# Installation, Operation, and Maintenance

# Blower Coil Air Handler

***Air Terminal Devices - 400 to 3000 cfm***

Models BCHC and BCVC
"AO" and later design sequence

**April 2008**

**BCXC-SVX01B-EN**

# Warnings, Cautions and Notices

**Warnings, Cautions and Notices.** Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that may result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

**ATTENTION:** Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

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

⚠ **CAUTION** – Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

***NOTICE*** – Indicates a situation that could result in equipment or property-damage only accidents.

## Important
## Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

## Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

## ⚠ WARNING
## Refrigerant warning information!

**System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.**

**Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.**

## ⚠ WARNING

### Hazard of Explosion and Deadly Gases!

**Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids. Failure to follow all proper safe refrigerant handling practices could result in death or serious injury.**

# Introduction

## About This Manual

Use this manual for commercial blower coil models BCHC and BCVC. This is the second version of this manual; this manual supercedes BCXB-SVX01A-EN. It provides specific installation, operation, and maintenance instructions for “AO” and later design sequences.

For previous design sequence information, contact your local Trane representative.

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# Table of Contents

# Model Number Description

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

### Digits 1, 2, 3, 4 — Unit Model

BCHC= horizontal blower coil
BCVC= vertical blower coil

### Digits 5, 6, 7 — Unit Size

| | | | |
|---|---|---|---|
| 012 | 024 | 054 | |
| 018 | 036 | 072 | 090 |

### Digit 8 — Unit Voltage

| | | | | | |
|---|---|---|---|---|---|
| A | = | 115/60/1 | H | = | 575/60/3 |
| B | = | 208/60/1 | J | = | 220/50/1 |
| C | = | 230/60/1 | K | = | 240/50/1 |
| D | = | 277/60/1 | L | = | 380/50/3 |
| E | = | 208/60/3 | M | = | 415/50/3 |
| F | = | 230/60/3 | N | = | 190/50/3 |
| G | = | 460/60/3 | P | = | two-speed, 115/60/1 |
| 0 | = | no motor, ctrls, elec ht. | | | |

### Digit 9 —Insulation Type

1 = 1” matte-faced
2 = 1” foil-faced

### Digits 10, 11 — Design Sequence

A0

### Digit 12 — Motor, Drive, and Control Box Location

A = same side as coil connections, horizontal or counterswirl only
B = opposite side from coil connections, horizontal or counterswirl only
C = same side as coil connections, pre-swirl only
D = opposite side from coil connections, pre-swirl only
R = right-hand access
L = left-hand access

### Digit 13 — Drain Pan Type, Coil & Drain Connection Side

0 = none
1 = polymer drain pan & right-hand connections
2 = polymer drain pan & left-hand connections
3 = stainless steel drain pan & right-hand connections
4 = stainless steel drain pan & left-hand connections

### Digit 14 — Unit Coil #1*

***Note:*** *All coils are hydronic unless stated otherwise.*

0 = none
A = 1-row preheat
L = 2-row hydronic high-capacity preheat
F = 4-row hydronic
G = 6-row hydronic
J = 4-row hydronic, autochangeover
K = 6-row hydronic, autochangeover
M = 4-row hydronic high-capacity
N = 6-row hydronic high-capacity
R = 4-row hydronic high-capacity, autochangeover
T = 6-row hydronic high-capacity, autochangeover
1 = 3-row DX, 3/16” distributor (0.032)
2 = 4-row DX, 3/16” distributor (0.032)
3 = 6-row DX, 3/16” distributor (0.032)
4 = 3-row DX, 3/16” distributor (0.049)
5 = 4-row DX, 3/16” distributor (0.049)
6 = 6-row DX, 3/16” distributor (0.049)

### Digit 15 — Unit Coil #2*

***Note:*** *All coils are hydronic unless stated otherwise.*

0 = none
A = 1-row reheat
L = 2-row hydronic high-capacity reheat
F = 4-row hydronic
G = 6-row hydronic
H = 2-row hydronic, autochangeover
J = 4-row hydronic, autochangeover
K = 6-row hydronic, autochangeover
M = 4-row hydronic high-capacity
N = 6-row hydronic high-capacity
P = 2-row hydronic high-capacity, autochangeover
R = 4-row hydronic high-capacity, autochangeover
T = 6-row hydronic high-capacity, autochangeover
1 = 3-row DX, 3/16” distributor (0.032)
2 = 4-row DX, 3/16” distributor (0.032)
3 = 6-row DX, 3/16” distributor (0.032)
4 = 3-row DX, 3/16” distributor (0.049)
5 = 4-row DX, 3/16” distributor (0.049)
6 = 6-row DX, 3/16” distributor (0.049)

### Digit 16 — Motor Horsepower

| | | | | | |
|---|---|---|---|---|---|
| 0 | = | none | 4 | = | 1 hp |
| 1 | = | 1/3 hp | 5 | = | 1-1/2 hp |
| 2 | = | 1/2 hp | 6 | = | 2 hp |
| 3 | = | 3/4 hp | 7 | = | 3 hp |

### Digit 17 — Motor Drives

0 = none
A = 390–552 rpm / 60 Hz
B = 478–678 rpm / 60 Hz
C = 540–765 rpm / 60 Hz
D = 619–878 rpm / 60 Hz
E = 727–1029 rpm / 60 Hz
F = 879–1245 rpm / 60 Hz
G = 1000–1417 rpm / 60 Hz
H = 1200–1700 rpm / 60 Hz
J = 1313–1859 rpm / 60 Hz
K = 1615–2288 rpm / 60 Hz
L = 678–877 rpm / 60 Hz
M = 765–990 rpm / 60 Hz
N = 878–1136 rpm / 60 Hz
P = 1029–1332 rpm / 60 Hz
R = 1245–1611 rpm / 60 Hz
T = 1174–1519 rpm / 50 Hz

### Digit 18 — Electric Heat Stages

0 = none
1 = 1-stage
2 = 2-stage

### Digits 19, 20, 21 — Electric Heat

| | | | | | |
|---|---|---|---|---|---|
| 000 | = | none | 100 | = | 10.0 kW |
| 010 | = | 1.0 kW | 110 | = | 11.0 kW |
| 015 | = | 1.5 kW | 120 | = | 12.0 kW |
| 020 | = | 2.0 kW | 130 | = | 13.0 kW |
| 025 | = | 2.5 kW | 140 | = | 14.0 kW |
| 030 | = | 3.0 kW | 150 | = | 15.0 kW |
| 035 | = | 3.5 kW | 160 | = | 16.0 kW |
| 040 | = | 4.0 kW | 170 | = | 17.0 kW |
| 045 | = | 4.5 kW | 180 | = | 18.0 kW |
| 050 | = | 5.0 kW | 190 | = | 19.0 kW |
| 055 | = | 5.5 kW | 200 | = | 20.0 kW |
| 060 | = | 6.0 kW | 210 | = | 21.0 kW |
| 065 | = | 6.5 kW | 220 | = | 22.0 kW |
| 070 | = | 7.0 kW | 240 | = | 24.0 kW |
| 075 | = | 7.5 kW | 260 | = | 26.0 kW |
| 080 | = | 8.0 kW | 280 | = | 28.0 kW |
| 090 | = | 9.0 kW | 300 | = | 30.0 kW |

### Digit 22 — Electric Heat Controls

0 = none
A = 24 volt magnetic contactors
B = 24 volt mercury contactors

### Digit 23 — Electric Heat Options

0 = none
A = electric heat with heater fuse
B = electric heat interlocking non-fused disconnect
C = A & B

### Digit 24 — Filters
0 = none
A = 1” throwaway
B = 2” pleated throwaway

### Digit 25 — Accessory Section
0 = none
A = mixing box only
B = angle filter box
C = angle filter/mixing box
D = top access filter box
E = bottom access filter
F = A & D
G = A & E
H = steam coil
J = A & H
K = B & H
L = C & H
M = D & H
N = E & H
P = A, D, & H
R = A, E, & H

### Digit 26 — Control Type
0 = no controls (4 x 4 junction box)
1 = control interface
2 = Tracer™ ZN010
3 = Tracer ZN510
4 = Tracer ZN520

### Digit 27 — Unit Coil #1 Control Valve
0 = none
A = 2-way, 2-position, n.c.
B = 2-way, 2-position, n.o.
C = 3-way, 2-position, n.c.
D = 3-way, 2-position, n.o.
E = 2-way modulating
F = 3-way modulating
G = field-supplied valve, 2-pos., n.c.
H = field-supplied valve, 2-pos., n.o.
J = field-supplied modulating valve

### Digit 28 — Unit Coil #1 Control Valve Cv
0 = none
A = 3.3 Cv, 1/2” valve & pipe
B = 3.3 Cv, 1/2” valve & 3/4” pipe
C = 3.8 Cv, 1/2” valve & 3/4” pipe
D = 6.6 Cv, 1” valve & pipe
E = 7.4 Cv, 1” modulating valve & pipe
F = 8.3 Cv, 1-1/4” modulating valve & pipe
G = 3.5 Cv, 1/2” valve & pipe
H = 4.4 Cv, 1/2” valve & pipe
J = 7.0 Cv, 3-way valve OR 6.0 Cv, 2-way valve, 1” valve & pipe
K = 8.0 Cv, 1” valve & pipe
L = 7.4 Cv, 1” 2-position valve & pipe
M = 8.3 Cv, 1-1/4” 2-position valve & pipe
Q = 1.3 Cv, 1/2” valve, 3/4” pipe
R = 1.8 Cv, 1/2” valve, 3/4” pipe
T = 2.3 Cv, 1/2” valve, 3/4” pipe
U = 2.7 Cv, 1/2” valve, 3/4” pipe

### Digit 29 — Unit Coil #1 Piping Package
0 = none
1 = basic piping package
2 = deluxe piping package

### Digit 30 — Unit Coil #2 Control Valve
0 = none
A = 2-way, 2-position, n.c.
B = 2-way, 2-position, n.o.
C = 3-way, 2-position, n.c.
D = 3-way, 2-position, n.o.
E = 2-way modulating
F = 3-way modulating
G = field-supplied valve, 2-pos., n.c.
H = field-supplied valve, 2-pos., n.o.
J = field-supplied modulating valve

### Digit 31 — Unit Coil #2 Control Valve Cv
0 = none
A = 3.3 Cv, 1/2” valve & pipe
B = 3.3 Cv, 1/2” valve & 3/4” pipe
C = 3.8 Cv, 1/2” valve & 3/4” pipe
D = 6.6 Cv, 1” valve & pipe
E = 7.4 Cv, 1” modulating valve & pipe
F = 8.3 Cv, 1-1/4” modulating valve & pipe
G = 3.5 Cv, 1/2” valve & pipe
H = 4.4 Cv, 1/2” valve & pipe
J = 7.0 Cv, 3-way valve OR 6.0 Cv, 2-way valve, 1” valve & pipe
K = 8.0 Cv, 1” valve & pipe
L = 7.4 Cv, 1” 2-position valve & pipe
M = 8.3 Cv, 1-1/4” 2-position valve & pipe
Q = 1.3 Cv, 1/2” valve, 3/4” pipe
R = 1.8 Cv, 1/2” valve, 3/4” pipe
T = 2.3 Cv, 1/2” valve, 3/4” pipe
U = 2.7 Cv, 1/2” valve, 3/4” pipe

### Digit 32 — Unit Coil #2 Piping Package
0 = none
1 = basic piping package
2 = deluxe piping package

### Digit 33 — Remote Heat Options
0 = none
1 = staged electric heat
2 = 2-position hot water, n.c.

### Digit 34 — Mixing Box Damper Actuator
***Note:*** *The back damper is the control damper when actuators are ordered. The back damper is n.c. (normally closed) or n.o. (normally open) as selected.*

0 = none
1 = 2-position, n.o., ship loose
2 = modulating, n.c.
3 = modulating, n.o.
4 = modulating, ship loose
5 = field-supplied 2-position, n.o.
6 = field-supplied 2-position, n.c.
7 = field-supplied modulating

### Digit 35 — Factory Mounted Control Options
0 = none
A = fan status
C = condensate overflow
D = low limit
F = A & C
G = A & D
K = C & D
N = A, C, & D

### Digit 36 — Control Options 2
0 = none
A = outside air sensor, field-mounted
B = discharge air sensor
C = A & B

### Digit 37 — Control Options 3
0 = none
A = dehumidification with communicated value
B = dehumidification with local humidity sensor

### Digit 38 — Zone Sensors
0 = none
1 = off/auto, setpoint knob, on/cancel, COMM
2 = off/auto/high/low, setpoint knob, on/cancel, COMM
3 = wall mtd. zone sensor (set point, occ, COMM)
4 = wall mtd. zone sensor (occ, COMM)
5 = wall mtd. zone temp sensor
A = digital zone sensor (O, A, H, L; SP; OCC; COMM)
B = digital zone sensor (CPS; OCC; COMM)
C = wireless zone sensor (setpoint only)

### Digit 39 — Extra Belt
0 = none
1 = ship loose extra belt

### Digit 40 — Extra Filter
0 = none
1 = ship loose extra 1” throwaway filter
2 = ship loose extra 2” pleated throwaway

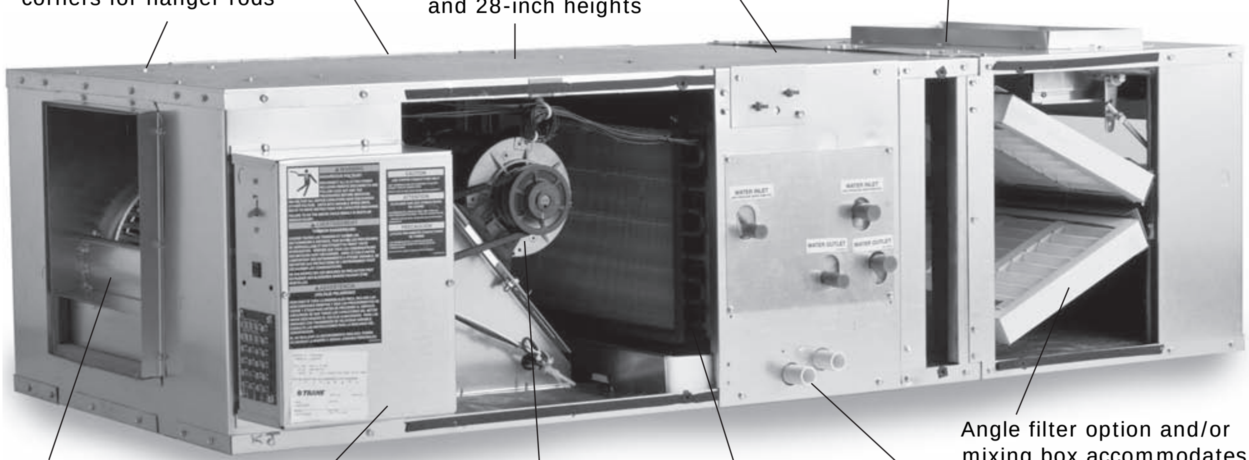
# General Information

## Blower Coil General Information

Blower coil units are draw-thru air handlers for cooling load conditions of 400–3000 cfm. Units are available in either horizontal (model BCHC) or vertical (model BCVC) configurations. Horizontal units are typically ceiling suspended via threaded rods. Knockouts are provided in all four corners to pass the rods through the unit. Horizontal units can also be floor mounted. Vertical units are typically floor mounted. They have a side inlet for easy duct connection, and do not require a field fabricated inlet plenum. Vertical units ship in two pieces and can be set up in either a pre-swirl or counter-swirl configuration.

