	208		3	3	0.75	2.25	6.3
	240		3	3	1.0	3.0	7.3
	480		3	4	1.0	3.0	3.7
03	208	60	1	2	1.5	4.5	21.7
	240		1	2	2.0	6.0	25.0
	277		1	2	2.0	6.0	21.7
	208		3	3	1.5	4.5	12.6
	240		3	3	2.0	6.0	14.5
	480		3	4	2.0	6.0	7.3
04	208	60	1	2	1.9	5.7	27.5
	240		1	2	2.5	7.5	31.3
	277		1	2	2.5	7.5	27.1
	208		3	3	1.9	5.7	15.9
	240		3	3	2.5	7.5	18.1
	480		3	4	2.5	7.5	9.1
06	208	60	1	2	3.4	7.9	38.0
	240		1	2	4.5	10.5	43.8
	277		1	2	4.5	10.5	38.0
	208		3	3	3.4	7.9	21.9
	240		3	3	4.5	10.5	25.3
	480		3	4	4.5	10.5	12.7
08	208	60	1	2	4.5	10.1	48.8
	240		1	2	6.0	13.5	56.3
	277		1	2	6.0	13.5	48.8
	208		3	3	4.5	10.1	28.2
	240		3	3	6.0	13.5	32.5
	480		3	4	6.0	13.5	16.3
10	208	60	1	2	6.0	13.5	65.0
	240		1	2	8.0	18.0	75.0
	277		1	2	8.0	18.0	65.0
	208		3	3	6.0	13.5	37.6
	240		3	3	8.0	18.0	43.3
	480		3	4	8.0	18.0	21.7
12	208	60	1	2	6.8	15.0	72.3
	240		1	2	9.0	20.0	83.4
	277		1	2	9.0	20.0	72.3
	208		3	3	6.8	15.0	41.7
	240		3	3	9.0	20.0	48.2
	480		3	4	9.0	20.0	24.1

Note: When both stages are on, the electric heat will operate only when fan is in high speed. All data based on individual units.



installation procedure

Installation

Installing the Unit

Follow the procedures below to install the unit properly. Reference the “Dimensions and Weights” section for specific unit dimensions and mounting hole locations.

Vertical Units

CAUTION

Electrical Wiring!

Do not allow electrical wire to fall between the unit and installation surface. Failure to comply may result in electrical shorts or difficulty accessing wires.

Install vertical units in an upright position using the $\frac{5}{8}$ -inch diameter double key slot hanger holes, located on the back of unit. The hanger holes allow a maximum shank size of $\frac{5}{16}$ -inch diameter threaded rods or lag screws (installer provides).

1. Prepare wall openings for recessed units. Reference unit submittal for each unit size dimensions. When installing vertical units, consideration should be given for units with an outside air intake.
2. If the unit has leveling legs, adjust them correctly to level unit.
3. Mark the position of the keyslot hanger holes on the wall according to the dimensions given in the *Dimensions & Weights* section for each unit model and size. Align the hole locations evenly.
4. Insert the threaded rods or lag screws in the wall before setting the unit in place.
5. Remove the front panel (cabinet unit only) by lifting it upward.
6. Position the hanger holes, located on the back of the unit, over the rod or lag screw heads, pushing the unit downward to properly position.
7. Complete piping and wiring connections, in addition to any necessary ductwork to the unit as instructed in the following sections. Ensure that the auxiliary drain pan is in position on fan-coil units.
8. Install the front panel before starting the unit.

On cabinet units, replace the front panel by aligning the bottom tabs on the unit with the respective slots on the panel

bottom. Slide the front panel down onto the tabs while holding the panel close as possible to the cabinet. While the bottom tabs are engaged, slide the front panel upward enough to allow the top engaging edge of the front panel to lap over the engaging edge of the unit. This should allow the panel to drop down and lock into position.

On recessed units, install the front panel by aligning and locking together the interlocking support channel of the panel and unit. While holding the panel against the unit, tighten the screws at the top of the panel until it fits tight against the unit's front. Do not over tighten the screws.

CAUTION

Motor Overload!

All unit panels and filters must be in place prior to unit startup. Failure to have panels and filters in place may cause motor overload.

Horizontal Units

Install horizontal units suspended from the ceiling using the four $\frac{5}{8}$ -inch diameter double key slot hanger holes, located on the top of the unit. The hanger holes allow a maximum shank size of $\frac{5}{16}$ -inch diameter threaded rods or lag screws (installer provides). Follow the installation procedure below.

Note: Follow the requirements of National Fire Protection Association (NFPA) Standard 90A or 90B, concerning the use of concealed ceiling spaces as return air plenums.

1. Prepare the ceiling opening for recessed units. Reference the unit submittals for dimensions.
2. Position and install the suspension rods or a suspension device (supplied by installer) according to the unit model and size in the *Dimensions & Weights* section.
3. On cabinet units, remove the bottom panel by using a $\frac{5}{32}$ -inch Allen wrench to unscrew fasteners. Swing the panel down and lift outward.
4. Level the unit by referencing the chassis end panels. Adjust the suspension device.

5. Complete piping and wiring connections. necessary ductwork as instructed in the following sections. Ensure that the auxiliary drain pan is in position on fan-coil units.
6. Install the bottom panel before starting the unit.
7. Ensure condensate drain line is pitched one inch per ten feet of pipe away from the fan-coil unit.

Cabinet units

Install the bottom panel by placing the hinged end on the unit's hinged end (always at the return end of the unit). Reference the *Dimensions & Weights* section for keyslot hanger hole locations. Swing the panel upward into position. Secure the panel with the fasteners provided. Do not overtighten the fasteners.

Recessed units

Reference the *Dimensions & Weights* section for mounting locations and unit weights. Follow the procedure below and reference Figure I-IP-1.

1. Insert the mounting bolts through the panel brackets of the trim ring and secure to the hanger holes on the unit. Tighten the mounting bolts to pull the trim ring snug against the finished ceiling.
2. Install the bottom panel by placing the hinged end on the trim ring hinged end (always at the unit's return end).
3. Adjust the expansion collar's inner duct (only on fan-coil units with a bottom return) to ensure a tight fit against the insulation located on the perimeter of the bottom panel's return louver.
4. Close the s-hook on each end of safety chain assembly. Insert s-hooks through holes in unit and door. Close s-hook on door.
5. Insert retaining screws through bottom panel door and place retaining rings on screws.
6. Swing the bottom panel upward into position. Hook the safety chain to the bottom panel and the unit. Tighten the panel to the unit with the fasteners provided.

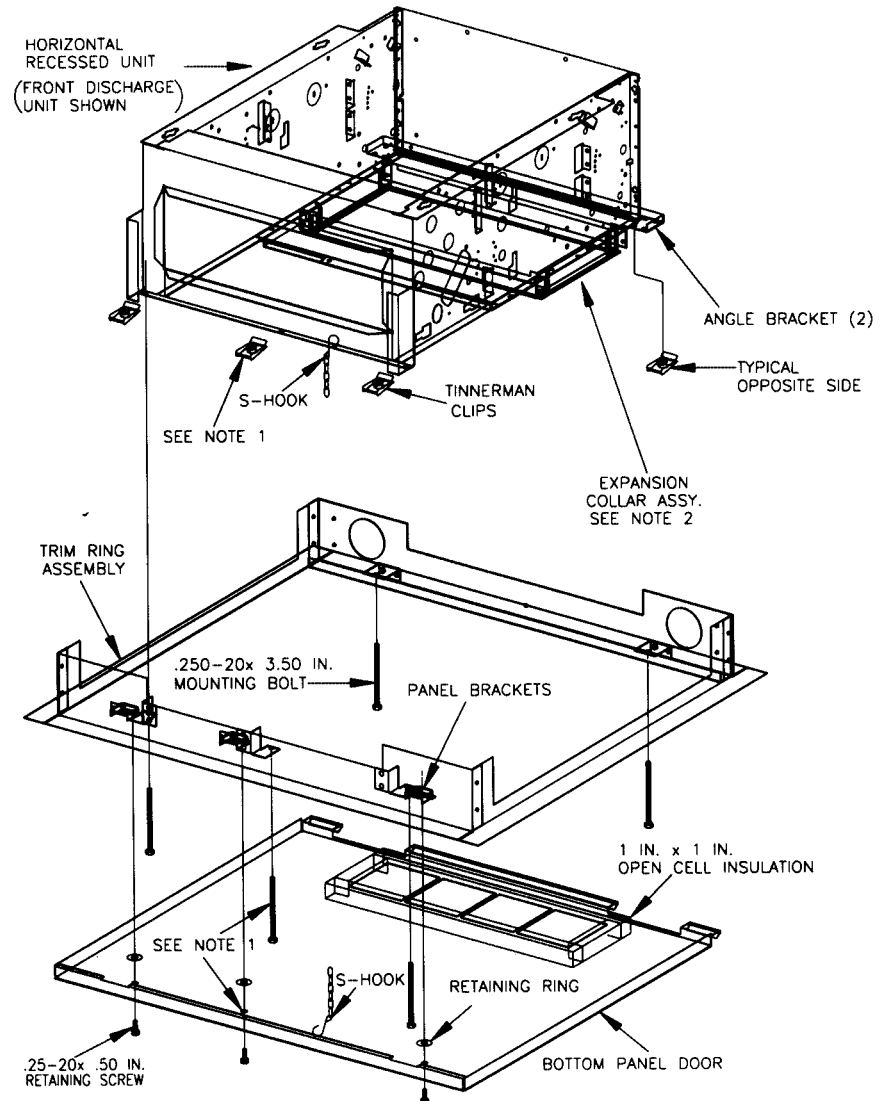
Installation

installation procedure

CAUTION

Unit Leveling!

All unit panels and filters must be in place prior to unit start-up. Failure to have panels and filters in place may cause motor overload.



PARTS LIST	
PART DESCRIPTION	QTY.
BOTTOM PANEL DOOR	1
TRIM RING ASSEMBLY	1
INSTALLATION DRAWING	1
UNIT SIZE	02-06 08-12
.25-20 x .50 IN. RETAINING SCREW	2 3
RETAINING RING	2 3
SAFETY CHAIN ASSEMBLY	1 2
.25-20 x 3.50 IN. BOLT	4 5
.25-20 x 2.00 IN. BOLT	0 1
TINNEMAN CLIP	4 5

Note: The trim ring assembly cannot accommodate unlevel ceilings.

Note: On sizes 8, 10, & 12 center installation position and use 2 or 3.5-inch bolts, whichever is best suited for installation. Also, install two safety chain assemblies on these sizes.

Note: Expansion collar is furnished with fan-coil with bottom return only. The collar is not necessary for Force Flo units.

Figure I-IP-1. Installing the trim ring assembly on horizontal recessed units.

Installation

installation procedure

Wall-Mounted Control Options



Figure I-IP-2. Zone sensor with off/ auto/high/low fan speeds, setpoint knob, on/cancel, and comm jack.



Figure I-IP-4. Zone sensor with setpoint knob, on/cancel, & comm jack.



Figure I-IP-3. Zone sensor with on/cancel and comm jack.



Figure I-IP-5. Zone sensor only.



Figure I-IP-6. Digital zone sensor option

Installation

Installing Wall Mounted Controls

Reference the wall-mounted zone sensor dimensions in Figure I-IP-6. Position the controller on an inside wall three to five feet above the floor and at least 18 inches from the nearest outside wall. Installing the controller at a lower height may give the advantage of monitoring the temperature closer to the zone, but it also exposes the controller to airflow obstructions. Ensure that air flows freely over the controller.

Before beginning installation, follow the wiring instructions below. Also, refer to the unit wiring schematic for specific wiring details and point connections.

Wiring Instructions

Avoid mounting the controller in an area subject to the following conditions:

- Dead spots, such as behind doors or in corners that do not allow free air circulation.
- Air drafts from stairwells, outside doors, or unsectioned hollow walls.
- Radiant heat from the sun, fireplaces, appliances, etc.
- Airflow from adjacent zones or other units.
- Unheated or uncooled spaces behind the controller, such as outside walls or unoccupied spaces.

- Concealed pipes, air ducts, or chimneys in partition spaces behind the controller.

Fan Mode Switch Installation

The fan mode switch ships loose inside the unit accessory bag. Follow the steps below to install the fan mode switch.

Items needed:

- 2 x 4 electrical junction box
1. Remove the brown wire if not using a field-supplied damper. Remove the terminals, cut and strip wires as required for installation.
2. Level and position a 2 x 4 electrical junction box. Follow the instructions given in the "Interconnection Wiring" section and route the wires as shown in the wiring diagram. Refer to the typical wiring diagram or to the unit specific diagram on the unit.
3. Position the fan mode switch over the junction box with the two screws supplied.

Zone Sensor Installation

Follow the procedure below to install the zone sensor module.

1. Note the position of the setpoint adjustment knob and gently pry the adjustment knob from the cover using the blade of a small screwdriver.
2. Insert the screwdriver blade behind the cover at the top of the module and carefully pry the cover away from the base.

3. To install the zone sensor module without a junction box (directly to the wall):
 - a. Using the module base as a template, mark the the rectangular cutout for the control wiring and module installation holes. Ensure the base is level.
 - b. Set the base aside and make the cutout. Then, drill two $\frac{3}{16}$ " diameter holes approximately one-inch deep. Insert and fully seat the plastic anchors.
 - c. Pull the control wires through the cutout and attach the module to the wall using the screws provided.
4. To install the zone sensor module to a standard junction box:
 - a. Level and install a 2" x 4" junction box (installer supplied) vertically on the wall.
 - b. Pull the control wires through the cutout. Attach the module to the wall using the screws provided.
5. Strip the insulation on the interconnection wires back 0.25 inch and connect to TB1. Screw down the terminal blocks.
6. Replace the zone sensor cover and adjustment knob.

If installing a Tracer ZN510 or Tracer ZN520 zone sensor, see the Tracer Summit Communication section for more information.

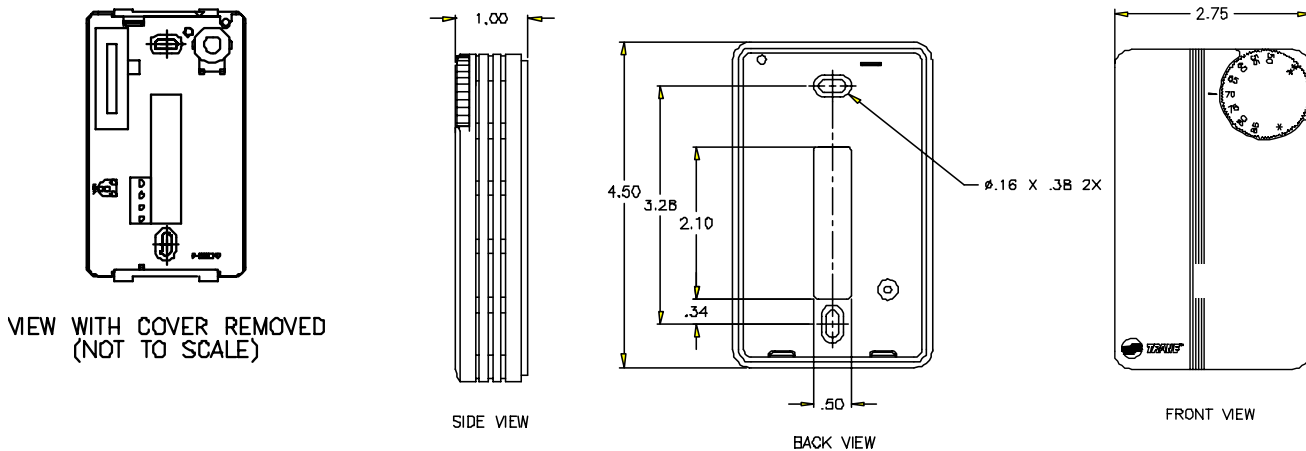


Figure I-IP-6. Wall mounted zone sensor dimensions.