Basic unit components consist of a water coil, condensate drain pan, filter, duct collars, one fan wheel, and motor with drive. See Figure 1. Drive components consist of sheaves, belt, and motor. The coil, drain pan, and motor/drive assembly can easily be field-converted from right hand to left hand configurations or vice versa.

**Figure 1. Blower coil air handler unit components (model BCHC, horizontal unit)**




Two, four, or six-row main coils are available for either hydronic cooling or heating. Three, four, or six-row direct expansion (DX) coils are also available for cooling. An optional one, two, four, or six-row heating coil is available factory-installed in either the preheat or reheat position. Also, a one-row preheat steam is available.

All units have an internal flat filter frame for one or two-inch filters. An optional angle filter box (two inch only), mixing box, bottom/top filter access box, or combination angle filter mixing box is available.

In addition, all units are available with either a basic or deluxe piping package option that includes a variety of control valve sizes in two or three-way configurations. The basic package consists of a control valve and stop (ball) valves. The deluxe package consists of a control valve, a stop (ball) valve, a circuit setter, and strainer.

Belt-drive motors range from 1/3 to 3 horsepower in a wide range of voltages. All motors have internal thermal and current overloads, permanently sealed ball bearings, and a resilient cradle mount to reduce noise and vibration transmission.

Variable pitch sheave drive kit options help make it possible to more accurately select design static pressure. For additional flexibility, 115 volt single phase, two speed motors are optional.

***Note:*** *Sheaves are factory set in the middle of the range. Field adjustment of sheaves, motor, and belt are required to arrive at desired rpm. Refer to the original sales order and* *Table 35, p. 68* *for drive information.*

Units may have no controls (4 x 4 junction box) or any of four different control types:

1. control interface
2. Tracer™ ZN010
3. Tracer ZN510
4. Tracer ZN520

All control options are factory-installed and tested.

# Pre-Installation

## Receiving and Handling

Blower coil units are packaged for easy handling and storage on the job site. Upon delivery, inspect all components for possible shipping damage. See the "Receiving Checklist" section (below) for detailed instructions. Trane recommends leaving units and accessories in their shipping packages/ skids for protection and handling ease until installation.

### Shipping Package

Blower coil air handlers ship assembled on skids with protective coverings over the coil and discharge openings.

### Ship-Separate Accessories

Field-installed sensors ship separately inside the unit's main control panel. Piping packages, mixing boxes, ship separately packaged on the same skid as the unit.

### 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 if possible.

☐ 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 Recommendations

This unit is intended for indoor use only. To protect the unit from damage due to the elements and prevent it from possibly becoming a contaminant source for IAQ problems, store the unit indoors. If indoor storage is not possible, the Trane Company makes 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.

***Note:*** *Wet interior unit insulation can become an amplification site for microbial growth (mold), which may cause odors and health-related indoor air quality problems. If there is visible evidence of microbial growth (mold) on the interior insulation, remove and replace the insulation prior to operating the system.*

## Installation Preparation

Before installing the unit, perform the following procedures to ensure proper unit operation.

1. 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. Standing water and wet surfaces inside units can result in microbial growth (mold) in the drain pan that may cause unpleasant odors and serious health-related indoor air quality problem.
2. Allow adequate service and code clearances as recommended in the "Service Access" section (below). Position the unit and skid assembly in its final location. Test lift the unit to determine exact unit balance and stability before hoisting it to the installation location.

## Service Access

See Table 1, below, and Figure 2, p. 13 for recommended service and code clearances.

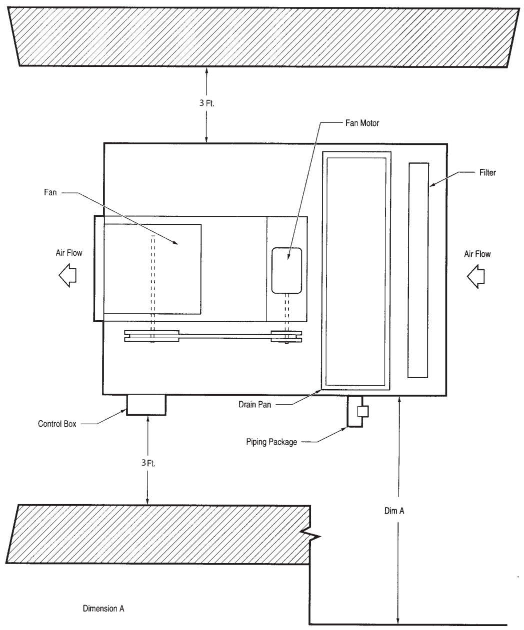
### ⚠ WARNING
### Hazardous Voltage!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

**Table 1. Service requirements, in. (cm)**

| Unit size | Dimension A |
|---|---|
| 12 | 20 (50.8) |
| 18 | 25 (63.5) |
| 24 | 25 (63.5) |
| 36 | 37 (94.0) |
| 54 | 37 (94.0) |
| 72 | 45 (114.3) |
| 90 | 45 (114.3) |

**Figure 2. Top view of blower coil unit showing recommended service and code clearances**




## Rigging and Handling

Before preparing the unit for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed, with more weight in the coil area. Approximate unit weights are given in "Dimensions and Weights," p. 15. Also, you may reference the unit weight on the unit nameplate.

Before hoisting the unit into position, use a proper rigging method such as straps, slings, or spreader bars for protection and safety. Always test-lift the unit to determine the exact unit balance and stability before hoisting it to the installation location.

### ⚠ WARNING
### Improper Unit Lift!

**Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.**

### Unit Handling Procedure

1. Position rigging sling under wood skid using spreader bars to avoid unit damage.
2. Use a forklift with caution to prevent unit damage. The fork length must be at least 68 inches long to safely fork the unit from front or back.
3. The unit center of gravity will fall within the center of gravity block at various locations depending on unit options.
4. See unit nameplate for unit weight.

## Unit Location Recommendations

When selecting and preparing the unit installation location, consider the following recommendations.

1. Consider the unit weight. Reference the unit weight on the unit nameplate or in "Dimensions and Weights," p. 15.
2. Allow sufficient space for the recommended clearances, access panel removal, and maintenance access. Refer to Figure 2, p. 13.
3. The installer must provide threaded suspension rods for ceiling mounted units. All units must be installed level.
4. Coil piping and condensate drain requirements must be considered.

   Allow room for proper ductwork and electrical connections. Support all piping and ductwork independently of unit to prevent excess noise and vibration.

## Skid Removal

The unit ships on skids that provide forklift locations from the front or rear. The skid allows easy maneuverability of the unit during storage and transportation. Remove the skids before placing the unit in its permanent location.

Remove the skids using a forklift or jack. Lift one end of the unit off of the skids. Vibration isolators for external isolation are field supplied.

# 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. Refer to "Dimensions and Weights," p. 15. 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 for the discharge ductwork.

# Dimensions and Weights

## Horizontal Blower Coil

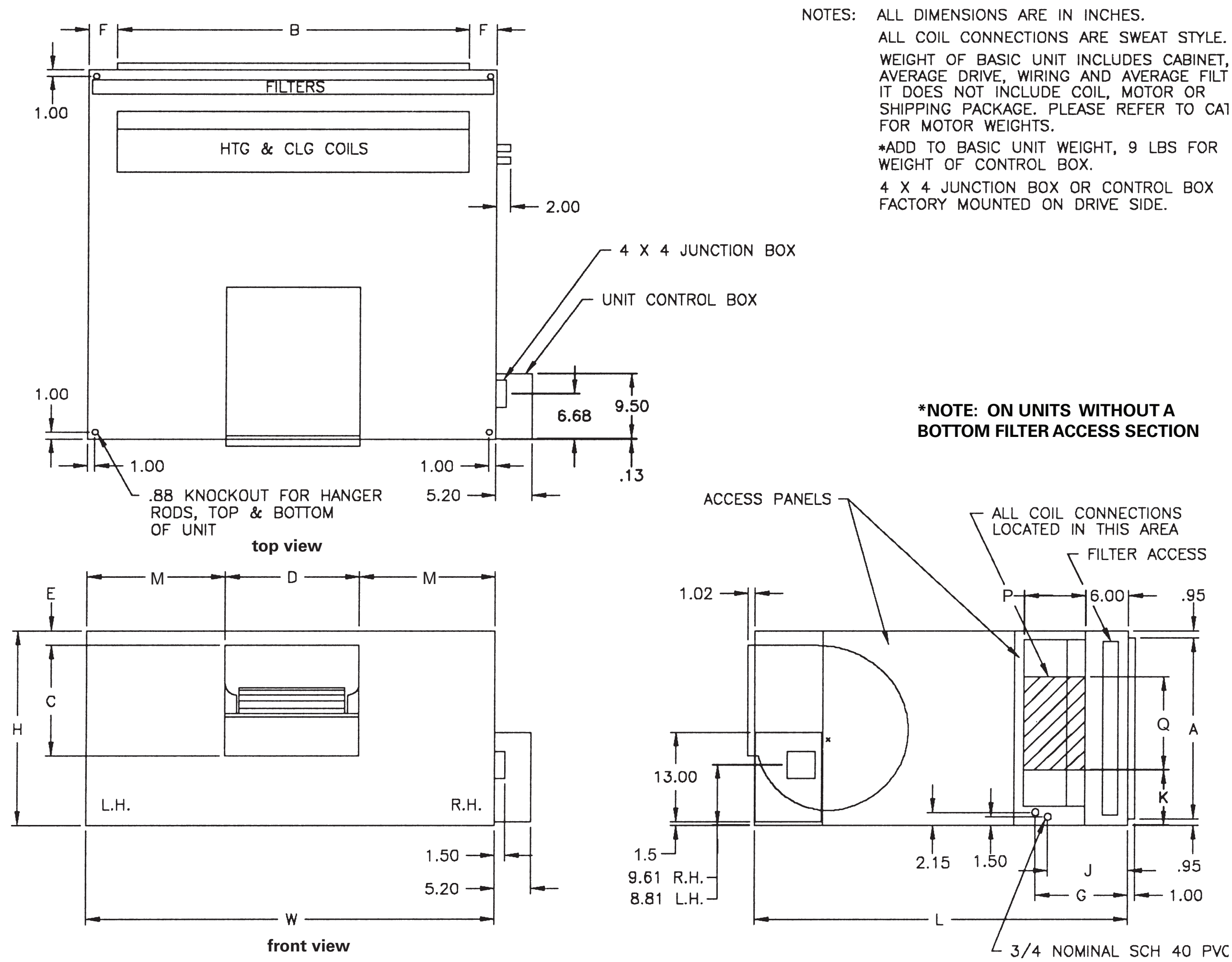



**Table 2. Horizontal blower coil dimensions (in.) and weights (lb)**

| Unit size | H | W | L | A | B | C | D | E | F | G (RH) | G (LH) | J (RH) | J (LH) | K | M | P | Q | Basic unit weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 14.00 | 24.00 | 39.75 | 12.09 | 18.00 | 10.56 | 7.09 | 0.55 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 4.20 | 8.46 | 9.00 | 5.75 | 70.40 |
| 18 | 14.00 | 28.00 | 39.75 | 12.09 | 22.00 | 10.56 | 7.09 | 0.55 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 4.20 | 10.46 | 9.00 | 5.75 | 76.10 |
| 24 | 18.00 | 28.00 | 44.00 | 16.09 | 22.00 | 13.56 | 12.56 | 1.30 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 6.20 | 7.72 | 9.00 | 5.75 | 98.90 |
| 36 | 18.00 | 40.00 | 44.00 | 16.09 | 34.00 | 13.56 | 12.56 | 1.30 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 6.20 | 13.72 | 9.00 | 5.75 | 116.10 |
| 54 | 22.00 | 40.00 | 49.00 | 20.09 | 34.00 | 13.56 | 12.56 | 0.72 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 7.43 | 13.72 | 11.00 | 7.27 | 138.90 |
| 72 | 22.00 | 48.00 | 49.00 | 20.09 | 40.00 | 13.56 | 12.56 | 0.72 | 4.00 | 11.42 | 13.42 | 9.42 | 11.42 | 7.43 | 17.72 | 11.00 | 7.27 | 152.20 |
| 90 | 28.00 | 48.00 | 52.00 | 26.09 | 40.00 | 13.56 | 12.56 | 1.66 | 4.00 | 12.79 | 14.79 | 10.79 | 12.79 | 8.24 | 17.72 | 11.25 | 11.64 | 174.80 |

## Vertical Blower Coil

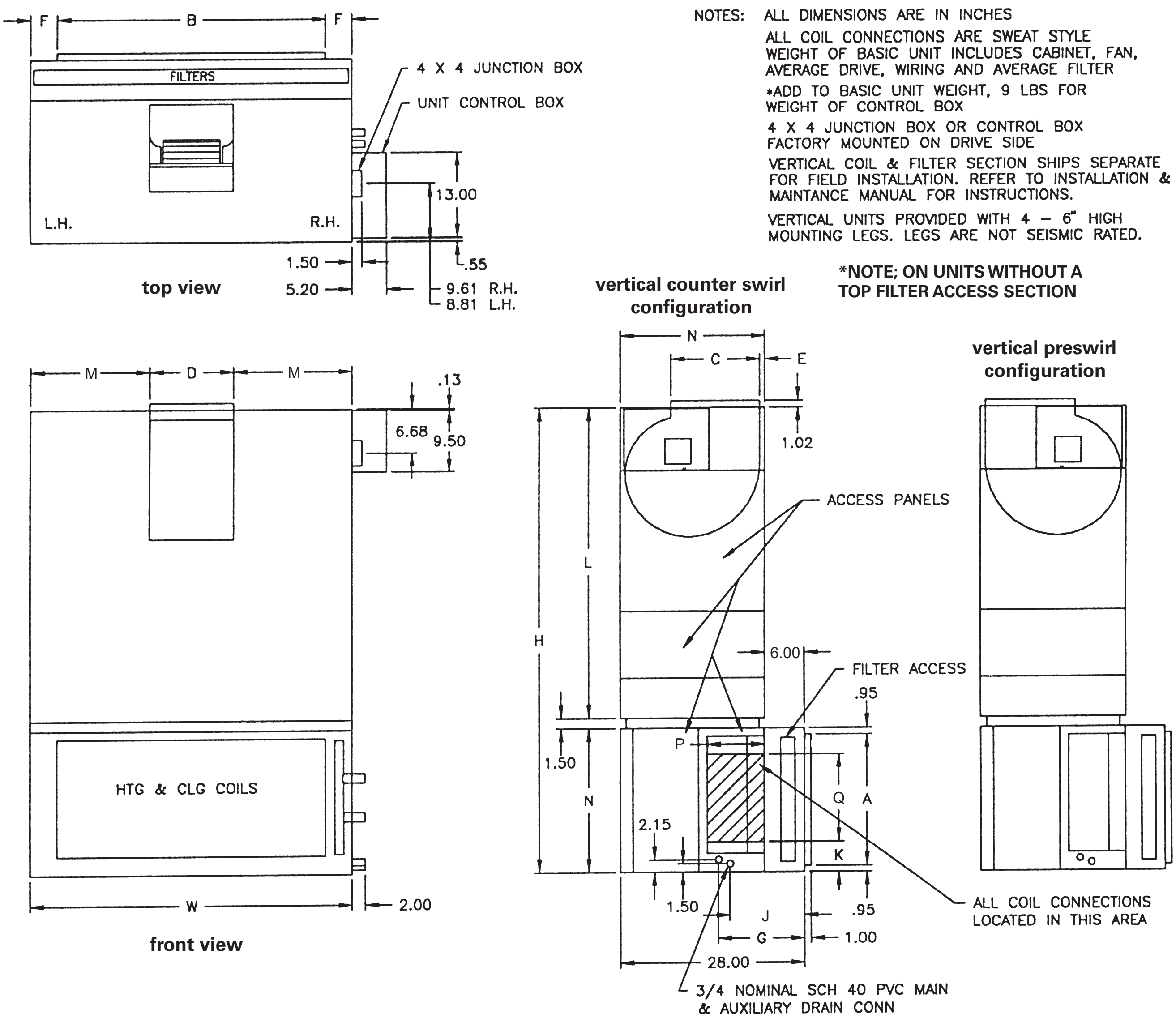
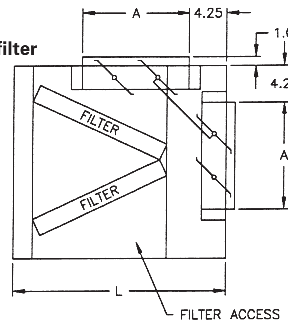


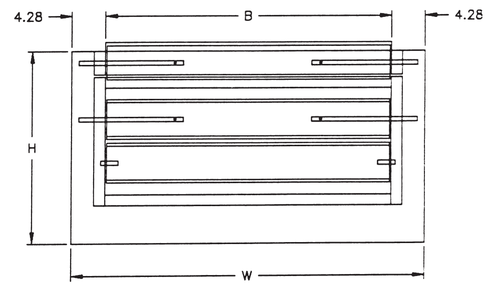

**Table 3. Vertical blower coil dimensions (in.) and weights (lb)**

| Unit size | H | W | L | A | B | C | D | E | F | G (RH) | G (LH) | J (RH) | J (LH) | K | M | N | P | Q | R | Basic unit weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 63.50 | 28.00 | 44.00 | 16.09 | 22.00 | 13.56 | 12.56 | 1.30 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 6.20 | 5.50 | 18.00 | 9.00 | 5.50 | 28.00 | 150.30 |
| 36 | 63.50 | 40.00 | 44.00 | 16.09 | 34.00 | 13.56 | 12.56 | 1.30 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 6.20 | 5.50 | 18.00 | 9.00 | 5.50 | 28.00 | 180.40 |
| 54 | 72.50 | 40.00 | 47.00 | 20.09 | 34.00 | 13.56 | 12.56 | 0.72 | 3.00 | 11.42 | 13.42 | 9.42 | 11.42 | 4.21 | 10.43 | 22.00 | 11.00 | 7.27 | 30.00 | 206.40 |
| 72 | 72.50 | 48.00 | 47.00 | 20.09 | 40.00 | 13.56 | 12.56 | 0.72 | 4.00 | 11.42 | 13.42 | 9.42 | 11.42 | 4.18 | 10.43 | 22.00 | 11.00 | 7.27 | 30.00 | 228.20 |
| 90 | 81.50 | 48.00 | 50.00 | 26.09 | 40.00 | 13.56 | 12.56 | 1.66 | 4.00 | 12.79 | 14.79 | 10.79 | 12.79 | 4.81 | 15.61 | 28.00 | 11.25 | 11.64 | 30.00 | 258.40 |

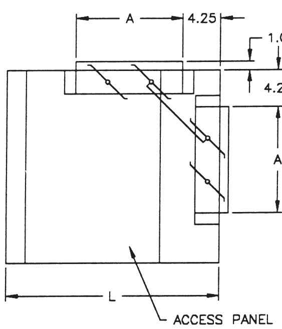
## Angle Filter and Mixing Box

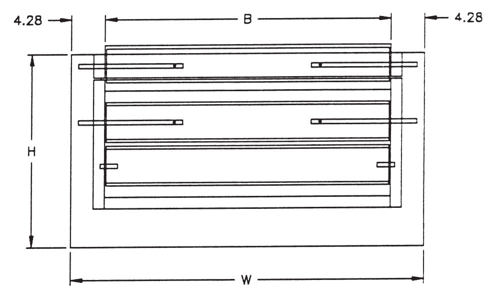
combination angle filter
& mixing box



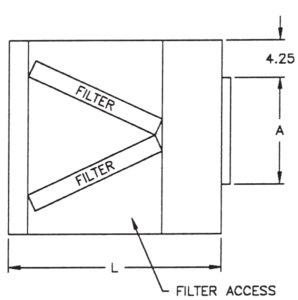



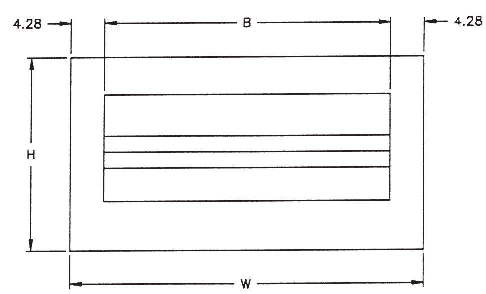

mixing box




angle filter box



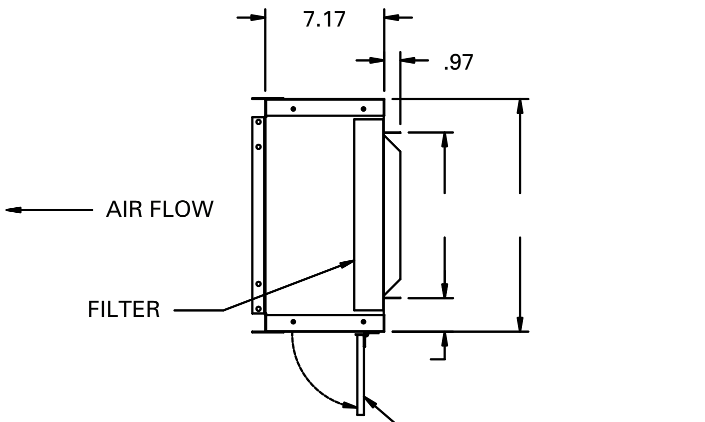



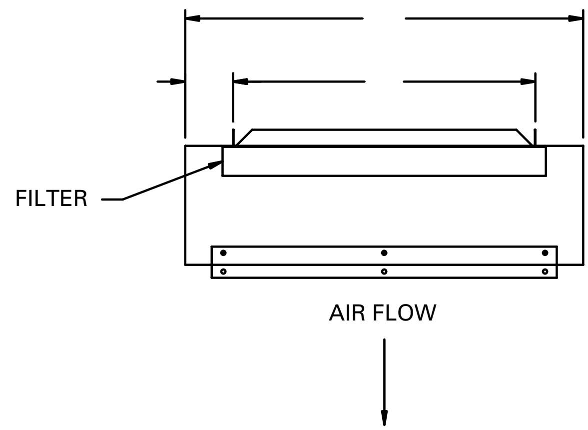

NOTES: ALL DIMENSIONS ARE IN INCHES.
MIXING BOX SHIPS ASSEMBLED FOR FIELD INSTALLATION
LINKAGE BETWEEN DAMPERS FACTORY INSTALLED INSIDE MIXING BOX OPPOSITE DRIVE SIDE.
DRIVE ROD ON BACK DAMPER MAY BE EXTENDED THRU KNOCKOUT FOR EXTERNALLY MOUNTED ACTUATOR. TO ADJUST LOSSEN HEX HD SET SCREW ON BLADE.
UNIT SIZE 36 HAS ONLY ONE ANGLED FILTER TRACK. ALL OTHER UNIT SIZES HAVE TWO FILTER TRACKS AS SHOWN.

**Table 4. Angle filter and mixing box dimensions (in.) and weights (lb)**

| Unit size | H | L | W | A | B | Weight |
|---|---|---|---|---|---|---|
| 12 | 14.12 | 22.00 | 24.11 | 7.06 | 15.56 | 36.0 |
| 16 | 14.12 | 22.00 | 28.11 | 7.06 | 19.56 | 41.0 |
| 24 | 18.12 | 19.50 | 28.11 | 7.06 | 19.56 | 43.0 |
| 36 | 18.12 | 24.50 | 40.11 | 7.06 | 31.56 | 56.0 |
| 54 | 22.12 | 23.50 | 40.11 | 12.81 | 31.56 | 72.0 |
| 72 | 22.00 | 23.50 | 48.00 | 12.81 | 32.56 | 72.5 |
| 90 | 27.90 | 27.56 | 48.00 | 12.85 | 31.56 | 84.1 |

## Bottom or Top Access Filter Box



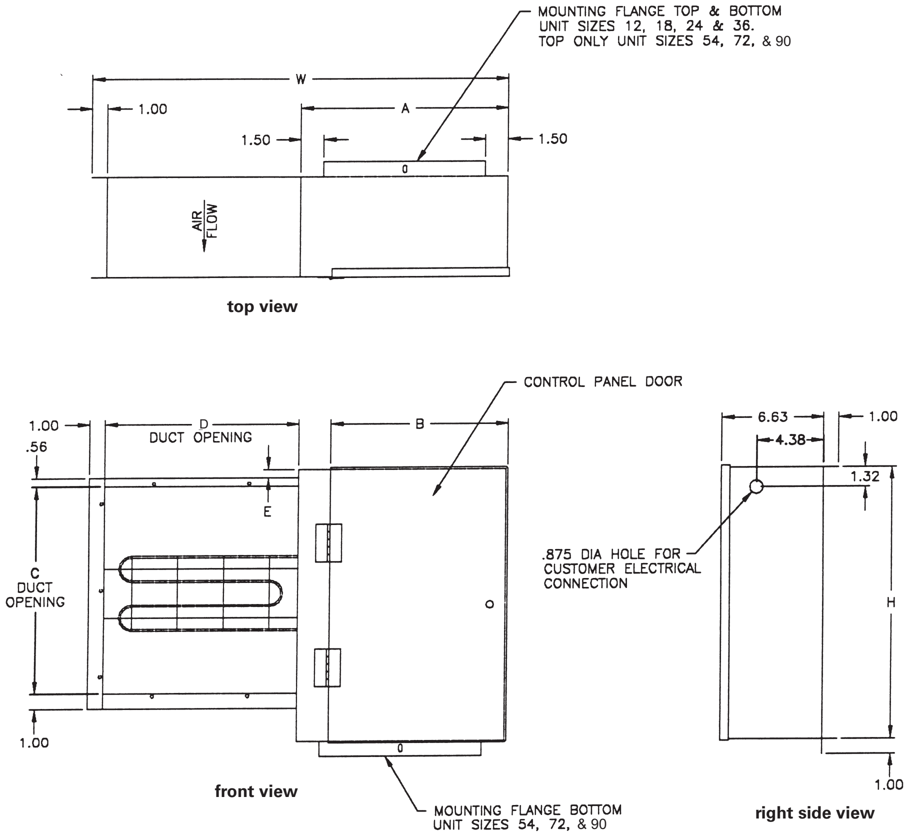




NOTES;
1. DIMENSIONS ARE IN INCHES.
2. ROTATE 180° FOR TOP ACCESS.
3. SECTIONS SHIPS ATTACHED TO THE UNIT.