Installation

installation procedure

Installation Checklist

The following checklist is only an abbreviated guide to the detailed installation procedures given in this manual. Use this list to ensure all necessary procedures are complete. For more detailed information, refer to the appropriate sections in this manual.

WARNING

Hazardous Voltage w/Capacitors!
Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

- 1. Inspect the unit for shipping damage.
- 2. Level installation location to support the unit weight adequately. Make all necessary wall or ceiling openings to allow adequate air flow and service clearances.
- 3. Ensure the unit chassis is installed level.

CAUTION

Unit Leveling!

The unit must be installed level (zero tolerance) in both horizontal axis for proper operation. Do not use the coil or drain pan as the reference point because the coil may be pitched and the drain pan has an inherent positive slope to provide proper drainage.

- 4. Verify that wall and ceiling openings are properly cut per the unit submittals.
- 5. Verify that installation of horizontal concealed units meets the national Fire

Protection Association (N.F.P.A.) Standard 90A or 90B concerning the use of concealed ceiling spaces as return air plenums. Verify correct ceiling opening dimensions on unit submittals. Secure the unit and any accessory items properly to the wall or ceiling support rods.

- 6. Complete all piping connections correctly.
- 7. Check field sweat connections for leaks and tighten the valve stem packing, and piping pkg unions if necessary.
- 8. Install the auxiliary drain pan properly under piping package on fan-coil units.
- 9. Complete condensate drain line connections on fan-coil units.
- 10. Pitch condensate drain line away from fan-coil one-inch drop per ten feet of pipe.
- 11. Install automatic changeover sensor option on the supply water line, if applicable.
- 12. Install automatic electric heat lockout switch option on the supply water line, if applicable.
- 13. Install condensate overflow switch option correctly on the auxiliary drain pan, if applicable.
- 14. Ensure the low temperature detection device option is correctly installed.
- 15. Complete all necessary duct connections.
- 16. Complete all interconnection wiring for the wall mounted fan mode switch or zone sensor per the wiring schematic and guidelines established in the "Wall Mounted Control Interconnection Wiring" section.
- 17. Install the wall mounted fan mode switch, or zone sensor module options properly.
- 18. Connect electrical supply power according to the NEC and unit wiring diagrams.
- 19. Remove any miscellaneous debris, such as sheetrock dust, that may have infiltrated the unit during construction.
- 20. Replace the air filter as required.

Installation

pre-startup requirements

Communication Wiring

Units with Tracer ZN510 and ZN520 Only Communications

Tracer ZN510 and ZN520 controllers are LonTalk® devices that interface with the Trane Tracer Summit building management system. Reference the unit wiring diagram or submittals.

Ground shields at each Tracer ZN510 and ZN520, taping the opposite end of each shield to prevent any connection between the shield and another ground. Refer to Trane publication, *CNT-SVX04A-EN Installation, Operation and Programming Guide*, for the communication wiring diagram.

Communication wire must conform to the following specification:

1. Shielded twisted pair 18 AWG
2. Capacitance 23 (21-25) picofarads (pF) per foot
3. Listing/Rating – 300V 150C NEC 725-2 (b) Class 2 Type CL2P
4. Trane Part No. 400-20-28 or equivalent, available through Trane BAS Buying Group Accessories catalog.

Note: Communication link wiring is a shielded, twisted pair of wire and must comply with applicable electrical codes.

Follow these general guidelines when installing communication wiring on units with a Tracer ZN510 or ZN520 controller:

- Maintain a maximum 5000 ft. aggregate run.
- Install all communication wiring in accordance with the NEC and all local codes.
- Solder the conductors and insulate (tape) the joint sufficiently when splicing communication wire. Do not use wire nuts to make the splice.
- Do not pass communication wiring between buildings because the unit will assume different ground potentials.
- Do not run power in the same conduit or wire bundle with communication link wiring.

Note: You do not need to observe polarity for LonTalk communication links.

Device Addressing

LonTalk devices are given a unique address by the manufacturer. This address is called a Neuron ID. Each Tracer ZN510 and ZN520 controller can be identified by its unique Neuron ID, which is printed on a label on the controller's logic board. The Neuron ID is also displayed when communication is established using Tracer Summit or Rover service tool. The Neuron ID format is 00-01-64-1C-2B-00.

Wire Characteristics

Controller communication-link wiring must be low capacitance, 18-gage, shielded, twisted pair with stranded, tinned-copper conductors. For daisy chain configurations, limit the wire run length to 5,000 ft. Trunk and branch configurations are significantly shorter. LonTalk wire length limitations can be extended through the use of a link repeater.

Recommended Communication Wiring Practices

The following guidelines should be followed while installing communication wire.

- LonTalk is not polarity sensitive. Trane recommends that the installer keep polarity consistent throughout the site.
- Only strip away two-inches maximum of the outer conductor of shielded cable.
- Make sure that the 24VAC power supplies are consistent in how they are grounded. Avoid sharing 24VAC between LonTalk UCMS.
- Avoid over-tightening cable ties and other forms of cable wraps. A tight tie or wrap could damage the wires inside the cable.
- Do not run LonTalk cable alongside or in the same conduit as 24VAC power.
- In an open plenum, avoid lighting ballasts, especially those using 277VAC.
- Do not use a trunk and branch configuration, if possible. Trunk and branch configurations shorten the distance cable can be run.

Installation

Pre-Startup Checklist

Complete this checklist after installing the unit to verify all recommended installation procedures are complete before unit startup. This does not replace the detailed instructions in the appropriate sections of this manual. Disconnect electrical power before performing this checklist. Always read the entire section carefully to become familiar with the procedures.

⚠ WARNING *Hazardous Voltage w/Capacitors!*

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Receiving

- Inspect unit and components for shipping damage. File damage claims immediately with the delivering carrier.
- Check unit for missing material. Look for ship-with options and sensors that may be packaged separately from the main unit. See the "Receiving and Handling" section.
- Check nameplate unit data so that it matches the sales order requirements.

Unit Location

1. Ensure the unit location is adequate for unit dimensions, ductwork, piping, and electrical connections.
2. Ensure access and maintenance clearances around the unit are adequate.

Unit Mounting

1. Ensure unit is installed level.

Component Overview

1. Ensure the fan rotates freely in the correct direction.
2. Ensure all unit access panels and air grilles are in place.
3. Verify that a clean air filter is in place.
4. Properly set the damper position to meet the fresh air requirement.

Unit Piping

1. Properly vent the hydronic coil to allow water flow through the unit.
2. Units with deluxe piping package: Tighten unions adequately.
3. Set water flow to the unit properly if unit piping has the circuit setter valve.
4. Check strainers (if supplied) for debris after apply system water.
5. Install the auxiliary drain pan and route the main drain pan hoses to the auxiliary drain pan on vertical fan-coil units.
6. Verify the condensate drain piping is complete for the unit drain pan.
7. Ensure the drain pan and condensate line are not obstructed. Remove any foreign matter that may have fallen into the drain pan during installation.

Electrical

- Check all electrical connections for tightness.

Note: Some circumstances may require the unit to run before building construction is complete. These operating conditions may be beyond the design parameters of the unit and may adversely affect the unit.



Installation

startup

Tracer™ ZN510 & ZN520 Unit Startup

Refer to the Trane publication, *CNT-IOP-1 Installation, Operation and Programming Guide* for Tracer ZN510 and CNT-SVX04A-EN for Tracer ZN520. The factory pre-programs the Tracer ZN510 and ZN520 with default values to control the temperature and unit airflow. Use Tracer Summit building automation system or Rover™ software to change the default values.

Follow the procedure below to operate the Tracer ZN510 or ZN520 in a stand-alone operation:

1. Turn power on at the disconnect switch option.
2. Position the fan mode switch to either high, medium, low, or the auto position.
3. Rotate the setpoint dial on the zone

sensor module to 55°F for cooling or 85°F for heating.

The appropriate control valve will actuate assuming the following conditions:

1. Room temperature should be greater than 55°F and less than 85°F.
2. For a 2-pipe fan-coil unit with an automatic changeover sensor, the water temperature input is appropriate for the demand placed on the unit. For example, cooling operation is requested and cold water (5° lower than room temperature) flows into the unit.
3. Select the correct temperature setpoint.

Note: Select and enable zone sensor temperature settings to prevent freeze damage to unit.

Operation

general information

General Information

Relay Board

The relay board is a new component on all models (except those with a unit-mounted, line-voltage fan speed switch) that replaces all the loose wires in the control box. It consolidates many control components onto one board, therefore making it easy to troubleshoot in the field. There is an LED on the board that indicates when power is supplied to the board. All connections are made to match up only with the applicable component to, thus prevent miswiring. Factory switches are pre-set and locked in place with lock-tight. The switch settings can be broken if field-modifications are needed. However, switches must be properly set for the unit to operate safely and properly. See Figure O-GI-1.

Manual Fan Mode Switch

The manual fan mode switch is available with a four-position switch (off-hi-med-lo) allows manual fan mode selection and is available unit or wall mounted. See Figure O-GI-2.

The unit-mounted option operates on line voltage. The wall mounted option is low-voltage and has three 24-volt relays using a factory-wired transformer and relays to control the fan motor.

Tracer ZN010 & ZN510

Tracer ZN010 is a stand-alone device that controls fan-coils and cabinet heaters. Tracer ZN510 can be stand-alone or use peer-to-peer communications.

The controller is easily accessible in the control end panel for service. The control end panel is on the end of the unit opposite the piping. Reference Figure O-GI-3.



Figure O-GI-2. Fan speed switch



Figure O-GI-1. Relay board



Figure O-GI-3. Tracer ZN010 board



Operation

sequence of operation

Fan Mode Switch Operation

Off

Fan is turned off, two-position damper option spring-returns closed.

Hi, Med, Lo

Fan runs continuously at the selected speed. The two-position damper option opens to an adjustable mechanical stop position.

Tracer ZN010 & ZN510 Operation

Off

Fan is off; control valves and fresh air damper option close. Low air temperature detection option is still active.

Auto (Fan Cycling)

Fan and fresh air damper cycle with control valve option to maintain setpoint temperature. In cooling mode, the fan cycles from off to medium and in heating mode it cycles from off to low. When no heating or cooling is required, the fan is off and the fresh air damper option closes.

Low/Med/High (Continuous Fan)

Fan operates continuously while control valve option cycles to maintain setpoint temperature. Fresh air damper option is open.

Tracer ZN520 Operation

Off

Fan is off; control valve options and fresh air damper options close. The low air temperature detection option is still active.

Auto

Fan speed control in the auto setting allows the modulating (3-wire floating point) or 2-position control valve option and three-speed fan to work cooperatively to meet precise capacity requirement, while minimizing fan speed (motor/energy/acoustics) and valve position (pump energy, chilled water reset). As the capacity requirement increases at low fan speed, the water valve opens. When the low fan speed capacity switch point is reached, the fan switches to medium speed and the water valve repositions to maintain an equivalent capacity. The reverse sequence takes place with a decrease in required capacity.

Low/Med/High

The fan runs continuously at the selected speed and the valve option will cycle to meet setpoint.



sequence of operation

Operation

Sequence of Operation Tracer ZN010 and ZN510

Note: this section applies only to units with a Tracer ZN010 or ZN510 controller.

Power-Up Sequence

When 24 VAC power is initially applied to the Tracer ZN010 or ZN510, the following sequence occurs:

1. All outputs are controlled off.
2. Tracer ZN010 and ZN510 reads all input values to determine initial values.
3. The random start time (0-25 seconds) expires.
4. Normal operation begins.

Entering Water Temperature Sampling Function

Both Tracer ZN010 and ZN510 use an entering water temperature sampling function to test for the correct water temperature for the unit operating mode. For all applications not involving changeover, the water temperature does not affect unit operation.

The entering water temperature sampling function opens the main hydronic valve, waits no more than three minutes to allow the water temperature to stabilize, then measures the entering water temperature to see if the correct water temperature is available.

The entering water must be five degrees or more above the space temperature to allow hydronic heating and five degrees or more below the space temperature to allow hydronic cooling.

If the correct water temperature is available, the unit begins normal heating or cooling operation. If the measured entering water temperature is too low or high, the controller closes the valve and waits 60 minutes before attempting to sample the entering water. Reference Table O-SO-1.

Table O-SO-1. Unit mode as related to water temperature

unit type	EWT sensor required?	coil water temperature
2-pipe changeover	yes	COOLS if: space temp - EWT $\geq 5^{\circ}\text{F}$ HEATS if: EWT - space temp $\geq 5^{\circ}\text{F}$
4-pipe changeover	yes	COOLS if: space temp - EWT $\geq 5^{\circ}\text{F}$ HEATS if: EWT - space temp $\geq 5^{\circ}\text{F}$
2-pipe heating only	no	hot water assumed
2-pipe cooling only	no	cold water assumed
4-pipe heat/cool	no	cold water assumed in main coil hot water assumed in aux. coil

Binary Inputs

BIP1: Low Temperature Detection Option

The factory hard wires the low temperature detection sensor to binary input #1 (BIP1) on the Tracer ZN010 and ZN510. The sensor defaults normally closed (N.C.), and will trip off the unit on a low temperature diagnostic when detecting low temperature. In addition, the Tracer ZN010 and ZN510 control unit devices as listed below:

- fan: off
- valves: open
- electric heat: off
- damper: closed

Note: See the "Diagnostics" section for more information.

BIP2: Condensate Overflow Detection Option

The factory hard wires the condensate overflow sensor to binary input #2 (BIP2) on the Tracer ZN010 and ZN510. The sensor defaults normally closed (N.C.), and will trip off the unit on a condensate overflow diagnostic if condensate reaches the trip point. In addition, the Tracer ZN010 and ZN510 control unit devices as listed below:

- fan: off
- valves: closed
- electric heat: off

Table O-SO-2. Occupancy sensor state table

sensor type	sensor position	unit occupancy mode
normally open	open	occupied
normally open	closed	unoccupied
normally closed	open	unoccupied
normally closed	closed	occupied

BIP3: Occupancy Sensor

Binary input #3 (BIP3) on Tracer ZN010 and ZN510 is available for field-wiring an occupancy sensor, such as a binary switch or a timeclock, to detect occupancy. The sensor can be either normally open or normally closed. Reference Table O-SO-2.

Binary Outputs

Reference Table O-SO-3 for the Tracer ZN010 and ZN510's six binary outputs.

Table O-SO-3. Binary outputs

binary output	description	pin
BOP1	fan high speed	J1-1
BOP2	fan medium speed	J1-2
BOP3	fan low speed	J1-4
BOP4	main valve	J1-5
BOP5	auxiliary valve/electric heat	J1-6
BOP6	2-position fresh air damper	J1-7

Notes:

1. In a four-pipe application, BOP4 is used for cooling and BOP5 is used for heating.
2. If no valves are ordered with the unit, the factory default for the Tracer ZN010 and ZN510 controller are:
BOP4 configured as normally closed
BOP5 configured as normally open
3. If the fresh air damper option is not ordered on the unit, BOP6 will be configured as none.



sequence of operation

Operation

Analog Inputs

Both Tracer ZN010 and ZN510 accept a maximum of five analog inputs. Reference Table O-SO-4.

Zone Sensors

The zone sensors available with the Tracer ZN010 and ZN510 provide up to three different inputs

1. Space temperature measurement (10KΩ thermistor)
2. Local setpoint
3. Fan mode switch

Wall mounted zone sensors include a thermistor as a component of the internal printed circuit board. Unit mounted zone sensors use a sensor placed in the unit's return air stream.

Each zone sensor is equipped with a thumbwheel for setpoint adjustment.

Fan Mode Switch

The zone sensor may be equipped with a fan mode switch. The fan mode switch offers selections of off, low, medium, high, or auto.

Supply Fan Operation

Reference Table O-SO-5 for fan mode operation. Reference Table O-SO-5 for fan mode operation. Tracer ZN010 and ZN510 will operate in either continuous fan or fan cycling mode. The fan cycles when the fan mode switch is placed in auto. The fan runs continuous when placed in the high, medium, or low position. Use Rover, Trane's installation and service tool, to change auto defaults.

Table O-SO-4. Analog inputs

analog input	description	application
zone	space temperature	space temperature detection
set	local setpoint	thumbwheel setpoint
fan	fan mode input	zone sensor fan switch
analog input 1 (AI1)	entering water temperature	entering water temperature detection
analog input 2 (AI2)	discharge air temperature	discharge air temperature detection

Notes:

1. The zone sensor, entering water temperature sensor, and the discharge air temperature sensor are 10KΩ thermistors. Figure 26 provides the resistance-temperature curve for these thermistors.
2. Zone sensor:
Wall mounted sensors include a thermistor soldered to the sensor's circuit board
Unit mounted sensors include a return air sensor in the unit's return air stream.
3. Changeover units include an entering water temperature sensor.

Table O-SO-5. Fan mode operation

heating mode		cooling mode		
fan mode	occupied	unoccupied	occupied	unoccupied
off	off	off	off	off
low	low	off/high (3)	low	off/high (3)
medium	medium	off/high (3)	medium	off/high (3)
high	high	off/high (3)	high	off/high (3)
auto				
continuous	heat default	off/high (3)	cool default	off/high (3)
cycling off/heat default		off/high (3)	off/cool default	off/high (3)

Notes:

1. During the transition from off to any fan speed but high, Tracer ZN010 and ZN510 automatically starts the fan on high speed and runs for three seconds before transitioning to the selected speed (if it is other than high). This provides enough torque to start all fan motors from the off position.
2. When the heating output is controlled off, Tracer ZN010 and ZN510 automatically controls the fan on for an additional 30 seconds. This delay allows the fan to dissipate any residual heat from the heating source, such as electric heat.
3. Whenever two states are listed for the fan:
The first state (off) applies when there is not a call for heating or cooling.
The second state (varies) applies when there is a call for heating or cooling.
The heat default is factory configured for low fan speed, and the cool default is medium.

Table O-SO-6. Valid operating range and factory default setpoints

setpoint/parameter	default setting	valid operating range
unoccupied cooling setpoint	85° F	40 to 115° F
occupied cooling setpoint	74° F	40 to 115° F
occupied heating setpoint	71° F	40 to 115° F
unoccupied heating setpoint	60° F	40 to 115° F
cooling setpoint high limit	110° F	40 to 115° F
cooling setpoint low limit	40° F	40 to 115° F
heating setpoint high limit	105° F	40 to 115° F
heating setpoint low limit	40° F	40 to 115° F
power-up control wait	0 sec	0 to 240 sec

Operation

Tracer ZN520 Sequence of Operation

The Tracer ZN520 operates the fan in the following modes:

- 1) occupied
- 2) unoccupied
- 3) occupied standby
- 4) occupied bypass
- 5) Tracer Summit with supply fan control

Occupied

When the controller is in the occupied mode, the unit attempts to maintain the space temperature at the active occupied heating or cooling setpoint, based on the measured space temperature, the discharge air temperature, the active setpoint, and the proportional/integral control algorithm. The modulating control algorithm used when occupied or in occupied standby is described in the following sections. Additional information related to the handling of the controller setpoints can be found in the previous Setpoint operation section.

Unoccupied Mode

When the controller is in the unoccupied mode, the controller attempts to maintain the space temperature at the stored unoccupied heating or cooling setpoint, based on the measured space temperature, the active setpoint and the control algorithm, regardless of the presence of a hardwired or communicated setpoint. Similar to other configuration properties of the controller, the locally stored unoccupied setpoints can be modified using Rover™ service tool.

In unoccupied mode, a simplified zone control algorithm is run. During the cooling mode, when the space temperature is above the cool setpoint, the primary cooling capacity operates at 100%. If more capacity is needed, the supplementary cooling capacity turns on (or opens to 100%). During the heating mode, when the space temperature is below the heat setpoint, the primary heating capacity turns on. All capacity is turned off when the space temperature is between the unoccupied cooling and heating setpoints. Note that primary

heating or cooling capacity is defined by unit type and whether heating or cooling is enabled or disabled. For example, if the economizer is enabled and possible, it will be the primary cooling capacity. If hydronic heating is possible, it will be the primary heating capacity.

Occupied Standby Mode

The controller can be placed into the occupied standby mode when a communicated occupancy request is combined with the local (hardwired) occupancy binary input signal. When the communicated occupancy request is unoccupied, the occupancy binary input (if present) does not affect the controller's occupancy. When the communicated occupancy request is occupied, the controller uses the local occupancy binary input to switch between the occupied and occupied standby modes.

During occupied standby mode, the controller's economizer damper position goes to the economizer standby minimum position. The economizer standby minimum position can be changed using Rover service tool.

In the occupied standby mode, the controller uses the occupied standby cooling and heating setpoints. Because the occupied standby setpoints typically cover a wider range than the occupied setpoints, the Tracer ZN520 controller reduces the demand for heating and cooling the space. Also, the outdoor air economizer damper uses the economizer standby minimum position to reduce the heating and cooling demands.

When no occupancy request is communicated, the occupancy binary input switches the controller's operating mode between occupied and unoccupied. When no communicated occupancy request exists, the unit cannot switch to occupied standby mode.

Occupied Bypass Mode

The controller can be placed in occupied bypass mode by either communicating an occupancy request of Bypass to the controller or by using the timed override On button on the Trane zone sensor.

When the controller is in unoccupied mode, you can press the On button on the zone sensor to place the controller into occupied bypass mode for the duration of the bypass time (typically 120 minutes).

Occupancy Sources

There are four ways to control the controller's occupancy:

- Communicated request (usually provided by the building automation system or peer device)
- By pressing the zone sensor's timed override On button
- Occupancy binary input
- Default operation of the controller (occupied mode)

A communicated request from a building automation system or another peer controller can change the controller's occupancy. However, if communication is lost, the controller reverts to the default operating mode (occupied) after 15 minutes (configurable, specified by the "receive heartbeat time"), if no local hardwired occupancy signal exists.

A communicated request can be provided to control the occupancy of the controller. Typically, the occupancy of the controller is determined by using time-of-day scheduling of the building automation system. The result of the time-of-day schedule can then be communicated to the unit controller.

Tracer Summit with Supply Fan Control

If the unit is communicating with Tracer Summit and the supply fan control programming point is configured for Tracer (the factory configures as local), Tracer Summit will control the fan regardless of the fan mode switch position.

When the fan mode switch is set to Off or when power is restored to the unit, all Tracer ZN520 lockouts (latching diagnostics) are manually reset. The last diagnostic to occur is retained until the unit power is disconnected. Refer to Trane publication, *CNT-SVX04A-EN Tracer ZN520 Installation Operation and Programming Guide*, for specific instructions regarding the procedure for running the Tracer ZN520.

Operation

Cooling Operation

The heating and cooling setpoint high and low limits are always applied to the occupied and occupied standby setpoints. During the cooling mode, the Tracer ZN520 controller attempts to maintain the space temperature at the active cooling setpoint. Based on the controller's occupancy mode, the active cooling setpoint is one of the following:

- Occupied cooling setpoint
- Occupied standby cooling setpoint
- Unoccupied cooling setpoint

The controller uses the measured space temperature, the active cooling setpoint, and discharge air temperature along with the control algorithm to determine the requested cooling capacity of the unit (0-100%). The outputs are controlled based on the unit configuration and the required cooling capacity. To maintain space temperature control, the Tracer ZN520 cooling outputs (modulating hydronic valve, two-position hydronic valve, or outdoor air economizer damper) are controlled based on the cooling capacity output.

The cooling output is controlled based on the cooling capacity. At 0% capacity, all cooling capacities are off and the damper is at minimum position. Between 0 and 100% capacity, the cooling outputs are controlled according to modulating valve logic (modulating valves) or cycled on (2-position valves). As the load increases, modulating outputs open further and binary outputs are energized longer. At 100% capacity, the cooling valve or damper is fully open (modulating valves) or on continuously (and 2-position valves).

Unit diagnostics can affect fan operation, causing occupied and occupied standby fan operation to be defined as abnormal. Refer to the Troubleshooting section for more information about abnormal fan operation.

The Tracer ZN520 controller operates the supply fan continuously when the controller is in the occupied and occupied standby modes, for either heating or cooling. The controller only cycles the fan off with heating and cooling capacity in the unoccupied mode.

The economizer is used for cooling purposes whenever the outdoor temperature is below the economizer enable setpoint and there is a need for cooling. The economizer is used first to meet the space demand, and other forms of cooling are used if the economizer cannot meet the demand alone. See modulating outdoor air damper operation for additional information.

Cascade cooling control initiates a discharge air tempering function if the discharge air temperature falls below the discharge air temperature control low limit, all cooling capacity is at minimum, and the discharge control loop determines a need to raise the discharge air temperature. The controller then provides heating capacity to raise the discharge air temperature to its low limit.

Discharge Air Tempering

The discharge air tempering function enables when cold outdoor air is brought in through the outdoor air damper, causing the discharge air to fall below the discharge air temperature control low limit. The controller exits the discharge air tempering function when heat capacity has been at 0% for five minutes.

Heating Operation

During heating mode, the Tracer ZN520 controller attempts to maintain the space temperature at the active heating setpoint. Based on the occupancy mode of the controller, the active heating setpoint is one of the following:

- Occupied heating
- Occupied standby heating
- Unoccupied heating

During dehumidification in the heating mode, the controller adjusts the heating setpoint up to the cooling setpoint. This reduces the relative humidity in the space with a minimum of energy usage.

The controller uses the measured space temperature, the active heating setpoint, and discharge air temperature, along with the control algorithm, to determine the requested heating capacity of the unit (0-100%). The outputs are controlled based on the unit configuration and the required heating capacity.

Unit diagnostics can affect the Tracer ZN520 controller operation, causing unit operation to be defined as abnormal. Refer to the Troubleshooting section for more information about abnormal unit operation.

The heating output is controlled based on the heating capacity. At 0% capacity, the heating output is off continuously. Between 0 and 100% capacity, the heating output is controlled according to modulating valve logic (modulating valves) or cycled on (two-position valves). As the load increases, modulating outputs open further and binary outputs are energized longer. At 100% capacity, the heating valve is fully open (modulating valves) or on continuously (two-position valves).

The Tracer ZN520 fan output(s) normally run continuously during the occupied and occupied standby modes, but cycle between high and off speeds with heating/cooling during the unoccupied mode. When in the occupied mode or occupied standby mode and the fan speed is set at the high, medium, or low position, the fan runs continuously at the selected speed. Refer to the Troubleshooting section for more information on abnormal fan operation.

When the unit's supply fan is set to auto, the controller's configuration determines the fan speed when in the occupied mode or occupied standby mode. The fan runs continuously at the configured heating fan speed or cooling fan speed. For all fan speed selections except off, the fan cycles off during unoccupied mode.

The economizer outdoor air damper is never used as a source of heating. Instead, the economizer damper (when present) is only used for ventilation; therefore, the damper is at the occupied minimum position in the occupied mode. The damper control is primarily associated with occupied fan operation.

sequence of operation

Operation

Fan Mode Operation

For multiple fan speed applications, the Tracer ZN520 controller offers additional fan configuration flexibility. Separate default fan speeds for heating and cooling modes can be configured. The fan runs continuously for requested speeds (off, high, medium, or low). When the fan mode switch is in the Auto position or a hardwired fan mode input does not exist, the fan operates at the default configured speed. See Table 21 for default fan configuration for heat and cool mode. During unoccupied mode, the fan cycles between high speed and off with heating and cooling fan modes. If the requested speed is off, the fan always remains off.

During dehumidification, when the fan is on Auto, the fan speed can switch depending on the error. Fan speed increases as the space temperature rises above the active cooling setpoint.

Additional flexibility built into the controller allows you to enable or disable the local fan switch input. The fan mode request can be either hardwired or communicated to the controller. When both are present, the communicated request has priority over the hardwired input. See Tables 22, 23, and 24.

Table O-SO-7. Fan configuration

	auto fan operation	fan speed default
Heating	continuous	off low medium high
Cooling	continuous	off low medium high

Table O-SO-11. Relationship between outdoor temperature sensors and damper position

Outdoor Air Temp.	Modulating Outdoor Air Damper		
	occupied or occupied bypass	occupied standby	unoccupied
none or invalid	open to occupied minimum position	open to occupied standby minimum position	closed
failed	open to occupied minimum position	open to occupied standby minimum position	closed
present and economizing feasible	economizing minimum position to 100%	economizing between occupied standby minimum position to 100%	open & economizing when unit is operating, closed otherwise
present & economizing not feasible	open to occupied minimum position	open to occupied standby minimum position	closed

Table O-SO-8. Local fan switch enabled

Communicated fan speed input	Fan switch (local)	Fan operation
Off	Ignored	Off
Low	Ignored	Low
Medium	Ignored	Medium
High	Ignored	High
Auto	Off	
Low		
Medium		
High		
Auto	Off	
Low		
Medium		
High		
Auto (configured default, determined by heat/cool mode)		

Table O-SO-9. Fan operation in heating and cooling modes

Fan mode	Heating		Cooling	
	Occ.	Unocc.	Occ.	Unocc.
off	off	off	off	off
Low	low	off/high	low	off/high
Medium	med	off/high	med	off/high
High	high	off/high	high	off/high
Auto	default fan sp.	off/high	default fan sp.	off/high

Table O-SO-10. Local fan switch disabled or not present

Communicated fan speed input	Fan operation
Off	Off
Low	Low
Medium	Medium
High	High
Auto (or not present)	Auto (fan runs at the default speed)

Continuous Fan Operation

During occupied and occupied standby modes, the fan normally is on. For multiple speed fan applications, the fan normally operates at the selected or default speed (off, high, medium, or low). When fan mode is auto, the fan operates at the default fan speed.

During unoccupied mode, the controller controls the fan off. While unoccupied, the controller heats and cools to maintain the unoccupied heating and cooling setpoints. In unoccupied mode, the fan is controlled on high speed only with heating or cooling.

The unit fan is always off during occupied, occupied standby, and unoccupied modes when the unit is off due to a diagnostic or when the unit is in the off mode due to the local zone sensor module, a communicated request, or the default fan speed (off).

If both a zone sensor module and communicated request exist, the communicated request has priority.

Fan Cycling Operation

Tracer ZN520 does not support fan cycling in occupied mode. The fan cycles between high speed and off in the unoccupied mode only. The controller's cascade control algorithm requires continuous fan operation in the occupied mode.

Fan Off Delay

When a heating output is controlled off, the Tracer ZN520 controller automatically holds the fan on for an additional 30 seconds. This 30-second delay gives the fan time to blow off any residual heat from the heating source, such as a steam coil. When the unit is heating, the fan off delay is normally applied to control the fan; otherwise, the fan off delay does not apply.



Operation

sequence of operation

Fan Start on High Speed

On a transition from off to any other fan speed, the Tracer ZN520 controller automatically starts the fan on high speed and runs the fan at high speed for 0.5 seconds. This provides the ample torque required to start all fan motors from the off position.

Entering Water Temperature Sampling Function

Only units using the main hydronic coil for both heating and cooling (2-pipe changeover and 4-pipe changeover units) use the entering water temperature sampling function. Two-pipe changeover and 4-pipe changeover applications allow the main coil to be used for heating and for cooling; therefore, these applications require an entering water temperature sensor.