**Table 5. Bottom or top access filter box dimensions (in.) and weights (lb)**

| Unit size | H | W | A | B | C | D | Weight |
|---|---|---|---|---|---|---|---|
| 12 | 14.00 | 24.00 | 9.98 | 2.01 | 18.23 | 2.88 | 15 |
| 18 | 14.00 | 28.00 | 9.98 | 2.01 | 21.98 | 3.01 | 17 |
| 24 | 18.00 | 28.00 | 14.23 | 1.89 | 23.23 | 2.38 | 18 |
| 36 | 18.00 | 40.00 | 14.23 | 1.89 | 33.73 | 3.13 | 25 |
| 54 | 22.00 | 40.00 | 18.23 | 1.89 | 33.73 | 3.13 | 28 |
| 72 | 22.00 | 48.00 | 18.23 | 1.89 | 42.73 | 2.63 | 32 |
| 90 | 28.00 | 48.00 | 23.23 | 1.89 | 41.23 | 3.38 | 37 |

## Electric Heat




NOTES: ALL DIMENSIONS ARE IN INCHES.
ELECTRIC HEATER IS FACTORY MOUNTED ON UNIT DISCHARGE FACE & WIRED TO UNIT CONTROL BOX.
RIGHT HAND HEATER SHOWN. LEFT HAND HEATER IS MIRROR IMAGE OF RIGHT HAND.
CONTROL PANEL DOOR IS HINGED AT BOTTOM ON UNIT SIZES 12, 18, 24 & 36. UNIT SIZES 54, 72, & 90 ARE HINGED AT SIDE AS SHOWN.
HEATER MAY BE MOUNTED WITH HORIZONTAL OR VERTICAL UP AIRFLOW.
OPTIONAL MERCURY CONTACTORS CANNOT BE USED WITH VERTICAL UP AIRFLOW.
ELECTRIC HEAT MAY NEED FIELD-SUPPLIED EXTERNALLY-WRAPPED INSULATION IF THE UNIT IS INSTALLED IN AN UNCONDITIONED SPACE OR IF SWEATING IS AN ISSUE.

**Table 6. Electric heat dimensions (in.) and weights (lb)**

| Unit size | H | W | A | B | C | D | E | Weight |
|---|---|---|---|---|---|---|---|---|
| 12 | 14.06 | 17.88 | 8.13 | 6.79 | 10.50 | 7.75 | 0.03 | 10.0 |
| 18 | 14.06 | 19.88 | 10.13 | 8.79 | 10.50 | 7.75 | 0.03 | 10.8 |
| 24 | 18.06 | 21.25 | 7.63 | 6.29 | 13.50 | 12.63 | 0.80 | 11.3 |
| 36 | 18.06 | 27.25 | 13.63 | 12.29 | 13.50 | 12.63 | 0.80 | 12.8 |
| 54 | 18.06 | 27.25 | 13.63 | 11.67 | 13.50 | 12.63 | 0.22 | 16.0 |
| 72 | 18.06 | 27.25 | 13.63 | 11.67 | 13.50 | 12.63 | 0.22 | 17.4 |
| 90 | 18.06 | 27.25 | 13.63 | 11.67 | 13.50 | 12.63 | 1.16 | 19.2 |

## Steam Coil

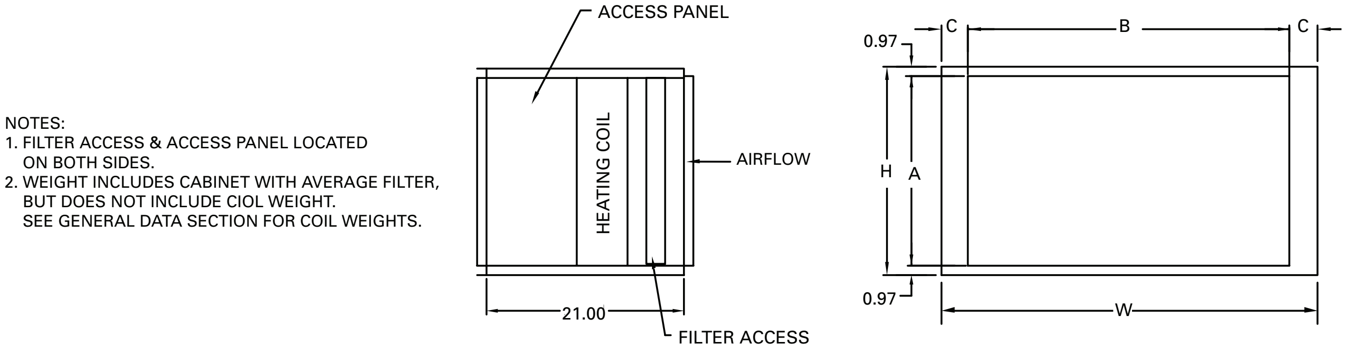



**Table 7. Steam coil box dimensions (in.) and weights (lb)**

| Unit size | H | W | A | B | C | Weight | Coil Connections, NPT Supply | Coil Connections, NPT Return |
|---|---|---|---|---|---|---|---|---|
| 12 | 14.00 | 24.00 | 12.06 | 18.04 | 2.98 | 34 | 1 | 3/4 |
| 18 | 14.00 | 28.00 | 12.06 | 22.04 | 2.98 | 37 | 1 | 3/4 |
| 24 | 18.00 | 28.00 | 16.06 | 22.04 | 2.98 | 40 | 1-1/2 | 1 |
| 36 | 18.00 | 40.00 | 16.06 | 34.04 | 2.98 | 48 | 1-1/2 | 1 |
| 54 | 22.00 | 40.00 | 20.06 | 34.04 | 2.98 | 50 | 2 | 1 |
| 72 | 22.00 | 48.00 | 20.06 | 42.04 | 2.98 | 56 | 2 | 1 |
| 90 | 28.00 | 48.00 | 26.06 | 40.04 | 3.98 | 63 | 2.5 | 1-1/4 |

## Coil Connections

**Table 8. Hydronic coil connection sizes, OD (in.)**

| | Standard capacity | | | High capacity | | |
|---|---|---|---|---|---|---|
| Unit size | 1-row | 4-row | 6-row | 2-row | 4-row | 6-row |
| 12 | 5/8 | - | - | 5/8 | 7/8 | 7/8 |
| 18 | 5/8 | - | - | 5/8 | 7/8 | 7/8 |
| 24 | 5/8 | - | - | 7/8 | 1-1/8 | 1-1/8 |
| 36 | 7/8 | - | - | 7/8 | 1-1/8 | 1-1/8 |
| 54 | 1-1/8 | 1-3/8 | 1-3/8 | 1-1/8 | 1-1/8 | 1-1/8 |
| 72 | 1-1/8 | 1-3/8 | 1-3/8 | 1-1/8 | 1-1/8 | 1-1/8 |
| 90 | 1-1/8 | 1-5/8 | 1-5/8 | 1-1/8 | 1-1/8 | 1-1/8 |

**Table 9. DX coil connection sizes, OD (in.)**

| | 3- & 4-row | | 6-row | |
|---|---|---|---|---|
| Unit size | Suction | Liquid | Suction | Liquid |
| 12 | 5/8 | 5/8 | 5/8 | 5/8 |
| 18 | 5/8 | 5/8 | 5/8 | 5/8 |
| 24 | 5/8 | 5/8 | 7/8 | 5/8 |
| 36 | 7/8 | 5/8 | 7/8 | 5/8 |
| 54 | 1-1/8 | 7/8 | 1-1/8 | 7/8 |
| 72 | 1-1/8 | 7/8 | 1-1/8 | 7/8 |
| 90 | 1-3/8 | 7/8 | 1-1/8 | 7/8 |

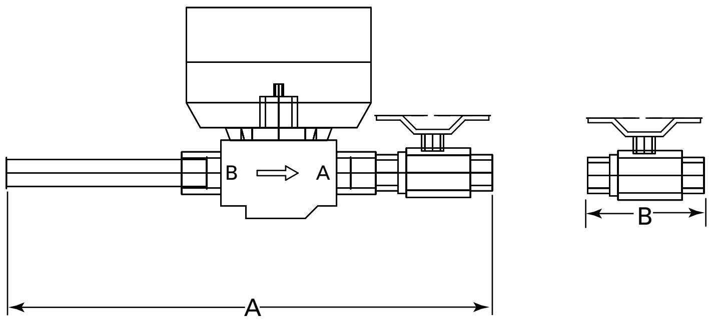
**Table 10. Steam coil connection sizes, female connection, NPT (in.)**

| Unit size | Supply | Return |
|---|---|---|
| 12 | 1 | 3/4 |
| 18 | 1 | 3/4 |
| 24 | 1-1/2 | 1 |
| 36 | 1-1/2 | 1 |
| 54 | 2 | 1 |
| 72 | 2 | 1 |
| 90 | 2-1/2 | 1-1/4 |

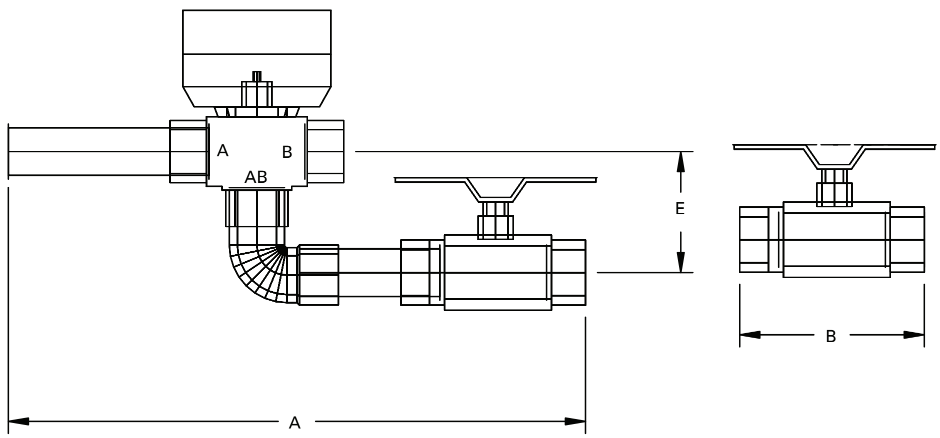
# Piping Packages

## Basic Piping

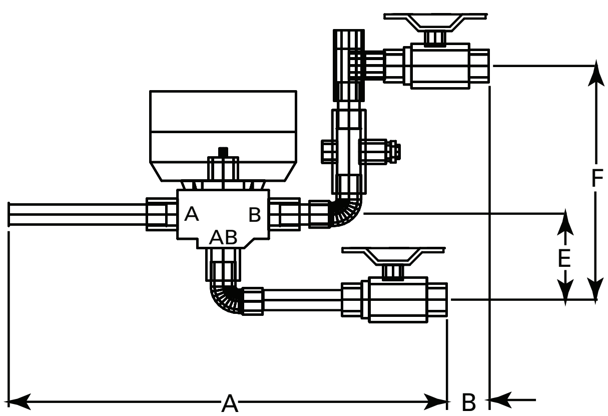
**Two-way, 1/2" and 1" valve basic piping package**




**Two-way, 1-1/4" valve basic piping package**

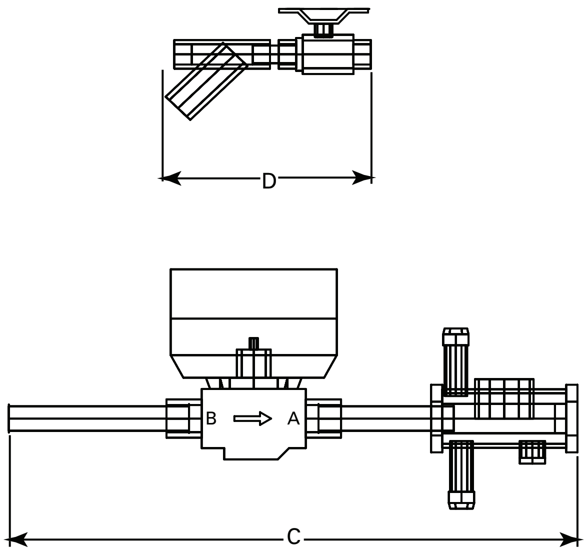



**Three-way, 1/2" and 1" valve basic piping package**

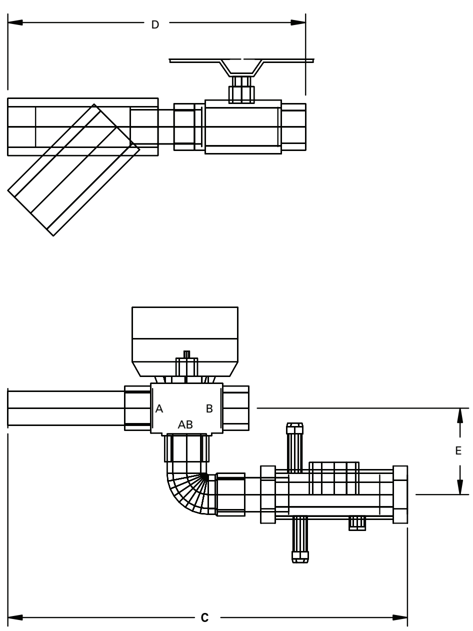


## Deluxe Piping

**Two-way, 1/2" and 1" valve deluxe piping package**




**Two-way 1-1/4" valve deluxe piping package**



## Dimensions and Weights

**Three-way, 1/2” and 1” valve deluxe piping package**

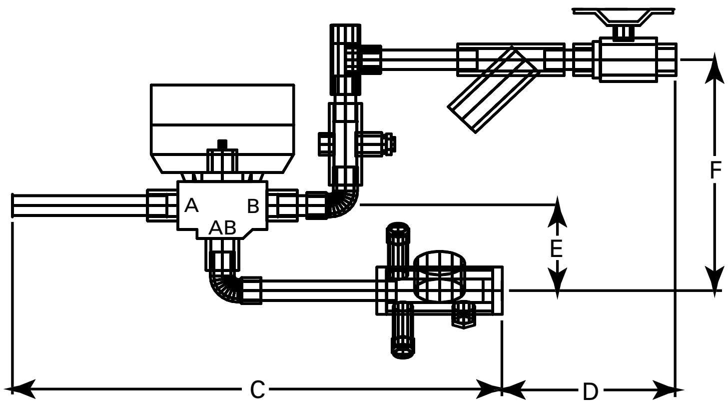



**Table 11. Piping package dimensions (in.)**

| Piping package | Nominal tube size | Actual size | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|
| 2-way | 1/2 | 5/8 | 12.025 | 2.650 | 12.625 | 5.650 | N/A | N/A |
| | 1 | 1-1/8 | 13.295 | 4.260 | 13.220 | 9.288 | 3.020 | N/A |
| 3-way | 1/2 | 5/8 | 12.088 | 2.097 | 12.688 | 4.497 | 6.351 | 6.351 |
| | 3/4 | 7/8 | 15.623 | 1.750 | 15.313 | 6.290 | 6.701 | 6.701 |
| | 1 | 1-1/8 | 13.370 | 3.690 | 13.210 | 9.060 | 9.813 | 9.813 |
| | 1-1/4 | 1-3/8 | 16.885 | 3.738 | 16.410 | 10.023 | 3.052 | 10.520 |

# Installation Controls

## Installing Wall Mounted Controls

Wall mounted zone sensors ship taped to the control box. Refer to Figure 3 for zone sensor dimensions.

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

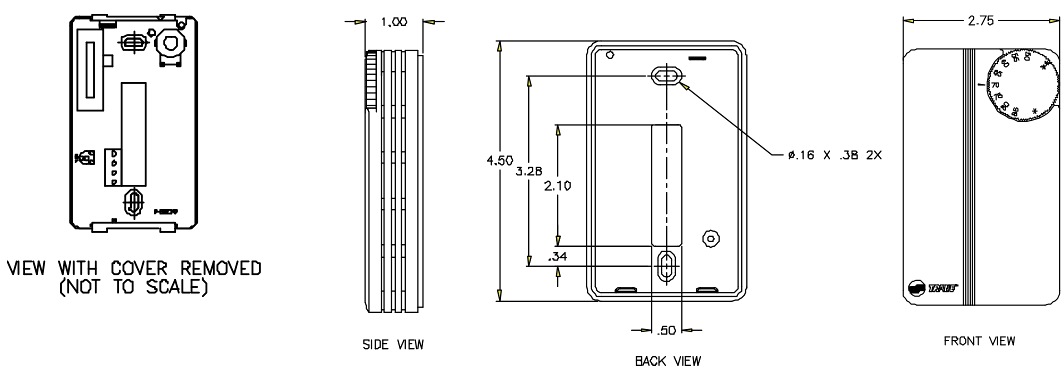
Avoid mounting the controller in an area subject to the following conditions:

- 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.

## Zone Sensor Installation

Follow the procedure below to install the zone sensor module (see Figure 3).

**Figure 3. Wall-mounted zone sensor dimensions**




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 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 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 ZN520 zone sensor, see "Tracer Summit Communication Wiring," p. 27 for more information.

## Communication Wiring

***Units with Tracer ZN510 or ZN520 only***

***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 either 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.

### Service Communication Wiring

Establish service communication using Rover™ service software connected to the Tracer™ ZN controller using a twisted wire pair to one of the following connection points:

- Remote zone sensor module
- Connections on the board

This allows the technician to view and edit the Tracer™ controller configuration and troubleshoot the unit.

***Note:*** *Unit control options and field wiring practices may limit the controller's communication ability.*

Route interconnecting wiring from the Tracer™ controller to provide service communication at the wall-mounted zone sensor module. Install wiring by referencing the unit wiring diagram and Table 12, p. 29 for appropriate wire sizes. After wiring is complete, connect the communication cable (provided with the Rover™ service tool) to the telephone style RJ11 connection on the zone sensor module. Attach the other end of the cable to a computer running Trane Rover software to communicate.

### Zone Sensors Without Interconnecting Wiring

Establish service communication to the Tracer™ ZN controller by wiring directly to the board inside the control box. Refer to the unit-wiring diagram for appropriate communication terminals on the board.

Once wiring is complete, Use Trane Rover™ software to communicate to the Tracer™ ZN controller.

### Tracer Communications

Tracer™ ZN controllers have Comm5 communication ports. 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 Comm5 communication links.

The controller provides six 0.25-inch quick-connect terminals for the Comm5 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

Each controller has its own unique address or I.D. number on a Neuron chip. Setting dip switches are not required on the Tracer™ controller.

## Tracer Summit Communication Wiring

For Tracer™ ZN-controlled units that will interface with the Trane Tracer Summit® building management system, terminate the communication wiring in the control box at the designated terminals on the board. Reference the unit wiring diagram or submittals.

Ground shields at each Tracer™ ZN controller, taping the opposite end of each shield to prevent any connection between the shield and anther ground. Refer to Trane publication CNT-SVX04A-EN, *Tracer ZN.520 Unit Controller - Installation, Operation and Programming Guid*e, for the communication wiring diagram.

Communication wire must conform to the following specification:

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

# Installation Electrical

## Unit Wiring Diagrams

Specific unit wiring diagrams are provided on the inside of the control panel door. Typical unit wiring diagrams are in "Wiring Diagrams," p. 81. Use these diagrams for connections or trouble analysis.

### ⚠ WARNING
### Grounding Required!

**Follow proper local and state electrical codes for requirements on grounding. Failure to follow code could result in death or serious injury.**

## Supply Power Wiring

Wiring must conform to NEC and all applicable code requirements.

It is the installer's responsibility to provide adequately-sized power wires and proper unit grounding.

Bring supply wiring through provided equipment knockouts located at the power connection point on the unit. Equipment submittals should be referred to for the exact electrical access connection point. Connect the power wires to the power connection point provided.

Connection to the installer-provided ground path must be made to the green wire or green grounding screw provided on each unit.

Locate unit wiring diagrams on the inside of the control box cover. Refer to the unit-specific wiring diagrams for wiring, connection point, and fuse installation information. Refer to the unit nameplate for unit-specific electrical information, such as voltage, minimum circuit ampacity (MCA), and maximum fuse size (MFS).

### ⚠ WARNING
### Hazardous Voltage!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

### *NOTICE*
### Use copper conductors only!

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

### *NOTICE*
### Correct phase critical!

**Correct phase sequence is critical. If phase sequence of the incoming line voltage is not correct, it could cause motor damage.**

## Electrical Connections

Units have one of three different connection points, depending on the unit type and options.

1. *If the unit has no controls:* power and ground are tucked inside of the handy box.
2. *If the unit has a control interface or Tracer™ ZN controller:* power and ground are inside the control box. If the unit has a control interface or a Tracer controller, the power wires and ground wire are inside the control box connected to a non fused disconnect switch.

3. *If the unit has a electric heat:* power and ground connections are inside the electric heat control box, connected to a non-fused disconnect switch or terminal block.

## Electrical Grounding Restrictions

### ⚠ WARNING
### Hazardous Voltage!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

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

***Note:*** *Unit transformer IT1 provides power to the blower coil unit only and is not intended for field connections. Field connections to the transformer IT1 may cause 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.

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

The installer must provide interconnection wiring to connect wall mounted devices such as a 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 12 for the wire size range and maximum wiring distance for each device.

**Table 12. Zone sensor maximum wiring distances, ft (m)**

| Wire size range | Max. wiring distance |
|---|---|
| 16–22 AWG | 200 (60.96) |

***Note:*** *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.*

### Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS) Calculations for Units with Electric Heat

Use these formulas to calculate the MCA and MFS.

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

***Note:*** *Use 120V heater voltage for 115V units. Use 240V heater voltage for 230V units. Use 480V heater voltage for 460V units. Use 600V heater voltage for 575V 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 units with electric heat.

See Table 13 for electric heat kW and Table 14, p. 31 for motor FLAs.

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

## Useful Formulas

kW = (cfm x ΔT)/3145
ΔT = (kW x 1000)/voltage
Single phase amps = (kW x 1000)/voltage
Three phase amps = (kW x 1000)/(voltage x 1.73)
Electric heat MBh = (Heater kW) (3.413)

**Table 13. Available electric heat, min–max (kW)**

| | Unit size | | | | | | |
|---|---|---|---|---|---|---|---|
| **Voltage** | **12** | **18** | **24** | **36** | **54** | **72** | **90** |
| 115/60/1 | 1–3 | 1–3 | 1–3 | 1–3 | 1–3 | 1–3 | 1–3 |
| 208/60/1 | 1–4 | 1–6 | 1–8 | 1–8 | 1–8 | 1–8 | 1–8 |
| 230/60/1 | 1–4 | 1–6 | 1–8 | 1–8 | 1–8 | 1–8 | 1–8 |
| 277/60/1 | 1–4 | 1–6 | 1–8 | 1–11 | 1–11 | 1–11 | 1–11 |
| 208/60/3 | 1–4 | 1–6 | 1–8 | 1–11 | 1–12 | 1–12 | 1–12 |
| 230/60/3 | 1–4 | 1–6 | 1–8 | 1–11 | 1–12 | 1–12 | 1–12 |
| 460/60/3 | 1.5–4 | 1.5–5 | 1–8 | 1–11 | 1–16 | 1–21 | 1–30 |
| 575/60/3 | 2–4 | 2–4 | 1–8 | 1–11 | 1–16 | 1–21 | 1–30 |
| 220/50/1 | 1–4 | 1–6 | 1–8 | 1–8 | 1–8 | 1–8 | 1–8 |
| 240/50/1 | 1–4 | 1–6 | 1–8 | 1–8 | 1–8 | 1–8 | 1–8 |
| 380/50/3 | 1–4 | 1–5 | 1–8 | 1–11 | 1–16 | 1–20 | 1–28 |
| 415/50/3 | 1.5–4 | 1.5–5 | 1–8 | 1–11 | 1–16 | 1–21 | 1–30 |
| 190/50/3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

**Notes:**

1. Heaters are available in the following Kw increments: 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0,19.0, 20.0, 21.0, 22.0, 24.0, 26.0, 28.0, 30.0.
2. Magnetic contactors are standard. Mercury contactors are available on horizontal units only.
3. Units with electric heat are available with or without door interlocking disconnect switch.
4. Units with electric heat are available with or without line fuses.
5. Units with electric heat must not be run below the minimum cfm listed in the general data section.
6. Electric heat is balanced staging: 1 stage = 100%, 2 stages = 50%/50%
7. Electric heat is not available on 190/50/3 units.
8. For two-speed units not being controlled by the Tracer™ family of controls, a 0.2-second delay for speed switching needs to be incorporated into the control sequence.