When three-way valves are ordered with a Tracer ZN520 control, the controller is factory-configured to disable the entering water temperature sampling function, and the entering water sensor is mounted in the proper location. Disabling entering water temperature sampling eliminates unnecessary water flow through the main coil when three-way valves are used.

The controller invokes entering water temperature sampling only when the measured entering water temperature is too cool to heat or too warm to cool. Entering water is cold enough to cool when it is five degrees below the measured space temperature. Entering water is warm enough to heat when it is five degrees above the measured space temperature.

When the controller invokes the entering water temperature sampling function, the unit opens the main hydronic valve for no more than three minutes before considering the measured entering water temperature. An initial stabilization period is allowed to flush the coil. This period is equal to 30 seconds plus ½ the valve stroke time. Once this temperature stabilization period has expired, the controller compares the entering water temperature against the effective space temperature (either hardwired or communicated) to determine whether the entering water can be used for the desired heating or cooling. If the water

temperature is not usable for the desired mode, the controller continues to compare the entering water temperature against the effective space temperature for a maximum of three minutes.

The controller automatically disables the entering water temperature sampling and closes the main hydronic valve when the measured entering water exceeds the high entering water temperature limit (110°F). When the entering water temperature is warmer than 110°F, the controller assumes the entering water temperature is hot because it is unlikely the coil would drift to a high temperature unless the actual loop temperature was very high.

If the entering water temperature is unusable — too cool to heat or too warm to cool — the controller closes the hydronic valve and waits 60 minutes before initializing another sampling. If the controller determines the entering water temperature is valid for heating or cooling, it resumes normal heating/cooling control and effectively disables entering water temperature sampling until it is required.

Electric Heat Operation

The Tracer ZN520 controller supports one or two-stage electric heat operation for heating. To control the space temperature, electric heat is cycled to control the discharge air temperature. The rate of cycling is dependent upon the load in the space and the temperature of the incoming fresh air from the economizer (if any). Two-pipe changeover units with electric heat use the electric heat only when hot water is not available.

Manual Fresh Air Damper

Units with the manual fresh air damper option ship with the damper in the closed position, which is adjustable from zero to 100% in 25% increments. To adjust the position, first remove the air filter to expose the damper stop screw on the control panel end. Relocate the stop screw to the appropriate position. Then loosen the stop screw with a nut and adjust the linkage.

Economizer Damper Option

With a valid outdoor air temperature (either hardwired or communicated), Tracer ZN520 uses the modulating economizer damper as the highest priority source of cooling. Economizer operation is only possible through the use of a modulating damper.

Economizing is possible during the occupied, occupied standby, unoccupied, and occupied bypass modes.

The controller initiates the economizer function if the outdoor air temperature is cold enough to be used as free cooling capacity. If the outdoor air temperature is less than the economizer enable setpoint (absolute dry bulb), the controller modulates the outdoor air damper (between the active minimum damper position and 100%) to control the amount of outdoor air cooling capacity. When the outdoor air temperature rises 5°F above the economizer enable point, the controller disables economizing and moves the outdoor air damper back to its predetermined minimum position based on the current occupancy mode or communicated minimum damper position.

Dehumidification

Dehumidification is possible when mechanical cooling is available, the heating capacity is located in the reheat position, and the space relative humidity setpoint is valid. The controller starts dehumidifying the space when the space humidity exceeds the humidity setpoint.

The controller continues to dehumidify until the sensed humidity falls below the setpoint minus the relative humidity offset. The controller uses the cooling and reheat capacities simultaneously to dehumidify the space. While dehumidifying, the discharge air temperature is controlled to maintain the space temperature at the current setpoint.

A typical scenario involves high humidity and high temperature load of the space. The controller sets the cooling capacity to 100% and uses the reheat capacity to warm the discharge air to maintain space temperature control. Dehumidification may be disabled via Tracer or configuration.

Operation

Note: If the unit is in the unoccupied mode, the dehumidification routine will not operate.

Data Sharing

Because this controller utilizes LonWorks™ technology, the controller can send or receive data (setpoint, heat/cool mode, fan request, space temperature, etc.) to and from other controllers on the communication link, with or without the existence of a building automation system. This applies to applications where multiple unit controllers share a single space temperature sensor (for rooms with multiple units but only one zone sensor) for both standalone (with communication wiring between units) and building automation system applications. For this application you will need to use the Rover service tool. For more information on setup, refer to the Trane publication *EMTX-IOP-2*.

Binary Inputs

The Tracer ZN520 controller has four available binary inputs. See Table O-SO-12. Normally, these inputs are factory-configured for the following functions:

- Binary input 1: Low temperature detection (freezestat)
- Binary input 2: Condensate overflow
- Binary input 3: Occupancy/ Generic
- Binary input 4: Fan status

Note: The generic binary input can be used with a Tracer Summit® building automation system only.

Each binary input default configuration (including normally open/closed) is set at the factory. However, you can configure each of the four binary inputs as normally open or normally closed. The controller will be set properly for each factory-supplied binary input end-device. When no device is connected to the input, configure the controller's input as not used.

Binary Outputs

Binary outputs are configured to support the following:

- Three fan stages (when one or two fan stages are present, medium fan speed can be configured as exhaust fan)
- One hydronic cooling stage
- One hydronic heating stage (dehumidification requires this to be in the reheat position)
- One DX cooling stage
- One or two-stage electric heat (dehumidification requires this to be in the reheat position)
- Face and bypass damper
- Modulating outdoor air damper
- One baseboard heat stage

For more information, see Table O-SO-13.

Table O-SO-12. Binary input configurations

binary input	description	configuration	controller operation	
			contact closed	contact open
BI 1	low temperature detection ^{Note 1}	normally closed	normal	diagnostic ^{Note 5}
BI 2	condensate overflow ^{Note 1}	normally closed	normal	diagnostic ^{Note 5}
BI 3	occupancy	normally open	unoccupied	occupied
BI 3	generic binary input	normally open	normal ^{Note 3}	normal ^{Note 3}
BI 4	fan status ^{Note 1}	normally open	normal	diagnostic ^{Note 4}

^{Note 1} During low temperature, condensate overflow, and fan status diagnostics, the Tracer ZN520 control disables all normal unit operation of the fan, valves, and damper. ^{Note 2} The occupancy binary input is for standalone unit controllers as an occupied/unoccupied input. However, when the controller receives a communicated occupied/unoccupied request, the communicated request has priority over the hardwired input. ^{Note 3} The generic binary input does not affect unit operation. A building automation system reads this input as a generic binary input. ^{Note 4} If the fan mode input is in the off position or the controller is in the unoccupied mode with the fan off, the fan status input will be open. A diagnostic will not be generated when the controller commands the fan off. A diagnostic will only be generated if the fan status input does not close after one minute from energizing a fan output or any time the input is open for one minute. The controller waits up to one minute after energizing a fan output to allow the differential pressure to build up across the fan. ^{Note 5} The table below shows the controller's response to low temperature detection, condensate overflow, and fan status diagnostics.

Table O-SO-13. Binary output configuration

binary output	configuration
J1-1	fan high
J1-2	fan medium
J1-3	fan low
J1-4	(Key)
J1-5	cool valve – open, or 2-position valve ^{Note 1}
J1-6	cool valve – close ^{Note 1}
J1-9	heat valve – open, or 2 position valve, or 1 st electric heat stage ^{Note 1}
J1-10	heat valve – close or 2 nd Electric heat stage ^{Note 1}
J1-11	fresh air damper - open
J1-12	fresh air damper - close
TB4-1	generic / baseboard heat output
TB4-2	24VAC

^{Note 1} For Tracer ZN520 units configured and applied as 2-pipe hydronic heat/cool changeover, terminals J1-5 and J1-6 are used to control the primary valve for both heating and cooling. For Tracer ZN520 units configured and applied as 2-pipe hydronic heat/cool changeover with electric heat, terminals J1-5 and J1-6 are used to control the primary valve (for both cooling and heating), and terminals J1-9 and J1-10 are used only for the electric heat stage. For those 2-pipe changeover units, electric heat will not be energized while the hydronic supply is hot (5° or more above the space temperature).

Operation

sequence of operation

Table O-SO-14. Analog inputs

description	terminals	function	range
zone	TB3-1	space temperature input	5° to 122°F (-15° to 50°C)
ground	TB3-2	analog ground	NA
set	TB3-3	setpoint input	40° to 115°F (4.4° to 46.1°C)
fan	B3-4	fan switch input	4821 to 4919 W (off) 2297 to 2342 W (auto) 10593 to 10807 W (low) 13177 to 13443 W (medium) 15137 to 16463 W (high)
ground	TB3-6	analog ground	NA
analog input 1	J3-1 J3-2	entering water temperature analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 2	J3-3 J3-4	discharge air temperature Analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 3	J3-5 J3-6	fresh air temp/generic temp Analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 4	J3-7	universal input generic 4-20ma humidity CO ₂	0 – 100% 0 – 100% 0 – 2000ppm
	J3-8	analog ground	NA
ground	J3-9	analog ground	NA

Notes:

1. The zone sensor, entering water temperature sensor, discharge air sensor, and the outside air temperature sensor are 10KΩ thermistors.
2. Zone sensor: Wall mounted sensors include a thermistor soldered to the sensor's circuit board. Unit mounted sensors include a return air sensor in the units return air stream.
3. Changeover units include an entering water temperature sensor.

Table O-SO-15. Analog inputs

description	terminals	function	range
zone	TB3-1	space temperature input	5° to 122°F (-15° to 50°C)
ground	TB3-2	analog ground	NA
set	TB3-3	setpoint input	40° to 115°F (4.4° to 46.1°C)
fan	B3-4	fan switch input	4821 to 4919 W (off) 2297 to 2342 W (auto) 10593 to 10807 W (low) 13177 to 13443 W (medium) 15137 to 16463 W (high)
ground	TB3-6	analog ground	NA
analog input 1	J3-1 J3-2	entering water temperature analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 2	J3-3 J3-4	discharge air temperature Analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 3	J3-5 J3-6	fresh air temp/generic temp Analog ground	-40° to 212°F (-40° to 100°C) NA
analog input 4	J3-7	universal input generic 4-20ma humidity CO ₂	0 – 100% 0 – 100% 0 – 2000ppm
	J3-8	analog ground	NA
ground	J3-9	analog ground	NA

Notes:

1. The zone sensor, entering water temperature sensor, discharge air sensor, and the outside air temperature sensor are 10KW thermistors.
2. Zone sensor: Wall mounted sensors include a thermistor soldered to the sensor's circuit board. Unit mounted sensors include a return air sensor in the units return air stream.
3. Changeover units include an entering water temperature sensor.

Operation

Zone Sensor

The Tracer ZN520 controller accepts the following zone sensor module inputs:

- Space temperature measurement (10kΩ thermistor)
- Local setpoint (either internal or external on the zone sensor module)
- Fan switch
- Timed override (On) and Cancel timed override
- Communication jack

Space Temperature Measurement

Trane zone sensors use a 10kW thermistor to measure the space temperature. Typically, zone sensors are wall-mounted in the room and include a space temperature thermistor. As an option, the zone sensor can be unit-mounted with a separate space temperature thermistor located in the unit's return air stream. If both a hardwired and communicated space temperature value exist, the controller ignores the hardwired space temperature input and uses the communicated value.

External Setpoint Adjustment

Zone sensors with an external setpoint adjustment (1kΩ) provide the Tracer ZN520 controller with a local setpoint (50 to 85°F or 10 to 29.4°C). The external setpoint is exposed on the zone sensor's front cover.

When the hardwired setpoint adjustment is used to determine the setpoints, all unit setpoints are calculated based on the hardwired setpoint value, the configured setpoints, and the active mode of the controller. The hardwired setpoint is used with the controller's occupancy mode (occupied, occupied standby, or unoccupied), the heating or cooling mode, the temperature deadband values, and the heating and cooling setpoints (high and low limits) to determine the controller's active setpoint.

When a building automation system or other controller communicates a setpoint to the controller, the controller ignores the hardwired setpoint input and uses the communicated value. The exception is the unoccupied mode, when the controller always uses the stored default unoccupied setpoints. After the controller completes all setpoint calculations, based on the requested setpoint, the occupancy

mode, the heating and cooling mode, and other factors, the calculated setpoint is validated against the following setpoint limits:

- Heating setpoint high limit
- Heating setpoint low limit
- Cooling setpoint high limit
- Cooling setpoint low limit

These setpoint limits only apply to the occupied and occupied standby heating and cooling setpoints. These setpoint limits do not apply to the unoccupied heating and cooling setpoints stored in the controller's configuration.

When the controller is in unoccupied mode, it always uses the stored unoccupied heating and cooling setpoints. The unit can also be configured to enable or disable the local (hardwired) setpoint. This parameter provides additional flexibility to allow you to apply communicated, hardwired, or default setpoints without making physical changes to the unit.

Similar to hardwired setpoints, the effective setpoint value for a communicated setpoint is determined based on the stored default setpoints (which determines the occupied and occupied standby temperature deadbands) and the controller's occupancy mode.

Fan Switch

The zone sensor fan switch provides the controller with an occupied (and occupied standby) fan request signal (Off, Low, Medium, High, Auto). If the fan control request is communicated to the controller, the controller ignores the hardwired fan switch input and uses the communicated value. The zone sensor fan switch input can be enabled or disabled through configuration using the Rover service tool. If the zone sensor switch is disabled, the controller resorts to its stored configuration default fan speeds for heating and cooling, unless the controller receives a communicated fan input.

When the fan switch is in the off position, the controller does not control any unit capacity. The unit remains powered and all outputs drive to the closed position. Upon a loss of signal on the fan speed input, the controller reports a diagnostic and reverts to using the default fan speed.

On/Cancel Buttons

Momentarily pressing the on button during unoccupied mode places the controller in occupied bypass mode for 120 minutes. You can adjust the number of minutes in the unit controller configuration using Rover service tool. The controller remains in occupied bypass mode until the override time expires or until you press the Cancel button.

Communication jack

Use the RJ-11 communication as the connection point from Rover™ service tool to the communication link — when the communication jack is wired to the communication link at the controller. By accessing the communication jack via Rover™, you can access any controller on the link.

Communications

Tracer ZN520 controller communicates via Trane's LonTalk protocol. Typically, a communication link is applied between unit controllers and a building automation system. Communication also is possible via Rover, Trane's service tool. Peer-to-peer communication across controllers is possible even when a building automation system is not present. You do not need to observe polarity for LonTalk communication links.