Table 14. Motor electrical data

| Voltage | Voltage range | rpm | Rated hp | lb | FLA | LRA |
|---|---|---|---|---|---|---|
| **115/60/1** | 104–126 | 1750 | 1/3 | 18 | 5.8 | 22.8 |
| | | | 1/2 | 21 | 7.2 | 30.4 |
| | | | 3/4 | 29 | 12.0 | 58.4 |
| | | | 1.0 | 29 | 12.8 | 58.4 |
| **Two-speed** | | | | | | |
| **115/60/1** | 104–126 | 1750/1160 | 3/4 | 40 | 8.9/6.1 | 42.0 |
| | | | 1.0 | 41 | 11.5/8.1 | 58.2 |
| **208–230/60/1** | 187–253 | 1750 | 1/3 | 18 | 3.1 | 11.4 |
| | | | 1/2 | 21 | 3.6 | 15.2 |
| | | | 3/4 | 29 | 6.0 | 29.2 |
| | | | 1.0 | 29 | 6.4 | 29.2 |
| **277/60/1** | 249–305 | 1750 | 1/3 | 15.5 | 2.5 | 12.1 |
| | | | 1/2 | 21.5 | 3.6 | 19.3 |
| | | | 3/4 | 25 | 4.3 | 25.3 |
| | | | 1.0 | 29 | 5.6 | 32.6 |
| **208/60/3** | 187–229 | 1750 | 1/2 | 22 | 2.3 | 11.4 |
| | | | 3/4 | 26 | 2.9 | 15.9 |
| | | | 1.0 | 28 | 3.5 | 20.2 |
| | | | 1.5 | 29 | 4.8 | 30.0 |
| | | | 2.0 | 34 | 6.2 | 38.5 |
| | | | 3.0 | 49 | 8.6 | 55.1 |
| **230/60/3** | 207–253 | 1750 | 1/2 | 22 | 2.4 | 12.8 |
| | | | 3/4 | 26 | 3.0 | 18.6 |
| | | | 1.0 | 28 | 3.6 | 23.0 |
| | | | 1.5 | 29 | 4.8 | 33.4 |
| | | | 2.0 | 34 | 6.2 | 43.6 |
| | | | 3.0 | 49 | 8.6 | 62.0 |
| **460/60/3** | 414–506 | 1750 | 1/2 | 22 | 1.2 | 6.4 |
| | | | 3/4 | 26 | 1.5 | 9.3 |
| | | | 1.0 | 28 | 1.8 | 11.5 |
| | | | 1.5 | 29 | 2.4 | 16.7 |
| | | | 2.0 | 34 | 3.1 | 21.8 |
| | | | 3.0 | 49 | 4.3 | 31.0 |
| **575/60/3** | 518–632 | 1750 | 3/4 | 20.5 | 1.1 | 7.5 |
| | | | 1.0 | 22.5 | 1.4 | 9.0 |
| | | | 1.5 | 31 | 1.9 | 13.3 |
| | | | 2.0 | 36 | 2.5 | 17.9 |
| | | | 3.0 | 49 | 3.3 | 23.7 |

**Note:** For two-speed units not being controlled by the Tracer™ family of controls, a 0.2-second delay for speed switching needs to be incorporated into the control sequence.

Table 14. Motor electrical data (continued)

| Voltage | Voltage range | rpm | Rated hp | lb | FLA | LRA |
|---|---|---|---|---|---|---|
| **220/50/1** | 198–242 | 1450 | 1/3 | 20.5 | 3.0 | 15.6 |
| | | | 1/2 | 25 | 3.6 | 20.5 |
| | | | 3/4 | 29 | 5.2 | 25.6 |
| | | | 1.0 | 38 | 9.3 | 52.2 |
| **240/50/1** | 216–264 | 1450 | 1/3 | 20.5 | 3.3 | 17.1 |
| | | | 1/2 | 25 | 4.0 | 22.7 |
| | | | 3/4 | 29 | 5.5 | 39.1 |
| | | | 1.0 | 38 | 10.6 | 57.8 |
| **190/50/3** | 171–209 | 1450 | 1/3 | 22 | 1.1 | 5.6 |
| **380/50/3** | 342–418 | | 1/2 | 26 | 1.4 | 7.8 |
| | | | 3/4 | 28 | 1.7 | 9.8 |
| | | | 1.0 | 29 | 2.1 | 14.6 |
| | | | 1.5 | 34 | 2.8 | 18.7 |
| | | | 2.0 | 49 | 3.6 | 27.2 |
| **415/50/3** | 374–456 | 1450 | 1/3 | 22 | 1.2 | 6.8 |
| | | | 1/2 | 26 | 1.5 | 9.4 |
| | | | 3/4 | 28 | 1.9 | 11.0 |
| | | | 1.0 | 29 | 2.5 | 17.4 |
| | | | 1.5 | 34 | 3.1 | 22.6 |
| | | | 2.0 | 49 | 3.6 | 32.3 |

**Note:** For two-speed units not being controlled by the Tracer™ family of controls, a 0.2-second delay for speed switching needs to be incorporated into the control sequence.

# Installation Mechanical

⚠ **WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

## Installing the Unit

Follow the procedures below to install the blower coil unit.

### Horizontal Units, Model BCHC

Install horizontal units suspended from the ceiling with 3/8” threaded rods that are field provided. There are two knockouts in each corner of the unit for installation of the threaded rods. Ensure the ceiling opening is large enough for unit installation and maintenance requirements.

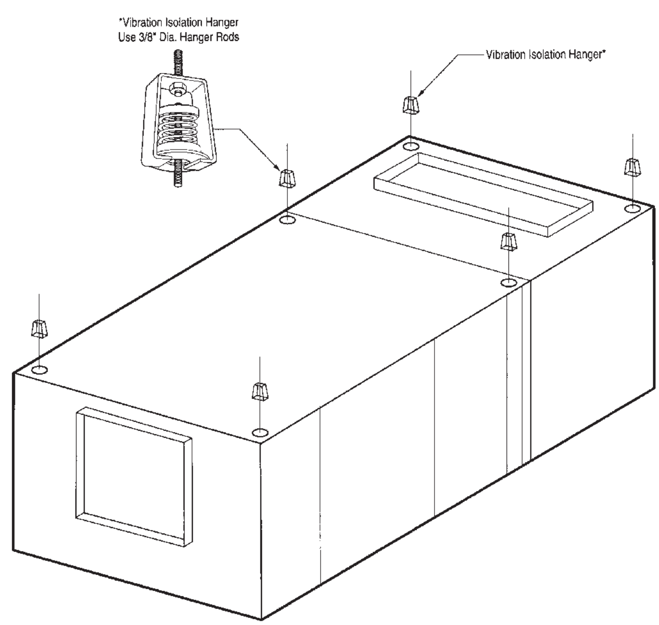
### BCHC Installation Procedure

***Materials needed:***

- threaded rods, 3/8” (4)
- nuts (8)
- flat washers or steel plates (8)
- vibration isolator hangers or turnbuckles (4)

1. Determine the unit mounting hole dimensions. Prepare the hanger rod isolator assemblies, which are field provided, and install them in the ceiling. Trane recommends using threaded rods to level the unit. Consult the unit nameplate or “Dimensions and Weights,” p. 15 in this manual for the unit weight. See Figure 4 for proper horizontal unit installation.

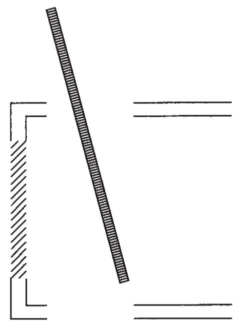
**Figure 4. How to hang the horizontal unit from the ceiling**




2. Remove motor access panels and filter access panels.
3. Punch out the eight knockouts in the top and bottom panels.

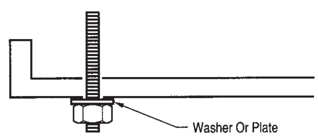
4. Guide the threaded rod through the unit from the top, careful not to damage insulation or wiring. See Figure 5. Insert the threaded rod at an angle to help prevent internal unit damage.

**Figure 5. When inserting the threaded rod though the unit knockouts, angle it through the top, careful not to damage unit coil or insulation.**



5. Put a nut and large flat washer or steel plate on the bottom of the threaded rod. See Figure 6.

**Figure 6. Correct placement of washer or steel plate and nut between threaded rod and unit. This helps prevent air leakage.**

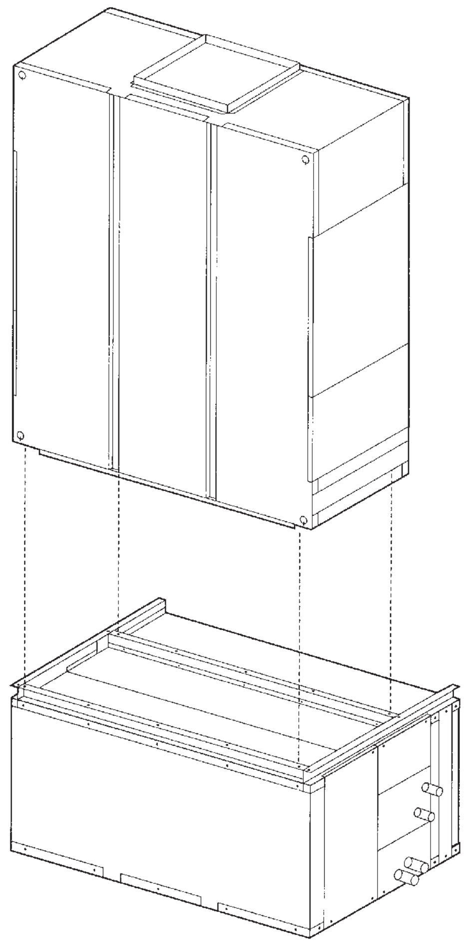



6. Put a nut and flat washer or steel plate on the top to prevent air leakage.
7. Thread the top of the rod into the isolator or turnbuckle.
8. Hoist the unit to the suspension rods and attach with washers and lock–nuts (see Figure 4, p. 33 for details).
9. Level the unit for proper coil drainage and condensate removal from the drain pan. Refer to "Condensate Drain Connections," p. 36.
10. Connect the ductwork to the unit. Refer to "Duct Connections," p. 37.

## Vertical Units, Model BCVC

Install vertical units on the floor. Units are provided with legs that are field-installed to help accommodate a U-trap on the drain connection, if necessary. A field-fabricated inlet plenum is not required. The unit is shipped in two pieces, and can be arranged in either a pre-swirl or counter-swirl inlet configuration (see Figure 7).

**Figure 7. Typical vertical unit installation**



## Heating Coil Option

***Note:*** *The hydronic heating coil option is factory installed in either the reheat or preheat position. Coils can be rotated for either right or left-hand connections.*

If you need to rotate the hydronic heating coil option to change the coil connection side, follow the procedure below.

1. Remove both coil access panels.
2. Remove the coil and rotate to change connection position.
3. Exchange coil patch plates.
4. Knock out drain pipe connections on new coil hand access panel.
5. Plug old drain connections.

## Mixing Box Option

***Materials provided:***

- mounting legs

- interconnecting linkage, LH or RH attachment

***Materials needed:***

- grooved and extendible drive rods, 1/2-inch O.D. grooved
- screws

The mixing box option ships separately for field installation. It has two low-leak, opposed blade dampers and all necessary interconnecting linkage components for left or right hand attachment onto 1/2-inch O.D. grooved, extendible drive rods. Also, mounting legs are provided for floor mounting on a vertical unit. Knockouts are provided to suspend the mixing box from the ceiling horizontally.

### Mixing Box Installation Procedure

1. Support the mixing box independent of the unit in the horizontal position.
2. Install the mixing box as a sleeve around the duct collar of the filter frame. To attach the mixing box to the filter frame, insert screws through the matching the holes on all sides of the mixing box and filter frame.
3. Install the linkage, following the procedure below.

### Linkage Installation Procedure

1. Attach the linkage on either the right or left side of the mixing box following the procedure below.
2. Open the damper blades fully. Locate drive rods on the LH or RH side for linkage attachment. Loosen drive rod set screw, without removing.
3. Remove knockouts on side access panel adjacent to the drive rods.
4. Pierce a hole through the insulation at the knockouts to allow the drive rod to extend freely through side of mixing box. Cut away insulation sufficiently to allow drive rod to turn smoothly.
5. Extend drive rod end at desired position beyond side of unit. Tighten drive rod set screws.
6. Attach linkage and tighten all set screws. Note that neither hand levers are provided. However, mixing box actuators are a factory-provided option that ship inside the mixing box when ordered.
7. Position linkage so both sets of dampers operate freely and so that when one damper is fully open, the other is fully closed.

## Condensate Drain Connections

***Note:*** *It is the installer's responsibility to provide adequate condensate piping to prevent potential water damage to the equipment and/or building.*

Size the main drain lines and trap them the same size as the drain connection, which is 3/4" schedule 40 PVC, 1.050" O.D. on blower coils.

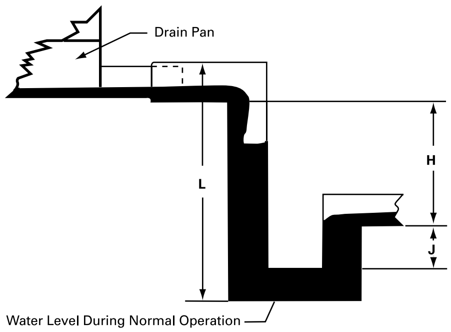
If drain pan removal is required, make the main and auxiliary drain connections with compression fittings. Follow the procedure below to remove the drain pan.

1. Remove the opposite side coil access panel.
2. Remove the drain pan clips.
3. Disconnect drain lines.
4. Remove the sheet metal screw.
5. Pull out drain pan through the opposite side.

***Note:*** *Prime drain traps to prevent the drain pan overflow.*

Plug or trap the auxiliary connection to prevent air from being drawn in and causing carryover (see Figure 8).

**Figure 8. Recommended drain trap installation for draw-through units**




H = 1" of length for each 1" of negative pressure + 1"additional
J = 1/2 of H
L = H + J + pipe diameter + insulation

All drain lines downstream of the trap must flow continuously downhill. If segments of the line are routed uphill, this can cause the drain line to become pressurized. A pressurized drain line may cause the trap to back up into the drain pan, causing overflow.

## Duct Connections

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).

Make duct connections to the unit with a flexible material such as heavy canvas to help minimize noise and vibration. If a fire hazard exists, Trane recommends using Flexweave 1000, type FW30 or equivalent canvas. Use *three inches* for the return duct and *three inches* for the discharge duct. Keep the material loose to absorb fan vibration.

Run the ductwork straight from the opening for a minimum of 1-1/2 fan diameters. Extend remaining ductwork as far as possible without changing size or direction. Do not make abrupt turns or transitions near the unit due to increased noise and excessive static losses. Avoid sharp turns and use elbows with splitters or turning vanes to minimize static losses.

Poorly constructed turning vanes may cause airflow generated noise. Align the fan outlet properly with the ductwork to decrease duct noise levels and increase fan performance. Check total external static pressures against fan characteristics to be sure the required airflow is available throughout the ductwork.

To achieve maximum acoustical performance, minimize the duct static pressure setpoint.

# Installation Piping

## Water Coil Connections

Water coils have sweat connections. Reference coil connection dimensions in "Dimensions and Weights," p. 15. Proper installation and piping is necessary to ensure satisfactory coil operation and prevent operational damage. Water inlet and outlet connections extend through the coil section side panel (see Figure 9). Follow standard piping practices when piping to the coil.

**Figure 9. Horizontal unit coil connect location**

***NOTICE***

**Potential coil-freeze condition!**

**Make provisions to drain the coil when not in use to prevent coil freeze-up. Failure to follow this procedure could result in equipment/property damage.**

## Piping Packages

Piping packages ship separate for field installation and have sweat type connections. Interconnecting piping is field provided.

When brazing piping, follow these guidelines to prevent piping component damage.

1. Avoid exposing piping components to high heat when making sweat connections.
2. Protect the closest valve to the connection with a wet rag.
3. Ensure the circuit balancing valve option is in the unseated position.

## Refrigerant Coil Piping

The DX cooling coil in a BCHC/BCVC unit is equipped with a single distributor (single-circuited). Exception: size 72 and 90 six-row DX cooling coils are horizontally split and have two distributors (double-circuited) which may be manifolded to a single refrigeration circuit in a condensing unit. Some condensing units have two, independent refrigeration circuits. *Do not manifold two, independent refrigeration circuits into a single-circuited DX (evaporator) coil.*

***Note:*** *Refer to "Warnings, Cautions and Notices" for information on handling refrigerants.*

Units that are UL listed shall not have refrigerant temperatures and pressures exceeding that listed on the unit nameplate.

Follow accepted refrigeration piping practices and safety precautions for typical refrigerant coil piping and components. Specific recommendations are provided with the compressor unit, including instructions for pressure-testing, evacuation, and system charging. Leak test the entire refrigerant system after all piping is complete. Charge the unit according to approximate weight requirements, operating pressures, and superheat/subcooling measurements. Adjust the thermal expansion valve setting, if necessary, for proper superheat.

### Liquid Line

**Line Sizing.** Properly sizing the liquid line is critical to a successful application. If provided, use the liquid line size recommended by the manufacturer of the compressor unit. The selected tube diameter must be as small as possible, while still providing at least 5°F [2.7°C] of subcooling at the expansion valve throughout the operating envelope.

**Routing.** Install the liquid line with a slight slope in the direction of flow so that it can be routed with the suction line. Minimize tube bends and reducers because these items tend to increase pressure drop and reduce subcooling at the expansion valve.

**Insulation.** The liquid line is generally warmer than the surrounding air, so it does not require insulation.

**Components.** Liquid-line refrigerant components necessary for a successful job include an expansion valve, moisture indicating sight glass, filter drier, manual ball shutoff valves, access port, and possibly a solenoid valve. Position these components as close to the evaporator as possible.

- Thermal expansion valve (TEV)

  Select the TEV based on the actual evaporator capacity, considering the full range of loadings. Verify that the valve will successfully operate at the lightest load condition, considering if hot gas bypass is to be used. For improved modulation, choose a TEV with balanced port construction and an external equalizer connection. The valve must be designed to operate against a back pressure of 20 psi higher than actual evaporator pressure. Install the TEV directly on the coil liquid connection (distributor provided).

  The remote expansion-valve bulb should be firmly attached to a straight, well-drained, horizontal section of the suction line. The external equalizer line should be inserted downstream of the remote bulb.

- Moisture-indicating sight glass

  Install a moisture-indicating sight glass in the liquid line between the expansion valve and filter drier. The sight glass should be sized to match the size of the liquid line.

- Filter drier

  Install a properly sized liquid line filter-drier upstream from the expansion valve and as close to the evaporator coil as possible. Select the filter-drier for a maximum pressure drop of 2 psi at the design condition.

  Manual, ball-type shutoff valves on either side of the filter drier allows replacement of the core without evacuating the entire refrigerant charge.

- Access port

  The access port allows the unit to be charged with liquid refrigerant and is used to determine subcooling. This port is usually a Schraeder valve with a core.

- Solenoid valve

  If required by the compressor unit, install the solenoid valve between the filter drier and sight glass.

***NOTICE***

### Valve Damage!

**Disassemble the thermal expansion valve before completing the brazing connections. If necessary, wrap the valve in a cool wet cloth while brazing. Failure to protect the valve from high temperatures could damage internal components.**

## Suction Line

**Line sizing.** Properly sizing the suction line is critical for ensuring that the oil returns to the compressor throughout the system operating envelope. If provided, use the suction line size(s) recommended by the manufacturer of the compressor unit. The selected tube diameter(s) must maintain adequate refrigerant velocities at all operating conditions.

**Routing.** To prevent residual or condensed refrigerant from “free-flowing” toward the compressor, install the suction line so it slopes slightly—1 inch per 10 feet of run [1 cm per 3 m]—toward the evaporator. Avoid putting refrigerant lines underground. Refrigerant condensation, installation debris inside the line, service access, and abrasion/corrosion can quickly impair system reliability.

**Insulation.** After operating the system and testing all fittings and joints to verify the system is leak-free, insulate the suction lines to prevent heat gain and unwanted condensation.

**Components.** Installing the suction line requires field installation of these components: an access port and possibly a suction filter. Position them as close to the compressor as possible.

- Access port

  The access port is used to determine suction pressure and adjust the TEV. It should be located near the external equalizer line connection. This port is usually a Schraeder valve with a core.

- Suction filter

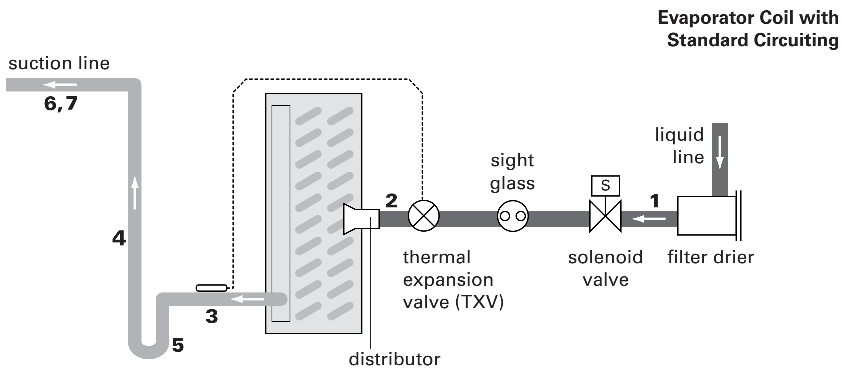
  If required by the compressor unit, a replaceable-core suction filter is installed as close to the compressor unit as possible. Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

## Field-Installing Evaporator Piping

See Figure 10 and refer to the instructions below to field-install evaporator piping.

1. Pitch the liquid line slightly—1 in./10 ft [1 cm/3 m]—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser — that is, 1 in./10 ft [1 cm/3 m] in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. For the vertical riser, use the tube diameter recommended by the condensing unit manufacturer. Assure the top of the riser is higher than the evaporator coil.
5. Arrange the suction line so the refrigerant vapor leaving the coil flows downward, below the suction-header outlet, before turning upward.
6. Pitch the suction line slightly—1 in./10 ft [1 cm/3 m]—so the refrigerant drains toward the evaporator.
7. Insulate the suction line.

**Figure 10. Field-installed evaporation piping example**



# Steam Piping

Proper installation, piping and trapping is necessary to insure satisfactory heating coil operation and prevent operational damage under service conditions. These installation recommendations and piping diagram (see Figure 11, p. 42) must be followed to assure satisfactory, trouble-free operation.

## General

1. Support all piping independently of coils.
2. Provide swing joints or flexible fittings in all piping connections adjacent to heating coils to absorb expansion and contraction strains.
3. Install coils so air passes through fins in proper direction (stenciled on top of coil channel).

## Steam Coils

### *NOTICE*
### Coil Condensate!

**Condensate must flow freely from the coil at all times to prevent coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion. In all steam coil installations, the condensate return connections must be at the low point of the coil. Failure to follow these instructions could result in equipment damage.**

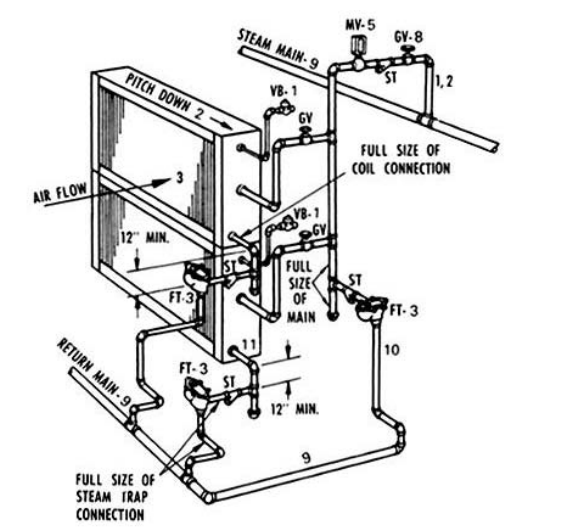
1. Install 1/2-inch 15-degree swing check vacuum breaker in unused condensate return tapping as close as possible to coil. Vent vacuum breaker line to atmosphere or connect into return main at discharge side of steam trap. Vacuum relief is particularly important when coil is controlled by modulating steam supply or two-position (on-off) automatic steam supply valve.
2. Proper steam trap selection and installation is necessary for satisfactory coil performance and service life.
   a. Select trap based on maximum possible condensate rate and recommended load factors.
   b. Locate steam trap discharge at least 12 inches below condensate return tapping. This provides sufficient hydrostatic head pressure to overcome trap losses and assure complete condensate removal.
   c. Float and thermostatic traps are preferred because of gravity drain and continuous discharge operation.
   d. Use float and thermostatic traps with atmospheric pressure gravity condensate return with automatic controls or where possibility of low pressure supply steam exists.
   e. Bucket traps should only be used when supply steam is unmodulated and 25 psig or higher.
   f. When installed with series airflow, size traps for each coil using capacity of first coil in airflow direction.
   g. Always trap each coil separately to prevent condensate holdup in one or more coils.
   h. Always install strainers as close as possible to inlet side of trap.
3. Use V-port modulating valves to obtain gradual modulating action or slow opening 2-position valves to prevent steam hammer.

   ***Note:*** *Contact the factory for recommendations regarding steam coil valve selections compatible with Tracer™ ZN controllers.*
4. Use normally-open non-modulating control valves if coils are exposed to freezing air.

   ***Note:*** *Contact the factory for recommendations regarding steam coil valve selections compatible with Tracer™ ZN controllers.*
5. Control each coil bank separately when installing coils for series airflow with automatic steam control valves.

6. Do not modulate steam or use on-off supply control on systems with overhead or pressurized returns unless condensate is drained by gravity to receiver (vented to atmosphere) and returned to main by condensate pump.
7. At startup with dampers, slowly turn steam on full for at least 10 minutes before opening fresh air intake.
8. Pitch all supply and return steam piping down a minimum of one inch per 10 feet in direction of flow.
9. Do not drain steam mains or take-offs through coils. Drain mains ahead of coils through steam trap to return line.
10. Do not bush or reduce coil return tapping size. Run return pipe full size of steam trap connection except for short nipple screwed directly into coil condensate connection.
11. Overhead returns require 1 psig pressure at steam trap discharge for each 2-foot elevation to assure continuous condensate removal.

**Figure 11. Type NS steam coils, horizontal tubes for horizontal airflow**




Code of System Components
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, 15-degree swing check valve
CV = Check valve
ST = Strainer
AV = Automatic or manual air vent

# Controls Interface

## Control Options

Blower coil air handlers are available without controls or with one of four different control options:

- Control interface
- Tracer™ ZN010
- Tracer ZN510
- Tracer ZN520

Units without controls have a junction box mounted on the drive side for motor power wire terminations. The controller is easily accessible in the control box for service. Control option descriptions follow below.

### Control Interface

The control interface is for use with a field–supplied low voltage thermostat. It includes a control box with a transformer, motor contactor, and disconnect switch. All hot leads to the motor are disconnected at the contactor and disconnect switch to eliminate the risk of shock during service. The end devices are mounted with the wires pulled and terminated inside the two-sided terminal strip. All customer connections other than power are on the outside of the two-sided terminal strip.

## Tracer Controllers

The Tracer™ family of controllers—ZN010, ZN510, and ZN520—offer the combined advantages of simple and dependable operation with the latest Trane-designed controller. Standard control features include options normally available on more elaborate control systems. All control options are available factory-configured or can be field-configured using Rover™ service software. For more detailed information, refer to Trane publication CNT-IOP-1, *Installation, Operation, and Programming Guide* (for ZN010 or ZN510), or CNT-SVX04A-EN, *Installation, Operation, and Programming Guid*e (for ZN520).

### Tracer ZN010

Tracer™ ZN010 is a stand-alone microprocessor controller.

### Tracer ZN510 and ZN520

The Tracer™ ZN510 controller can be used as either a standalone or as part of a Trane Integrated Comfort™ System (ICS).