The controller provides six 0.25-inch quick-connect terminals for the LonTalk communication link connections, as follows:

- Two terminals for communication to the board
- Two terminals for communication from the board to the next unit (daisy chain)
- Two terminals for a connection from the zone sensor back to the controller

Table O-SO-16. Zone sensor wiring connections

TB1	description
1	space temperature
2	common
3	setpoint
4	fan mode
5	communications
6	communications



Maintenance

diagnostics

Diagnostics

Table M-D-1. Tracer ZN520 Diagnostics

Diagnostic	Fan	Other Outputs (Note 1)
Condensate overflow	Off	Valves Closed, Fresh air damper Closed, electric heat Off, Baseboard heat Off
Low temperature detection	Off	Valves Open, Fresh air damper Closed, electric heat Off, Baseboard heat Off
Low air flow - fan failure	Off	Valves Closed, Fresh air damper Closed, electric heat Off, Baseboard heat Off
Space temperature failure	Off	Valves Closed, Fresh air damper Closed, electric heat Off, Baseboard heat Off
Entering water temp failure	On	Valves Enabled (Note 2), Fresh air damper Enabled (Note 2), electric heat Enabled (Note 2), Baseboard heat Off
Discharge air temp low limit	Off	Valves Open, Fresh air damper Closed, electric heat Off, Baseboard heat Off
Discharge air temp failure	Off	Valves Closed, Fresh air damper Closed, electric heat Off, Baseboard heat Off,
Fresh air temp failure	On	Valves Enabled, Fresh air damper Minimum position ³ , electric heat Enabled, Baseboard heat Enabled
Relative humidity failure	On	Valves Enabled, Fresh air damper Enabled, electric heat Enabled, Baseboard heat Enabled
Generic 4-20ma failure	On	Valves Enabled, Fresh air damper Enabled, electric heat Enabled, Baseboard heat Enabled
CO ₂ Input failure	On	Valves Enabled, Fresh air damper Enabled, electric heat Enabled, Baseboard heat Enabled
Maintenance required	On	Valves Enabled, Fresh air damper Enabled, electric heat Enabled, Baseboard heat Enabled
Local fan mode failure	On	Valves Enabled, Fresh air damper Enabled, Electric Heat Enabled, Baseboard heat Enabled
Local setpoint failure	On	Valves Enabled, Fresh air damper Enabled, electric heat Enabled, Baseboard heat Enabled
Invalid unit configuration	Off	Valves Disabled, Fresh air damper Disabled, electric heat Disabled, Baseboard heat Disabled
Normal - power up	On	Valves Enabled, Fresh air damper Enabled, Electric heat Enabled

Note 1: The generic binary output (TB4-1, TB4-2) state is unaffected by all unit diagnostics.

Note 2: When the entering water temperature is required but not present, the Tracer ZN520 controller generates a diagnostic to indicate the sensor loss condition. The controller automatically clears the diagnostic once a valid entering water temperature value is present (non-latching diagnostic). When the entering water temperature sensor fails, the controller prohibits all hydronic cooling operation, but allows the delivery of heat when heating is required. In the Cool mode, all cooling is locked-out, but normal fan and outdoor air damper operation is permitted.

Note 3: When the outdoor air temperature sensor has failed or is not present, the Tracer ZN520 controller generates a diagnostic to indicate the sensor loss condition. The controller automatically clears the diagnostic once a valid outdoor air temperature value is present (non-latching diagnostic). When the outdoor air temperature sensor fails or is not present, the controller prohibits economizer operation.

Maintenance diagnostics

Translating Multiple Diagnostics

The controller senses and records each diagnostic independently of other diagnostics. It is possible to have multiple diagnostics present simultaneously. The diagnostics are reported in the order they occur.

Possible diagnostics include:

- Low temperature detection
- Condensate overflow
- Low air flow - fan status
- Discharge air temp limit
- Space temperature failure¹
- Entering water temp failure¹
- Discharge air temp failure¹
- Outdoor air temp failure¹
- Local setpoint failure¹
- Local fan mode failure¹
- CO₂ sensor failure¹
- Generic AIP failure¹
- Humidity input failure¹
- Defrosting compressor lockout¹
- Maintenance required
- Invalid unit configuration
- Generic temperature failure
- Discharge air low limit

¹ Non-latching diagnostics automatically reset when the input is present and valid.

Resetting Diagnostics

There are a number of ways in which diagnostics are reset:

1. Automatic reset by the controller
2. By initiating a manual output test at the controller
3. By cycling power to the controller
4. Through Rover™, Trane's service tool
5. Tracer ZN520: by using any other communicating device able to access the controller's diagnostic reset input.
6. Tracer ZN520: by cycling the fan switch from Off to any speed setting.

Automatic Reset by the Controller

The controller includes an automatic diagnostic reset function that attempts to automatically restore the unit when a low temperature diagnostic occurs.

Note: The controller implements the automatic diagnostic reset function only once every 24 hours. For the controller to increment the 24 hour timer, you must maintain power to the controller. Cycling power resets all timers and counters.

Table M-D-2. Tracer ZN510 controller diagnostics

diagnostic	latching?	fan	valves	elec heat	damper
auxiliary temp. failure	no	enabled	no action	no action	no action
condensate overflow detection	yes	off	closed	off	closed
entering water temp. failure	no	enabled	enabled	enabled	enabled
fan mode failure	no	enabled	enabled	enabled	enabled
invalid unit configuration failure	yes	disabled	disabled	disabled	disabled
low temp. detection	yes	off	open	off	closed
maintenance required	yes	enabled	no action	no action	no action
setpoint	no	enabled	no action	no action	no action
zone temp. failure	no	off	closed	off	closed

Notes:

Priority Level: Diagnostics are listed in order from highest to lowest priority. The controller senses and records each diagnostic independently of other diagnostics. It is possible to have multiple diagnostics present simultaneously. The diagnostics affect unit operation according to priority level.

Latching: A latching diagnostic requires a manual reset of the controller; while a non-latching diagnostic automatically resets when the input is present and valid.

Enabled: End device is allowed to run if there is a call for it to run.

Disabled: End device is not allowed to run even if there is a call for it to run.

No Action: The diagnostic has no affect on the end device.

After the controller detects the first special diagnostic, the unit waits 30 minutes before invoking the automatic diagnostic reset function. The automatic diagnostic reset function clears the special diagnostic and attempts to restore the controller to normal operation. The controller resumes normal operation until another diagnostic occurs.

Note: The automatic diagnostic reset function does not operate during the manual output test sequence.

If a special diagnostic occurs within 24 hours after an automatic diagnostic reset, the controller must be manually reset. Other possible methods of resetting diagnostics are described in the sections that follow.

Manual Output Test

To verify proper end device operation, press the controller's Test button. This exercise will verify all outputs in a predefined sequence, the first of which will attempt to reset the controller diagnostics if any are present.

Cycling Power to the Controller

After removing and reapplying the 24 VAC power from the board, the unit cycles through a power-up sequence. By default, the controller attempts to reset all diagnostics present at power-up. Diagnostics present at power-up and those that occur after power-up are handled according to Table M-D-2.

Using Trane's Service Tool, Rover™

Rover™, Trane's service tool, can reset diagnostics present in the controller and troubleshoot the unit. For more information, refer to the Trane publication *EMTX-SVX01D-EN, Rover Installation, Operation and Programming Guide*.

Diagnostic Reset

Any device that can communicate the network variable nviRequest (enumeration "clear_alarm") can reset diagnostics in the Tracer ZN520 controller. The controller also attempts to reset diagnostics whenever power is cycled.

Cycling the Fan Switch

Cycle the fan speed switch from Off to any speed and the controller resets all diagnostics. Diagnostics may recur immediately if the problem still exists.



Maintenance diagnostics

Table M-D-3. Fan outputs do not energize

Probable Cause	Explanation
Random start	After power-up, the controller always observes a random start that varies observed between 0 and 25 seconds. The controller remains off until the random start time expires.
Power-up control wait	When power-up control wait is enabled (non-zero time), the controller remains off until one of two conditions occurs: 1. The controller exits power-up control wait once it receives communicated information. 2. The controller exits power-up control wait once the power-up control wait time expires.
Cycling fan operation	When the fan mode switch is in the auto position, the unit fan cycles off when there is no call for heating or cooling. The heating/cooling sources cycle on or off periodically with the unit fan to match the capacity according to pulse-width-modulation (PWM) logic.
Unoccupied operation	The fan cycles with capacity when the unit is in unoccupied mode. This occurs even if the unit is in continuous fan operation. While unoccupied, the fan cycles on or off with heating/cooling to provide varying amounts of heating or cooling to the space. to match the capacity according to pulse-width-modulation (PWM) logic.
Fan mode off	When using the local fan mode switch to determine the fan operation, the off position controls the unit fan to off.
Requested mode: off	It is possible to communicate the operating mode (such as off, heat, and cool) to the controller. When "off" is communicated to the controller, the unit controls the fan to off. The unit is not capable of heating or cooling when the controller is in this mode.
Diagnostic present	A specific list of diagnostics effects fan operation. For more information, see the "Diagnostics" section.
No power to the controller	If the controller does not have power, the unit fan will not operate. For the controller to operate normally, it must have an input voltage of 24 VAC. When the green LED is off continuously, the controller does not have sufficient power or the controller has failed.
Manual output test	The controller includes a manual output test sequence to verify binary output operation and the associated wiring. However, based on the current step in the test sequence, the unit fan may not be powered on. Refer to the "Manual Output Test" section.
Unit wiring	The wiring between the controller outputs and the fan relays and contacts must be present and correct for normal fan operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

Table M-D-4. Valves Stay Closed

Probable Cause	Explanation
Normal operation	The controller opens and closes the valves to meet the unit capacity requirements.
Requested mode: off	It is possible to communicate the operating mode (such as off, heat, and cool) to the controller. When off is communicated to the controller, the unit controls the fan to off. The unit is not capable of heating or cooling when the controller is in this mode.
Valve override	The controller can communicate a valve override request. This request effects the valve operation.
Manual output test	The controller includes a manual output test sequence to verify analog and binary output operation and the associated wiring. However, based on the current step in the test sequence, the valves may not be open. Refer to the "Manual Output Test" section.
Diagnostic present	A specific list of diagnostics affects valve operation. For more information, see the "Diagnostics" section.
Sampling logic	The controller includes entering water temperature sampling logic that automatically invokes during 2-pipe or 4-pipe changeover. It determines when the entering water temperature is either too cool or too hot for the desired heating or cooling mode. Refer to the "Entering Water section.
Unit configuration	The controller must be properly configured based on the actual installed end devices and application. When the unit configuration does not match the actual end device, the valves may not work correctly.
No power to the controller	If the controller does not have power, the valves do not operate. For the controller to operate normally, it must have an input voltage of 24 VAC. When the green LED is off continuously, the controller does not have sufficient power, or the controller has failed.
Unit wiring	The wiring between the controller outputs and the valve(s) must be present and correct for normal valve operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

Table M-D-5. Valves Stay Open

Probable Cause	Explanation
Normal operation	The controller opens and closes the valves to meet the unit capacity requirements.
Valve override	The controller can communicate a valve override request to affect the valve operation.
Manual output test	The controller includes a manual output test sequence that verifies analog and binary output operation and the associated wiring. However, based on the current step in the test sequence, the valves may be open. Refer to the "Manual Output Test" section.
Diagnostic present	A specific list of diagnostics affects valve operation. For more information, see the "Diagnostics" section.
Sampling logic	The controller includes entering water temperature sampling logic that automatically invokes during 2-pipe or 4-pipe changeover to determine if the entering water temperature is correct for the unit operating mode. Refer to the "Entering Water Temperature Sampling" section.
Unit configuration	The controller must be properly configured based on the actual installed end devices and application. When the unit configuration does not match the actual end device, the valves may not work correctly.
Unit wiring	The wiring between the controller outputs and the valve(s) must be present and correct for normal valve operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

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Table M-D-6. Electric Heat Not Operating

Probable Cause	Explanation
Normal operation	The controller cycles electric heat on and off to meet the unit capacity requirements.
Requested mode: off	It is possible to communicate the operating mode (such as off, heat, cool) to the controller. When off is communicated to the controller, the units shuts off the electric heat.
Communicated disable	Numerous communicated requests may disable electric heat, including an auxiliary heat enable input and the heat/cool mode input. Depending on the state of the communicated request, the unit may disable electric heat.
Manual output test	The controller includes a manual output test sequence that verifies analog and binary output operation and associated output wiring. However, based on the current step in the test sequence, the electric heat may not be on. Refer to the "Manual Output Test" section.
Diagnostic present	A specific list of diagnostics affects electric heat operation. For more information, see the "Diagnostics" section.
Unit configuration	The controller must be properly configured based on the actual installed end devices and application. When the unit configuration does not match the actual end device, the electric heat may not work properly.
No power to the controller	If the controller does not have power, electric heat does not operate. For the controller to operate normally, a 24VAC input voltage must be applied. When the green LED is off continuously, the controller does not have sufficient power or has failed.
Unit Wiring	The wiring between the controller outputs and the electric heat contacts must be present and correct for normal electric heat operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

Table M-D-7. Fresh Air Damper Stays Open

Probable Cause	Explanation
Normal operation	The controller opens and closes the fresh air damper based on the controller's occupancy mode and fan status. Normally, the fresh air damper is open during occupied mode when the fan is running and closed during unoccupied mode.
Manual output test	The controller includes a manual output test sequence that verifies analog and binary output operation and associated output wiring. However, based on the current step in the test sequence, the fresh air damper may not be open. Refer to the "Manual Output Test" section.
Unit configuration	The controller must be properly configured based on the actual installed end devices and application. When the unit configuration does not match the actual end device, the damper may not work correctly.
Unit wiring	The wiring between the controller outputs and the fresh air damper must be present and correct for normal damper operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

Table M-D-8. Fresh Air Damper Stays Closed

Probable Cause	Explanation
Normal operation	The controller opens and closes the fresh air damper based on the controller's occupancy mode and fan status. Normally, the fresh air damper is open during occupied mode when the fan is running and closed during unoccupied mode.
Warmup and cooldown	The controller includes both a warmup and cooldown sequence to keep the fresh air damper closed during the transition from unoccupied to occupied. This is an attempt to bring the space under control as quickly as possible.
Requested mode: off	It is possible to communicate the operating mode (such as off, heat, cool) to the controller. When off is communicated to the controller, the unit closes the fresh air damper.
Manual output test	The controller includes a manual output test sequence that verifies analog and binary output operation and associated output wiring. However, based on the current step in the test sequence, the fresh air damper may not be open. Refer to the "Manual Output Test" section.
Diagnostic present	A specific list of diagnostics effects fresh air damper operation. For more information, see the "Diagnostics" section.
Unit configuration	The controller must be properly configured based on the actual installed end devices and application. When the unit configuration does not match the actual end device, the damper may not work correctly.
No power to the controller	If the controller does not have power, the fresh air damper does not operate. For the controller to operate normally, a 24 VAC input voltage must be applied. When the green LED is off continuously, the controller does not have sufficient power or has failed.
Unit wiring	The wiring between the controller outputs and the fresh air damper must be present and correct for normal damper operation. Refer to the typical unit wiring diagrams in the Appendix of this manual.

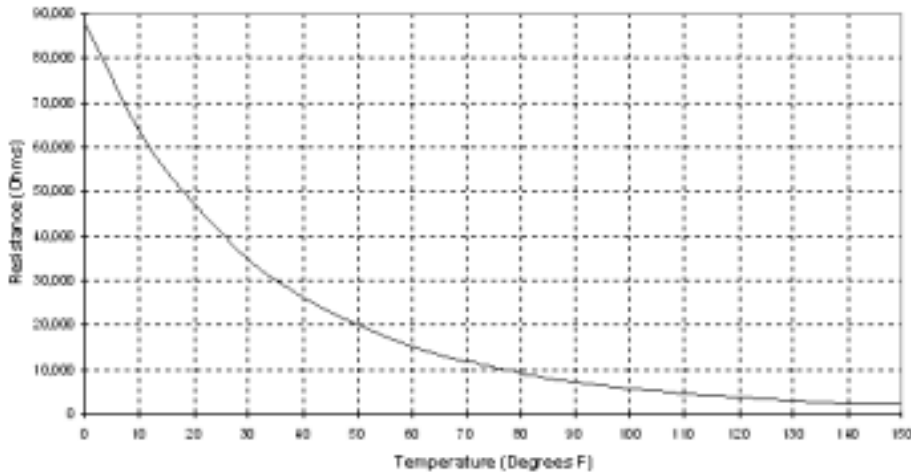


Figure M-T-1. Resistance temperature curve for the zone sensor, entering water temperature sensor, and discharge air sensor. Thermistor = 10kΩ at 77°F.

Board switches are factory set based on unit control options. Figure M-T-2 shows a relay board detail. Additional information on switch settings follows.

Switch SW1: Controller Type

SW1 determines the unit control type. Position 1 indicates one of the following:

- generic field controller
- low-voltage fan speed switch
- Tracer ZN010
- Tracer ZN510

Position 2 indicates Tracer ZN520.

Switch SW2: Electric Heat

SW2 determines if the unit has electric heat.

Switch SW3: High-Speed Interlock

SW3 determines if the unit will have a safety-mandated “high-speed interlock” with electric heat. High-speed interlock ensures heat dissipates in a manner that keeps the unit in a safe operating condition. SW3 configures the unit to actuate high-speed interlock if the first or second stage is on.

SW3 is a three-position slide switch that actuates high-speed interlock to operate with specific electric heat coils.

- Position 1: default position and for low vertical units with electric heat
- Position 2: single-stage electric heat, model number digit 18 = N
- Position 3: two-stage electric

Switch SW4: Electric Heat Lockout

SW4 allows the unit to use the electric heat lockout function when hydronic heat is in operation. Electric heat lockout prevents electric heat from enabling when hydronic heating is available. This feature is on models with both hydronic and electric heat. Low vertical models with electric heat, switch SW4 to position 2 (on).

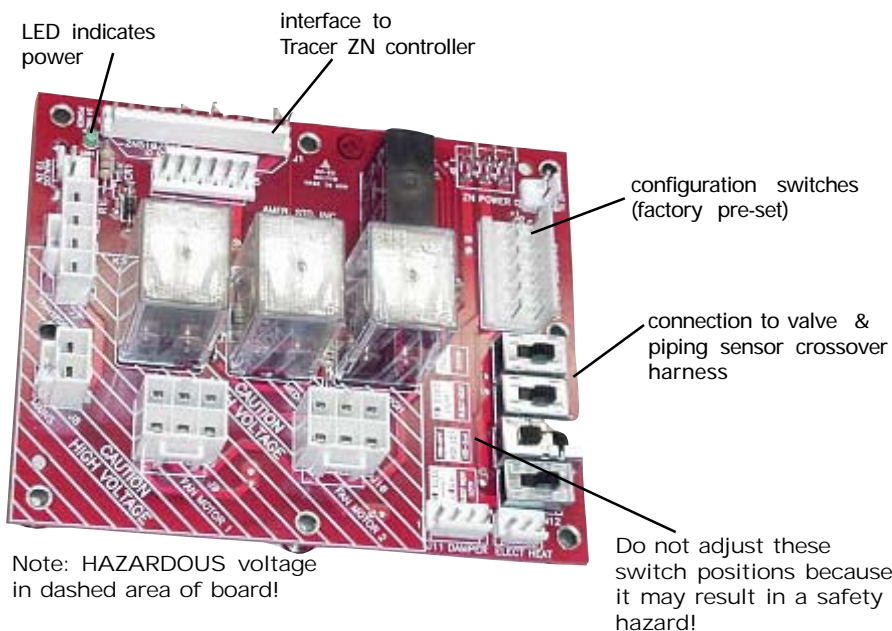


Figure M-T-2. Relay board detail

Troubleshooting the Relay Board

The relay board serves as a common interface to all of the standard end devices, and has an LED that indicates power to the board. Factory switches are pre-set and locked in place with lock-tight. However, these seals can be broken if field-modifications are needed.

If the board needs replacement, the switches on the new board must be field-set in the same positions as the old board, as shown in the unit wiring diagram.

Note: SW3 and SW4 affect safety functionality, and they are factory secured. When replacing a board with SW3 and SW4, be sure to affix the switch positions with 3M 3764Q or equivalent.

Maintenance troubleshooting

Troubleshooting Tracer ZN010, ZN510 & ZN520

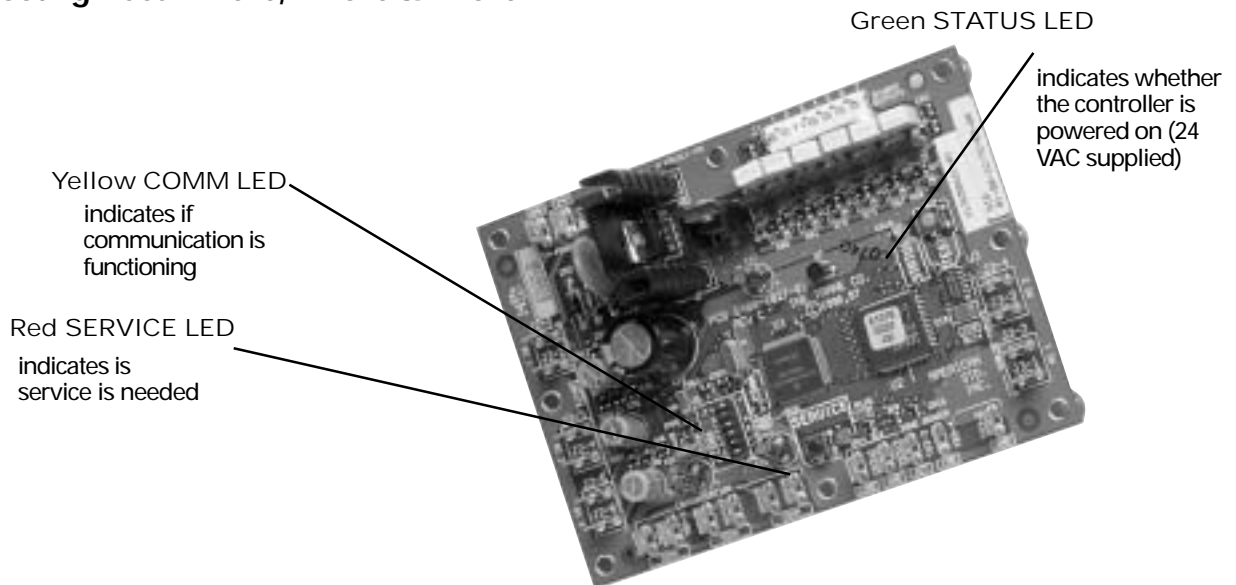


Figure M-T-1. The Tracer ZN010 board

Red SERVICE LED

During normal operation, the LED is off continuously when power is applied to the controller.

If the LED is on continuously, even when power is applied to the controller means that someone is pressing the SERVICE button or that the controller has failed.

If the LED flashes once every second, use Rover™, Trane's service tool, to restore the unit to normal operation. Refer to the Rover™ product literature for more information.

Note: If the Service button is held down for more than 15 seconds on the Tracer ZN520 controller, it will uninstall itself from the ICS communication network and shut down all unit operation.

Green STATUS LED

During normal operation, the LED is on continuously.

If the LED blinks once, the controller is in Manual output test mode.

If the LED blinks twice the controller is in Manual output test mode, with one or more diagnostics present.

If the LED blinks ($\frac{1}{4}$ second on, $\frac{1}{4}$ second off for 10 seconds) the controller is in the "Wink" mode.

Note: The "wink" feature allows the identification of a particular controller. When sending a request from a device, such as Rover™, the controller will "wink" to indicate it received the signal.

If the LED is off, either the power is off, an abnormal condition is present or the TEST button is pressed.

Yellow COMM LED

If the LED is off continuously, the controller is not detecting any communication. This is normal for units in standalone applications.

If the LED blinks, the controller detects communication.

If the LED is on continuously, this indicates an abnormal condition.

Manual Output Test

The purpose of the manual output test sequence is to verify output and end device operation. Use the manual output test to:



Maintenance troubleshooting

- Verify output wiring and operation without using Rover™, service tool
- Force the water valve to open and balance the hydronic system

Note: The manual output test is not an automatic cycle. You must press the TEST button to proceed through each step.

The controller observes all diagnostics that occur during the test sequence. Although an automatic diagnostic reset sequence exists as part of the controller's normal operation, the automatic diagnostic reset feature is not active during the test sequence.

If left in an individual test step, the controller remains in test mode for 60 minutes and then exits to normal operation.

Many service calls are due to unit diagnostics. The test sequence resets unit diagnostics and attempts to restore normal unit operation prior to testing the outputs. If the diagnostics remain after a reset, the STATUS LED indicates the diagnostic condition is still present (two blinks).

Manual Output Test Procedure

Follow the procedure below to test the Tracer ZN010, ZN510, and ZN520 controllers.

1. Press and hold the TEST button for at least two seconds (not exceeding 5 seconds), and then release, to start the test mode.
2. The test sequence will turn off all outputs and then attempt to clear all diagnostics.
3. Press the TEST button several more times (no more than once per second) to advance through the test sequence.

The outputs are not subject to minimum times during the test sequence. However, the test sequence only permits one step per second which limits minimum output time.

The green LED is turned off when the TEST button is pressed. To begin the manual output test mode, press and hold the TEST button (turning off the green LED) for at least two seconds. The green LED will begin to blink, indicating the controller is in test mode.

Table M-T-1. Test sequence for 1-heat/1-cool configurations

steps	fan BOP1-3	cool output BOP4 (1)	heat output BOP5	damper BOP6
1. off	off	off	off	closed
2. fan High	high	off	off	closed
3. fan medium	medium	off	off	closed
4. fan low	low	off	off	closed
5. cool	high	on	off	closed
6. heat	high	off	on	closed
7. fresh air damper (3)	high	off	off	open
8. exit	(2)			

Notes:

- (1) At the beginning of step 2, the controller attempts to clear all diagnostics.
 - (2) For all 1-heat/1-cool applications including 2-pipe changeover, BOP4 energizes in the cooling test stage and BOP5 energizes in the heat test stage. This occurs even though during normal 2-pipe changeover operation BOP4 controls the unit valve for both cooling and heating.
 - (3) After the Fresh Air Damper step, the test sequence performs the Exit step. This initiates a reset and attempts to return the controller to normal operation.
- (3) The fresh air damper (BOP6) only energizes during this step if binary output 6 has been configured as a fresh air damper.

Maintenance

Maintenance Procedures

Perform the following maintenance procedures to ensure proper unit operation.

⚠ WARNING

Live Electrical Components!
 During installation, testing, servicing, and troubleshooting this equipment, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who is properly trained in handling live electrical components perform these tasks. Failure to follow all electrical components could result in death or serious injury.

⚠ WARNING

Hazardous Voltage w/Capacitors!
 Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Air Filters

Change or clean air filters at least twice a year. Filters require more frequent care under high load or dirty air conditions since a clogged filter reduces airflow. Table M-A-1 lists filter size and quantity by unit size. Throwaway and pleated media filters are available for all units. Follow the instructions below to replace the disposable filters.

All models except vertical cabinets

Remove the front panel of the vertical recessed unit and open the bottom panel door of the horizontal cabinet and horizontal recessed unit to access the filter. The front panel of the vertical cabinet unit does not require removal to change the filter.

Note: Vertical recessed, horizontal cabinet, & horizontal recessed units with a bottom return have filter guides to secure the filter in position. Also, if these unit types have a fresh air opening, they require an additional filter for the fresh air opening.

CAUTION

Replace all panels and filters properly!

All unit panels and filters must be in place prior to unit startup. Failure to have panels and filters in place may result in equipment damage.

Inspecting and Cleaning Drain Pans

Clean the fan-coil unit's main and auxiliary drain pans to ensure the unit drains condensate properly.

Check the condensate drain pan and drain line to assure the condensate drains properly at least every six months or as dictated by operating experience.

If evidence of standing water or condensate overflow exists, immediately identify and remedy the cause.

Clean the drain pans of any moisture or debris.

Auxiliary Drain Pan

1. To remove the auxiliary drain pan, loosen the hose clamp (installer supplied) around the drain connection collar and disconnect the drain line.
2. Remove the overflow drain line to the auxiliary drain pan if it was installed.
3. Remove the condensate overflow switch option from the auxiliary drain pan.
4. Slide the pan horizontally towards the end of the large groove of the mounting slots in the chassis end panel and remove pan from unit. See Figure M-MP-2.

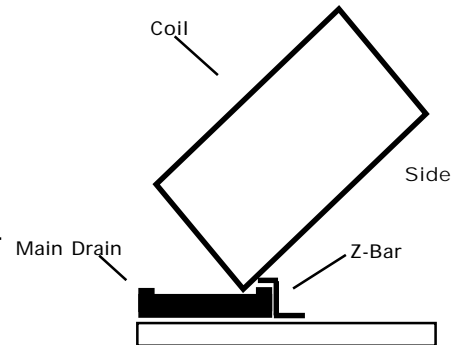


Figure M-MP-1. When replacing the fan-coil's main drain pan, install it correctly under the z-bar.

Main Drain Pan

See Figure M-MP-1 to replace main drain correctly.

Vertical Units

To remove the main drain pan on vertical fan-coil units, disconnect the clips holding the pan to the fanboard. Disconnect the main and overflow drain hoses and slide pan forward to remove. See Figure M-MP-3.

Horizontal Units

To remove the main drain pan on a horizontal fan-coil unit, peel the insulation from the edges of the pan's underside to access the mounting screws. Remove the screws and lower the end of the drain pan closest to the control box. Remove the drain spout by pulling it from the hole in the chassis end panel. See Figure M-MP-4.

Note: Do not operate the fan-coil unit without the main and auxiliary drain pans in place to prevent condensate leakage.

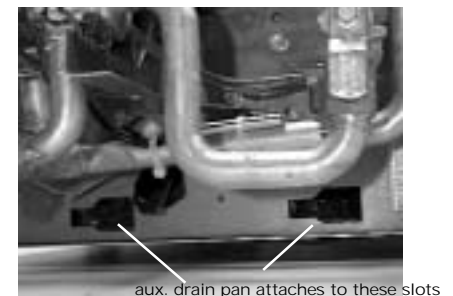


Figure M-MP-2. Insert the auxiliary drain pan tabs into these slots in the fan-coil's chassis end panel. A horizontal unit shown.

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Figure M-MP-3. To remove the main drain pan on vertical fan-coil units, disconnect the clips holding the pan to the fanboard.



Figure M-MP-4. To remove the main drain pan on horizontal fan-coil units, peel the insulation from the edges of the pan's underside to access the mounting screws.

Coil Maintenance

Keep coils clean to maintain maximum performance. For operation at its highest efficiency, clean the coil often during periods of high demand or when dirty conditions prevail. Clean the coil a minimum of once a year to prevent dirt buildup in the coil fins, where it may not be visible.

Remove large debris from the coils and straighten fins before cleaning. Remove filters before cleaning.

Clean the coil fins using steam with detergent, hot water spray and detergent, or a commercially available chemical coil cleaner. Be sure to rinse coils thoroughly after cleaning.

WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline. Handle chemical carefully. Proper handling should include goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

Inspecting and Cleaning Coils

Coils become externally fouled as a result of normal operation. Dirt on the coil surface reduces its ability to transfer heat that can result in comfort problems, increased airflow resistance and thus increased operating energy costs. If the coil surface dirt becomes wet, which commonly occurs with cooling coils, microbial growth (mold) may result, causing unpleasant odors and serious health-related indoor air quality problems.

Inspect coils at least every six months or more frequently as dictated by operating experience. Cleaning frequently is dependent upon system operating hours, filter maintenance, and efficiency and dirt load. Follow the suggested methods in the following paragraphs.

Steam and Hydronic Coil Cleaning Procedure

1. Disconnect all electrical power to the unit.
2. Don the appropriate personal protective equipment (PPE).
3. Access both sides of the coil.
4. Use a soft brush to remove loose debris from both sides of the coil.
5. Use a steam cleaning machine, starting from the top of the coil and working downward. Clean the leaving air side of the coil first, then the entering air side. Use a block-off to prevent steam from blowing through the coil and into a dry section of the unit.
6. Repeat step five as necessary. Confirm that the drain line is open following completion of the cleaning process.
7. Allow the unit to dry thoroughly before putting the system back into service.
8. Straighten any coil fins that may be damaged with a fin rake.
9. Replace all panels and parts and restore electrical power to the unit.

Winterizing the Coil

Make provisions to drain coils that are not in use, especially when subjected to freezing temperatures.

To drain the coil, blow the coil out with compressed air. Next, fill and drain the tubes with full-strength ethylene glycol several times. Drain the coil as completely as possible.

CAUTION

Coil Freeze-up Damage!

Failure to properly drain and vent coils when not in use during freezing temperatures may result in coil freeze-up damage.

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Fan Board Assembly Removal

Follow the procedure below when replacing the coil or making repairs to the fan or motor.

WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Vertical Units

1. Remove the front panel of cabinet and recessed units.
2. Pull the main and overflow drain hoses of the main drain pan into the inside of the fan-coil chassis end panel.
3. Remove the two fanboard mounting screws.
4. Slide the fanboard out horizontally to remove.

Horizontal Units

1. Open the bottom panel of cabinet and recessed models.
2. Remove the main drain pan following the instructions given under the drain pan section above for horizontal fan-coil units.
3. While supporting the fanboard in place, remove the two fanboard mounting screws which secure the fanboard to the unit.

CAUTION

Heavy Object!

Support the fanboard when removing it from the unit. Failure to properly support fanboard may result in minor to moderate personal injury.

Replacing the Motor

The capacitor for all unit motors can be replaced should it fail. Contact the local Trane service department to replace the motor capacitor in the event it fails. However, the motor itself cannot be repaired or rewound. If the motor fails, record the model number from the unit nameplate and present to the local Trane Service Parts Center to purchase a replacement. The motor bearings are permanently lubricated and do not require any further oiling.

After removing the fanboard assembly from the unit, disconnect the fan wheel/wheels from the motor shaft by loosening the Allen head setscrew on the fan wheel hub collar. Next, remove the mounting bolts holding the fan motor plate to the mounting bracket of the fanboard. Then remove the motor by sliding the fan shaft from the fan wheel hub.

During re-assembly, make certain the fan wheel(s) is/are properly centered in the fan housing to prevent the fan wheel from contacting the housing on either side. After the unit has been re-assembled, verify that no unusual noise or vibration is present at startup.

Control Device Replacement

To order control components such as relays, contactors, transformers, low temperature detection devices, condensate overflow detection devices, differential pressure switches, sensors, control valves and actuators, contact the local Trane Service Parts Center. To order, the Trane parts center will need the unit model number (which can be found on the unit nameplate), the serial number, and the part name or ID.

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Periodic Maintenance Checklists

Monthly Checklist

The following check list provides the recommended maintenance schedule to keep the unit running efficiently.

⚠ WARNING

Live Electrical Components!

During installation, testing, servicing, and troubleshooting this equipment, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who is properly trained in handling live electrical components perform these tasks. Failure to follow all electrical components could result in death or serious injury.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Monthly Maintenance

1. Inspect unit air filters. Clean or replace if airflow is blocked or if filters are dirty.
2. Check the main and auxiliary drain pans on fan-coil units to be sure the pans are clean and do not impede the condensate flow through the drain line.

Annual Maintenance

Check and tighten all set screws, bolts, locking collars and sheaves.

1. Inspect the unit cabinetry for chips or corrosion. Clean or repair to provide unit protection.
2. Inspect the fan wheel and housing for damage. Rotate the fan wheel manually to be sure movement is not blocked by obstructions.
3. Inspect the coil fins for excessive dirt or damage. Remove dirt and straighten fins.
4. Clean and tighten all electrical connections.
5. Inspect the strainer option for debris trapped in the filter screen.

Maintenance

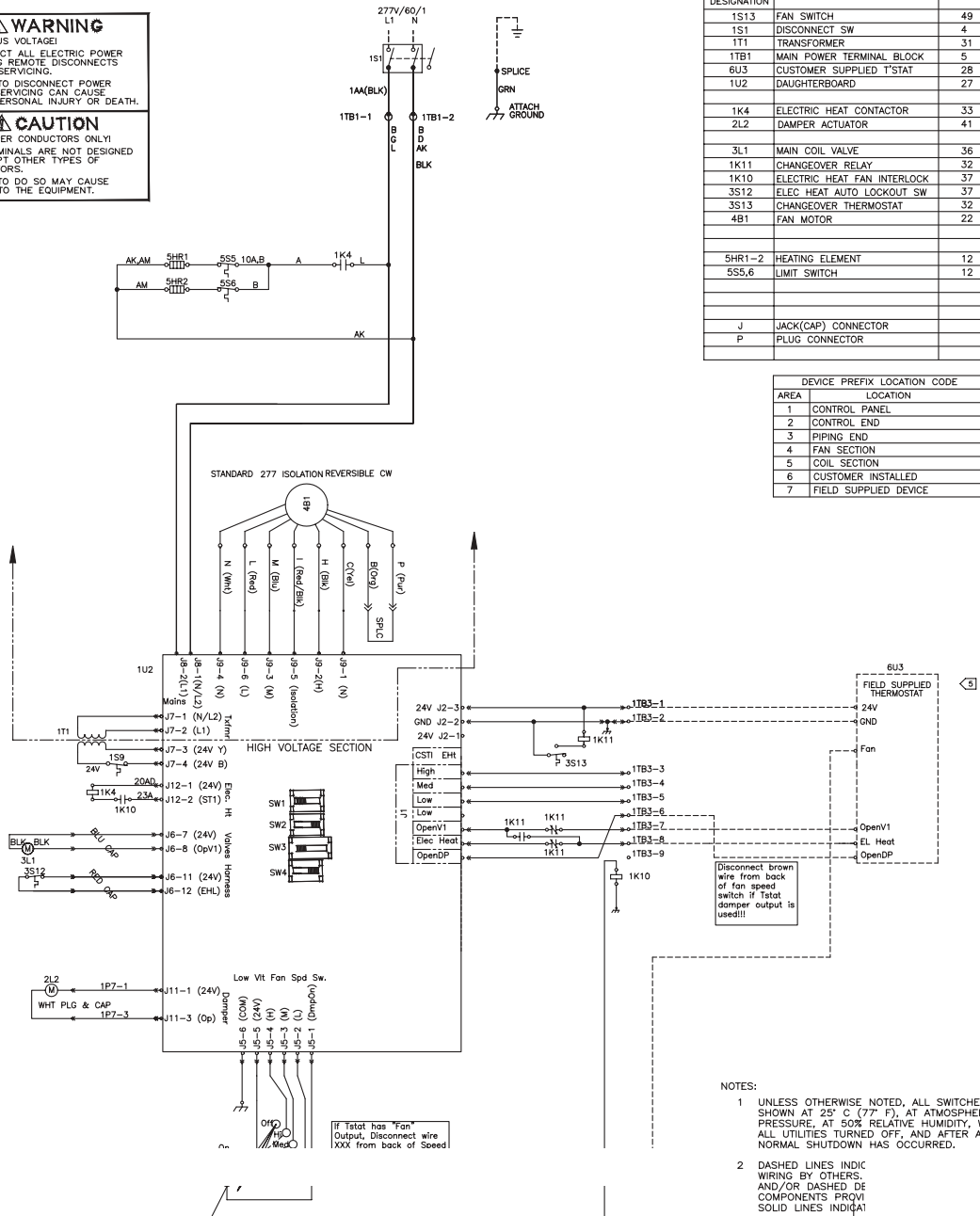
typical wiring diagram

CSTI Fan Speed Switch

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HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

CAUTION
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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.



LEGEND	
DEVICE DESIGNATION	DESCRIPTION
1S13	FAN SWITCH
1S1	DISCONNECT SW
1T1	TRANSFORMER
1TB1	MAIN POWER TERMINAL BLOCK
6U3	CUSTOMER SUPPLIED T*STAT
1U2	DAUGHTERBOARD
1K4	ELECTRIC HEAT CONTACTOR
2L2	DAMPER ACTUATOR
3L1	MAIN COIL VALVE
1K11	CHANGEOVER RELAY
1K10	ELECTRIC HEAT FAN INTERLOCK
3S12	ELEC HEAT AUTO LOCKOUT SW
3S13	CHANGEOVER THERMOSTAT
4B1	FAN MOTOR
SHR1-2	HEATING ELEMENT
5S5,6	LIMIT SWITCH
J	JACK(CAP) CONNECTOR
P	PLUG CONNECTOR

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	CONTROL PANEL
2	CONTROL END
3	PIPING END
4	FAN SECTION
5	COIL SECTION
6	CUSTOMER INSTALLED
7	FIELD SUPPLIED DEVICE

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- UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
 - DASHED LINES INDIC WIRING BY OTHERS, AND/OR DASHED DE COMPONENTS PROVI SOLID LINES INDICAT
 - NUMBERS ALONG TI- SCHEMATIC DESIGNA CONTACTS BY LINE
 - ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS. ALL FIELD WIRING MUST HAVE AN INSULATION VOLTAGE RATING THAT EQUALS OR EXCEEDS UNIT RATED VOLTAGE.

POWER AVAILABLE FOR FIELD SUPPLIED CONTROLLER IS 24VAC 40VA. OUTPUTS MUST BE RATED AT 10VA OR BETTER.

Maintenance

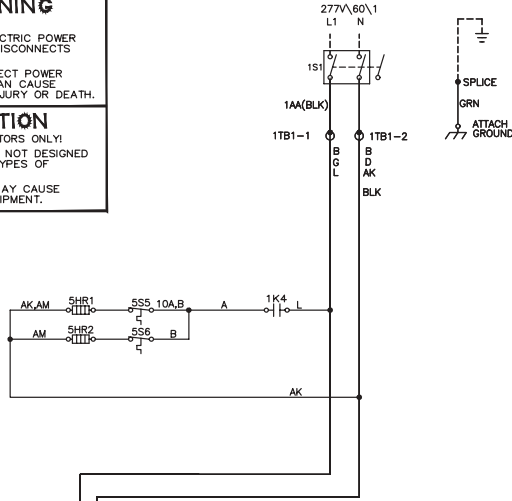
typical wiring diagram

CSTI Non Fan Speed Switch

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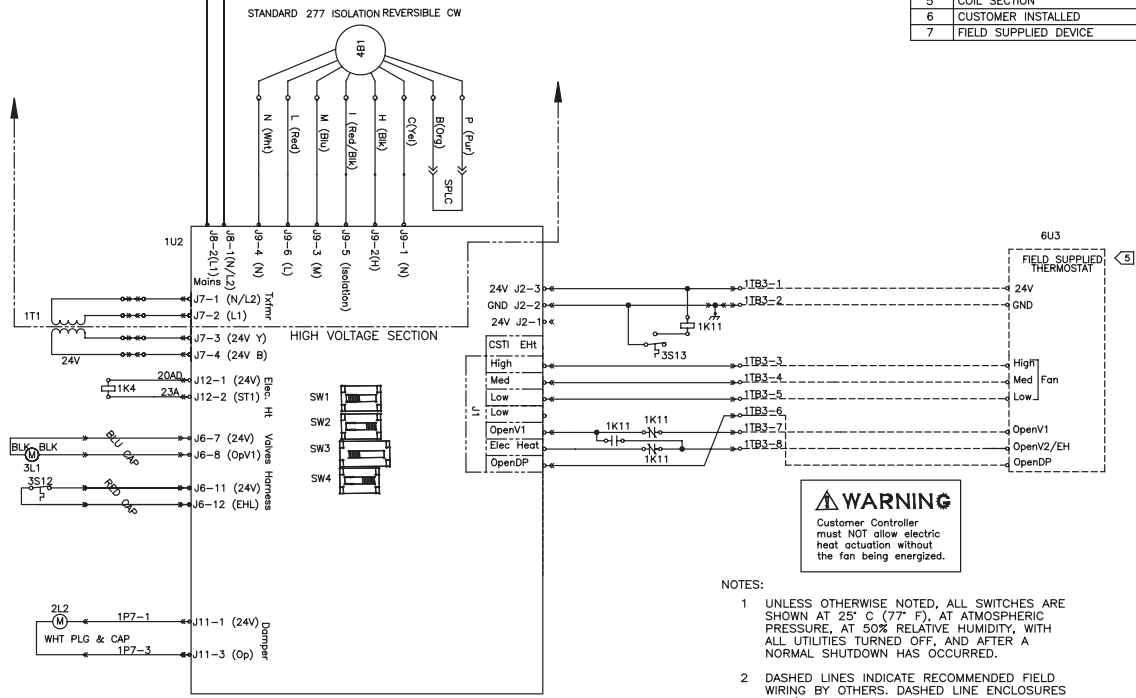
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LEGEND		
DEVICE DESIGNATION	DESCRIPTION	
1S1	DISCONNECT SW	4
1T1	TRANSFORMER	31
1TB1	MAIN POWER TERMINAL BLOCK	5
6U3	CUSTOMER SUPPLIED T'STAT	28
1U2	DAUGHTERBOARD	27
1K4	ELECTRIC HEAT CONTACTOR	33
2L2	DAMPER ACTUATOR	41
3L1	MAIN COIL VALVE	36
1K11	CHANGEOVER RELAY	32
3S12	ELEC HEAT AUTO LOCKOUT SW	37
3S13	CHANGEOVER THERMOSTAT	32
4B1	FAN MOTOR	22
5HR1-2	HEATING ELEMENT	12
5S5,6	LIMIT SWITCH	12
J	JACK(CAP) CONNECTOR	
P	PLUG CONNECTOR	

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	CONTROL PANEL
2	CONTROL END
3	PIPING END
4	FAN SECTION
5	COIL SECTION
6	CUSTOMER INSTALLED
7	FIELD SUPPLIED DEVICE

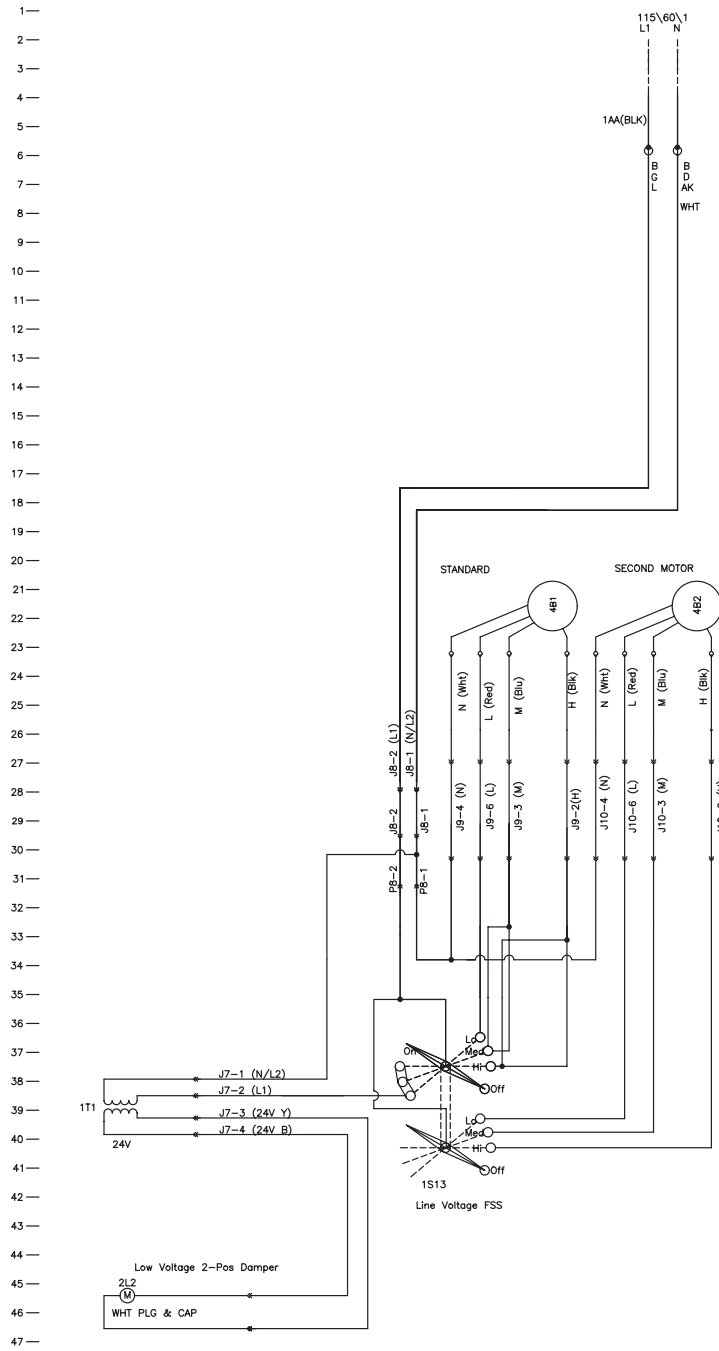


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Maintenance

typical wiring diagram

Line voltage fan speed switch



LEGEND		
DEVICE DESIGNATION	DESCRIPTION	
1S13	FAN SWITCH	41
1T1	TRANSFORMER	39
1TB1	MAIN POWER TERMINAL BLOCK	5
2L2	DAMPER ACTUATOR	46
2U2	FAN SWITCH	39
4B1	FAN MOTOR	22
4B2	FAN MOTOR	22
J	JACK(CAP) CONNECTOR	
P	PLUG CONNECTOR	

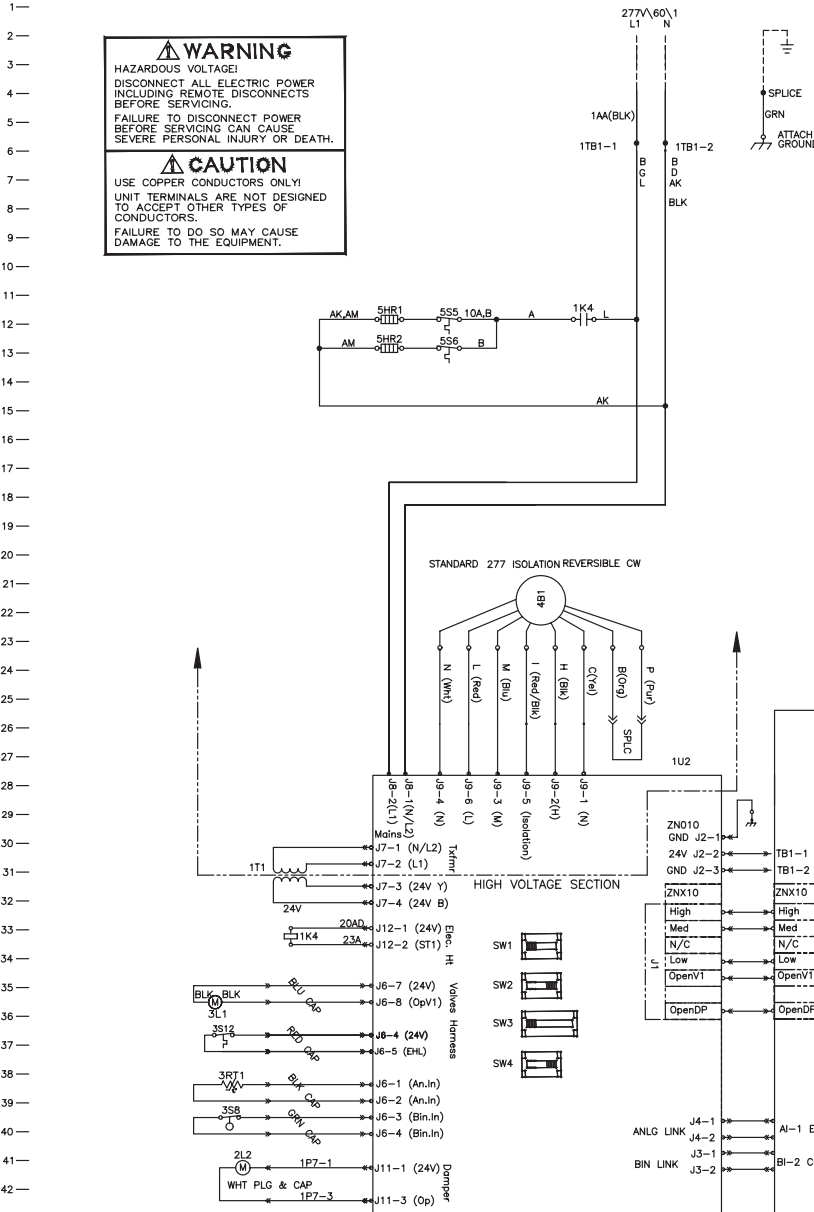
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AREA	LOCATION
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Tracer ZN010 with electric heat



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LEGEND		
DEVICE DESIGNATION	DESCRIPTION	
1T1	TRANSFORMER	31
1T2	MAIN POWER TERMINAL BLOCK	5
1U1	MAIN BOARD	26
1U2	DAUGHTERBOARD	27
1S9	FREEZE-STAT	45
1K4	ELECTRIC HEAT CONTACTOR	33
2L2	DAMPER ACTUATOR	41
2U2	FAN SWITCH	34
3L1	MAIN COIL VALVE	36
3L3	HEATING COIL VALVE	37
3RT1	AUTO CHANGE TEMP SENSOR	39
3S12	ELEC HEAT AUTO LOCKOUT SW	40
3S8	CONDENSATE OVERFLOW SW	37
4B1	FAN MOTOR	22
4RT2	RETURN AIR SENSOR	23
5HR1-2	HEATING ELEMENT	12
5S5,6	LIMIT SWITCH	12
6U2	ZONE SENSOR MODULE	26
J	JACK(CAP) CONNECTOR	
P	PLUG CONNECTOR	

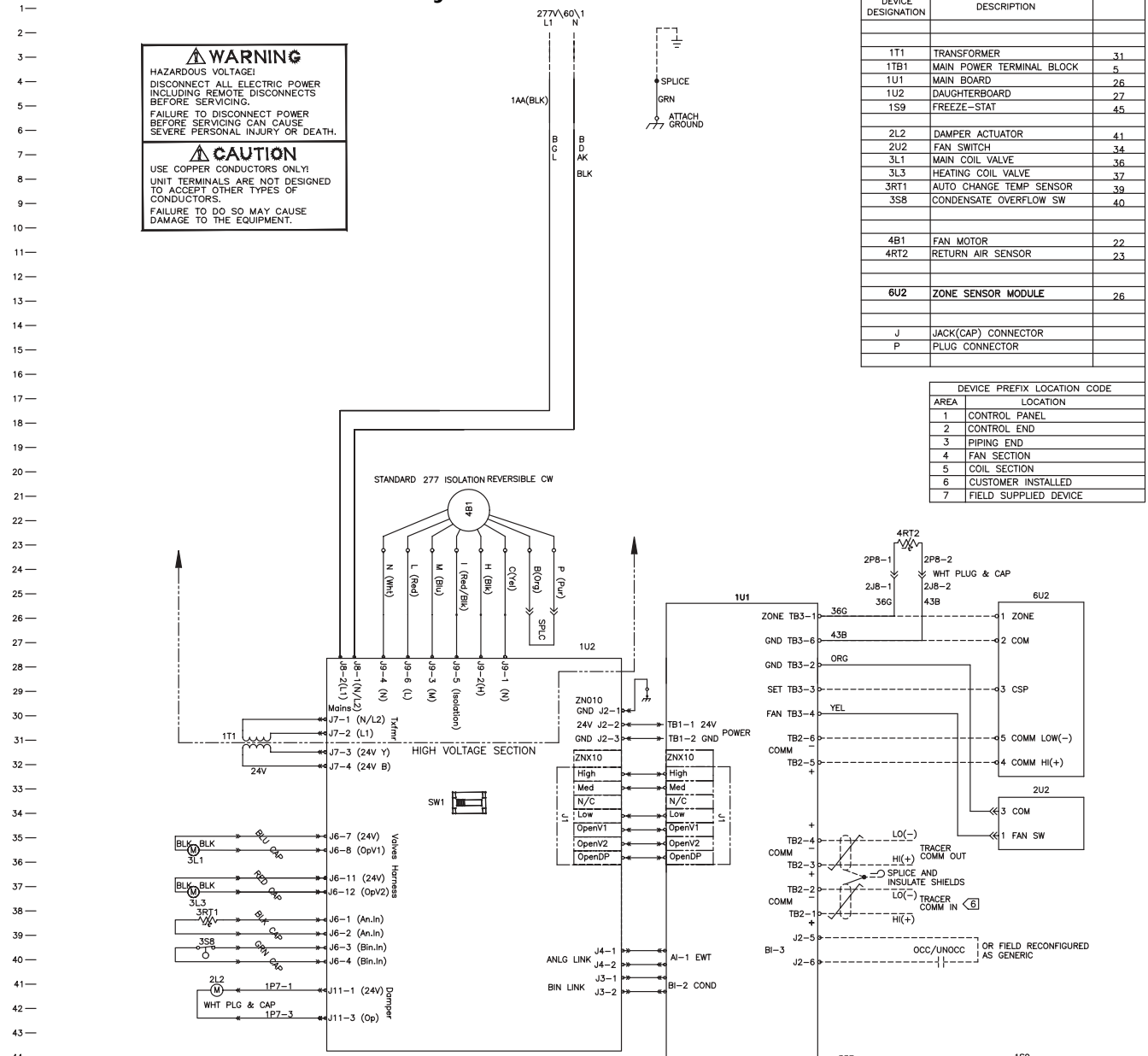
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AREA	LOCATION
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Maintenance

typical wiring diagram

Tracer ZN510 with main and auxilliary valves



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1TB1	MAIN POWER TERMINAL BLOCK	5
1U1	MAIN BOARD	26
1U2	DAUGHTERBOARD	27
1S9	FREEZE-STAT	45
2L2	DAMPER ACTUATOR	41
2U2	FAN SWITCH	34
3L1	MAIN COIL VALVE	36
3L3	HEATING COIL VALVE	37
3RT1	AUTO CHANGE TEMP SENSOR	39
3SB	CONDENSATE OVERFLOW SW	40
4B1	FAN MOTOR	22
4RT2	RETURN AIR SENSOR	23
6U2	ZONE SENSOR MODULE	26
J	JACK(CAP) CONNECTOR	
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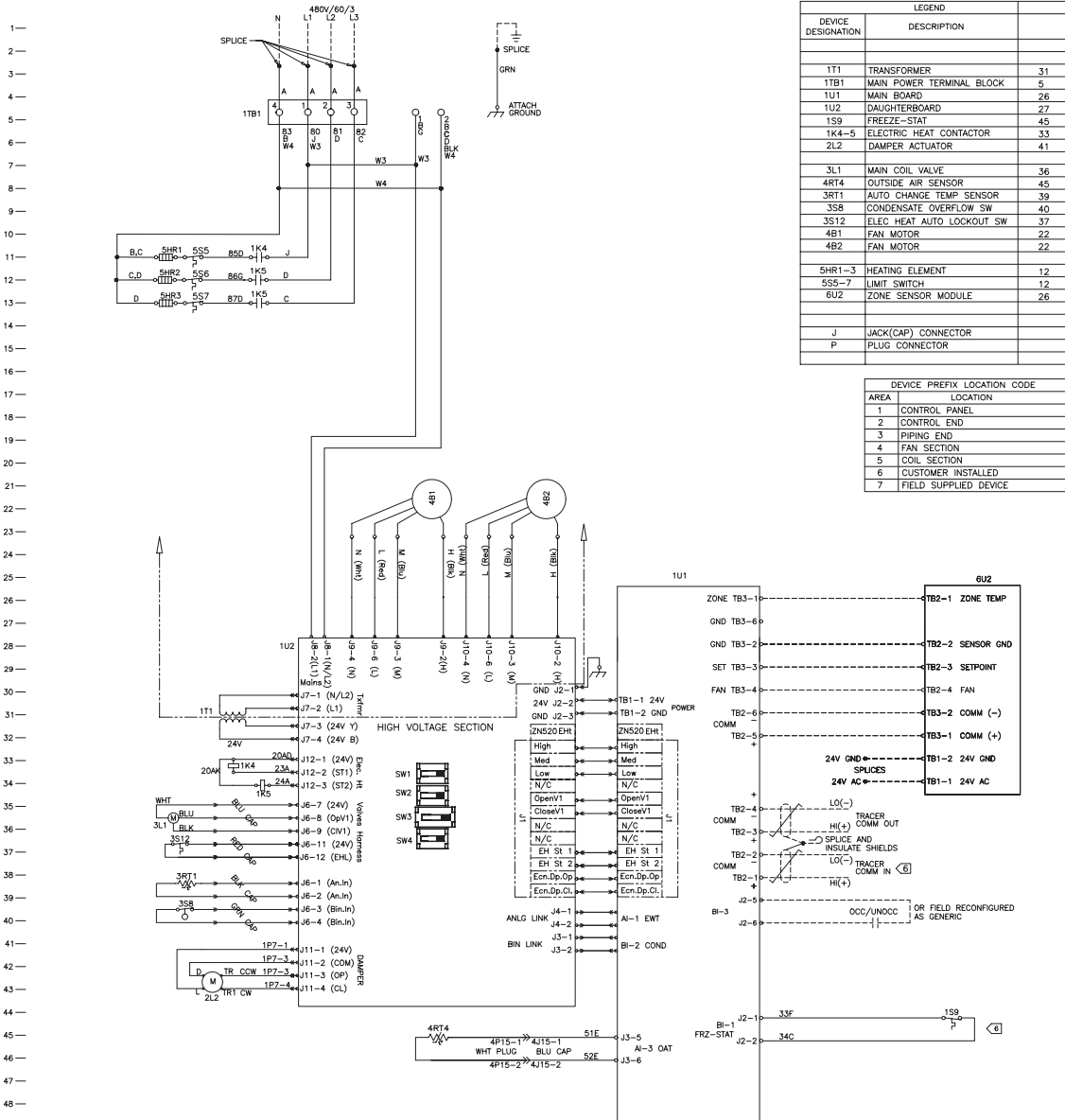
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Maintenance

typical wiring diagram

ZN520 with 2-stage electric heat



DEVICE DESIGNATION	LEGEND	DESCRIPTION	
1T1	TRANSFORMER		31
1TB1	MAIN POWER TERMINAL BLOCK		5
1U1	MAIN BOARD		26
1U2	DAUGHTERBOARD		27
1S9	FREEZE-STAT		45
1K4-5	ELECTRIC HEAT CONTACTOR		33
2L2	DAMPER ACTUATOR		41
3L1	MAIN COIL VALVE		36
4RT4	OUTSIDE AIR SENSOR		45
3RT1	AUTO CHANGE TEMP SENSOR		39
3S8	CONDENSATE OVERFLOW SW		40
3S12	ELEC HEAT AUTO LOCKOUT SW		37
4B1	FAN MOTOR		22
4B2	FAN MOTOR		22
5HR1-3	HEATING ELEMENT		12
5S5-7	LIMIT SWITCH		12
6U2	ZONE SENSOR MODULE		26
J	JACK(CAP) CONNECTOR		
P	PLUG CONNECTOR		

DEVICE PREFIX LOCATION CODE	
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www.trane.com*

*For more information contact
your local office or e-mail us at
comfort@trane.com*

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Trane has a policy of continuous product improvement and reserves the right to change design and specifications without notice. Only qualified technicians should install and service equipment.