**Figure 12. ZN510 control board**

**Figure 13. ZN520 control board**

In the stand-alone configuration, ZN510 or 520 receives operation commands from the zone sensor and/or the auto changeover sensor (on auto changeover units). ZN520 also receives commands from the discharge air sensor. The entering water temperature is read from the auto changeover sensor and determines if the unit is capable of cooling or heating. The zone sensor module is capable of transmitting the following information to the controller:

- Timed override on/cancel request

- Zone setpoint
- Current zone temperature
- Fan mode selection (off-auto-high-low)

For optimal system performance, blower coil units can operate as part of an Integrated Comfort™ System (ICS) building automation system controlled by Tracer Summit®. The controller is linked directly to the Summit control panel via a twisted pair communication wire, requiring no additional interface device (i.e., a command unit). The Trane ICS system can monitor or override ZN520 control points. This includes such points as temperature and output positions.

## Rover Service Software

This windows-based software package option allows field service personnel to easily monitor, save, download, and configure Tracer™ controllers through a communication link from a portable computer. When connected to the communication link, Rover™ can view any Tracer controller that is on the same communication link.

**Table 15. Tracer controller input/output summary**

| | Tracer™ controller | | |
|---|---|---|---|
| | **ZN010** | **ZN510** | **ZN520** |
| **Binary outputs** | | | |
| 2-speed fan | • | • | • |
| 2-position hydronic valve | • | • | • |
| 2-position mixing box damper | • | • | |
| 1-stage electric heat | • | • | • |
| Modulating mixed air damper | | | • |
| Modulating hydronic valve | | | • |
| 2-stage electric heat | | | • |
| Reheat (hydronic) | | | • |
| Generic | • | • | • |
| **Binary inputs** | | | |
| Condensate overflow detection | • | • | • |
| Low temperature detection | • | • | • |
| Occupancy | • | • | • |
| Generic input | • | • | • |
| **Analog inputs** | | | |
| Zone temperature | • | • | • |
| Setpoint | • | • | • |
| Fan mode: auto, high, low | • | • | • |
| Entering water | • | • | • |
| Discharge air | • | • | • |
| Outside air | | | • |
| Generic | | | |

**Notes:**
1. The generic input and output are for use with a Tracer Summit® systems only.
2. Contact the factory for recommendations regarding steam coil valve selections compatible with Tracer™ ZN controllers.

Table 16. Tracer controller function summary

| | Tracer™ Controller | | |
|---|---|---|---|
| | ZN010 | ZN510 | ZN520 |
| **Control functions** | | | |
| Entering water temp. sampling (purge) | • | • | • |
| Timed override | • | • | • |
| Auto changeover | • | • | • |
| Fan cycling | • | • | |
| Warm-up | • | • | • |
| Pre-cool | • | • | • |
| Data sharing (master/slave) | | • | • |
| Random start | • | • | • |
| Dehumidification | | | • |
| Staged capacity (2-stage electric supplementary) | | | • |
| DX cooling | | | • |
| **Other Functions** | | | |
| Manual test | • | • | • |
| Filter maintenance timer | • | • | • |
| Setpoint limits | • | • | • |

Table 17. End Device Option Availability

| Device | Tracer™ ZN010 | Tracer ZN510 | Tracer ZN520 | Control interface |
|---|---|---|---|---|
| Condensate float switch | • | • | • | • |
| Low limit | • | • | • | • |
| Filter status | | | | • |
| Filter run-time diagnostic | • | • | • | • |
| Fan status | | | • | • |
| Positive proof fan status switch | | | • | • |
| 2-position control valves | • | • | • | • |
| Modulating control valves | | | • | • |
| 2-position mixing box actuator | • | • | | • |
| Modulating mixing box actuator | | | • | • |
| 1-stage electric heat | • | • | • | • |
| 2-stage electric heat | | | • | • |
| Frostat™ protection (DX coils) | | | • | • |

**Notes:**
1. The Tracer ZN010, Tracer ZN510, and Tracer ZN520 are factory-provided controls that control the end devices listed in the table.
2. The control interface option is the wiring tied back to a terminal strip to be controlled by a field-supplied controller.
3. Units with a DX coil are provided with a DX cool relay if unit has the control interface or Tracer controls.
4. Contact the factory for recommendations regarding steam coil valve selections compatible with Tracer™ ZN controllers.

# Pre-Start

## Pre-Start 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!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power 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 drives, isolators, filters, and sensors that are packaged separately and placed inside the main control panel, fan section, or compressor section (see “Receiving and Handling,” p. 11).

☐ Check nameplate unit data so that it matches the sales order requirements.

### Unit Location

☐ Remove crating from the unit. Do not remove the shipping skid until the unit is set in its final position.

☐ Ensure the unit location is adequate for unit dimensions, ductwork, piping, and electrical connections.

☐ Ensure access and maintenance clearances around the unit are adequate. Allow space at the end of the unit for shaft removal and servicing (see “Service Access,” p. 12).

### Unit Mounting

☐ Place unit in its final location.

☐ Remove shipping skid bolts and skid.

☐ If using isolators, properly mount unit according to the isolator placement sheet.

## Component Overview

☐ Verify the fan and motor shafts are parallel.

☐ Verify the fan and motor sheaves are aligned.

☐ Check the belt tension for proper adjustment. Adjust the belt tension if it is floppy or squeals continually.

☐ Ensure the fan rotates freely in the correct direction.

☐ Tighten locking screws, bearing set screws and sheaves.

☐ Ensure bearing locking collars do not wobble when rotated and correct torque settings. Refer to Table 31, p. 64 for recommended torques.

☐ Verify that a clean air filter is in place.

## Ductwork

☐ If using return ductwork to the unit, secure it with three inches of flexible duct connector.

☐ Extend discharge duct upward without change in size or direction for at least one and one half fan diameters.

☐ Use a 3" flexible duct connection on discharge ductwork.

☐ Ensure trunk ductwork is complete and secure to prevent leaks.

☐ Verify that all ductwork conforms to NFPA 90A or 90B and all applicable local codes

## Unit Piping

☐ Verify the condensate drain piping is complete for the unit drain pan. Install and tighten the condensate "P" trap drain plug.

☐ Make return and supply water connections to the unit and/or piping package.

☐ Ensure the drain pan and condensate line are not obstructed. Remove any foreign matter that may have fallen into the drain pan during installation.

☐ Verify that piping does not leak. Make sure drain lines are open while performing the leak test.

☐ Treat water to prevent algae, slime, and corrosion.

☐ Connect refrigerant piping lines.

☐ Connect steam supply lines and condensate return lines to coil in accordance with steam piping recommendations.

## Electrical

☐ Check all electrical connections for tightness.

☐ Verify motor voltage and amps on all phases with the unit nameplate ratings to ensure unit operates correctly.

## Unit Panels

☐ Ensure all unit access panels are in place and that all screws, nuts, and bolts are tightened to their proper torques.

***Note:*** *During the unit break-in period, bearing temperature may be 150–160°F. during normal operation bearing temperature should range be 90–100°F.*

# Start-Up

## Sequence of Operation

### Tracer ZN Controller Sequence of Operation

#### Controller Start-Up

Refer to Trane publication CNT-SVX04A-EN, *Installation, Operation, and Programming Guide*, to operate the Tracer™ ZN controller with Trane Integrated Comfort™ System (ICS). The factory pre-programs the Tracer ZN controller 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™ ZN controller in a stand-alone operation:

1. Turn power on at the disconnect switch option.
2. Position the fan mode switch to either high, 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 two-pipe 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.*

#### Power-Up Sequence

When 24 VAC power is initially applied to the Tracer™ ZN controller, the following sequence occurs:

- all outputs are controlled off
- Tracer reads all input values to determine initial values,
- the random start time (0–25 seconds) expires, and
- normal operation begins.

#### Tracer ZN Modes of Operation

Tracer™ ZN controllers operate the fan in one of the modes listed below as noted:

- occupied
- unoccupied
- occupied standby (Tracer ZN510 or ZN520 only)
- occupied bypass
- Tracer Summit® with supply fan control (Tracer ZN510 or ZN520 only)

***Note:*** *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.*

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.

#### Occupancy Sources

There are four ways to control the Tracer™ ZN controller's occupancy, as noted below:

1. By pressing the zone sensor's timed override "on" button
2. Occupancy binary input, either normally open or normally closed, see Table 18 for occupancy sensor states

3. Default operation of the controller (occupied mode)
4. Communicated request, usually provided by the building automation system (BAS) or peer device (available on Tracer™ ZN510 and ZN520 only)

**Table 18. Occupancy sensor state**

| Sensor type | Sensor position | Unit occupancy mode |
|---|---|---|
| Normally open | Open | Occupied |
| Normally open | Closed | Unoccupied |
| Normally closed | Open | Unoccupied |
| Normally closed | Closed | Occupied |

A communicated request will control the controller's occupancy. Typically, this request comes from the BAS time-of-day scheduling to the controller. However, if a communication request from a BAS or peer controller 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.

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

For complete information about Tracer Summit® application setup using the Tracer™ ZN controller, see the Tracer Summit product literature. For more information on the setup of another BAS, refer to the product-specific literature from that manufacturer.

## Occupied Mode

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 (Tracer™ ZN520 only),
- 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.

***Note:*** *Heating and cooling setpoint high and low limits are always applied to the occupied and occupied standby setpoints.*

## Unoccupied Mode

When the controller is in the unoccupied mode, the controller attempts to maintain space temperature at the stored unoccupied heating or cooling setpoint based on the:

- measured space temperature,
- active setpoint, and
- control algorithm, regardless of the presence of a hardwired or communicated setpoint.

Similar to other controller configuration properties, the locally stored unoccupied setpoints can be modified using Rover™ service tool.

During 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 heating mode, when the space temperature is below the heat setpoint, the primary heating capacity turns on. All capacity turns off when the space temperature is between the unoccupied cooling and heating setpoints. Note that primary heating or cooling capacity is defined by the unit type and whether heating or cooling is enabled or disabled. For example, if the economizer is enabled (Tracer™ ZN520 only) and possible, it is the primary cooling capacity. If hydronic heating is possible, it will be the primary heating capacity.

### Occupied Standby Mode (Tracer ZN510 or ZN520 only)

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.

During occupied standby mode, the Tracer™ ZN520 controller's economizer damper position goes to the economizer standby minimum position.

***Note:*** *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 controller reduces heating/cooling demand for the space. Also, units with Tracer™ ZN520 and the fresh air economizer damper use the economizer standby minimum position to reduce heating and cooling demand.

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, Tracer ZN510 or ZN520 Only

The controller can be placed in occupied bypass mode by either communicating an occupancy bypass request to the controller or by using the timed override “on” button on the zone sensor. When the controller is in unoccupied mode, pressing the “on” button will place the controller into occupied bypass mode for the duration of the bypass time (typically 120 minutes).

### Tracer Summit With Supply Fan Control, Tracer ZN510 or ZN520 Only

All Tracer™ ZN lockouts (latching diagnostics) are manually reset whenever the fan mode switch is set to the off position or when power is restored to the unit. The last diagnostic to occur is retained until the unit power is disconnected. Refer to Trane publication CNT-SVX04A-EN, *Installation, Operation, and Programming Guide*, for specific Tracer ZN520 operating procedures.

## Cooling Operation

During cooling mode, the Tracer™ ZN controller attempts to maintain the space temperature at the active cooling setpoint. Based on the controller's occupancy mode, the active cooling setpoint is either the:

- occupied cooling setpoint,
- occupied standby cooling setpoint (Tracer ZN510 or ZN520 only), or
- unoccupied cooling setpoint.

The controller uses the measured space temperature, the active cooling setpoint, and discharge air temperature (Tracer™ ZN520 only) 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 cooling outputs (modulating or 2-position hydronic valve, or economizer damper) are controlled based on the cooling capacity output.

***Note:*** *Economizer dampers and modulating valves are only available on units with the Tracer™ ZN520 controller. Two-position dampers are only available on units with Tracer ZN010 and ZN510.*

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 (Tracer™ ZN520 only) or cycled with 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 (2-position valves).

*Note: Unit diagnostics can affect fan operation, causing occupied and occupied standby fan operation to be defined as abnormal. Refer to* *"Troubleshooting," p. 72* *for more information about abnormal fan operation.*

## Economizer Cooling (Tracer ZN520 Only)

The economizer provides cooling whenever the outdoor temperature is below the economizer enable setpoint and there is a need for cooling. The economizer operates to meet the space demand, with other forms of cooling enabling when the economizer cannot meet the demand alone. See economizer air damper operation for additional information.

## DX Cooling (Tracer ZN520 only)

The controller does not use both the DX compressor and the economizer at the same time. This prevents problems where the entering air temperature is too low for the evaporator coil to operate as designed, which leads to compressor short cycling due to low discharge air temperatures.

## Discharge Air Tempering (Tracer ZN520 Only)

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.

The discharge air tempering function enables when cold, fresh air is brought in through the fresh air damper and causes 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™ ZN controller attempts to maintain the space temperature at the active heating setpoint. Based on the controller's occupancy mode, the active heating setpoint can be:

- occupied heating,
- occupied standby heating (Tracer ZN510 or ZN520 only), or
- unoccupied heating.

*Note: Unit diagnostics can affect the controller operation, causing unit operation to be defined as abnormal. Refer to* *"Troubleshooting," p. 72* *for more information about abnormal unit operation.*

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 (ZN520 only) or cycled with 2-position valves. As the load increases, modulating outputs open further and binary outputs are energized longer. At 100% capacity, the modulating valve is fully open (Tracer™ ZN520 only) or on continuously with 2-position valves.

## Economizer Damper (Tracer ZN520 Only)

The economizer damper option is never used for as a source for heating, but only 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.

## Dehumidification (Tracer ZN520 only)

During dehumidification, the Tracer™ ZN520 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 (Tracer™ ZN520 only) 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.

## Fan Mode Operation

### WARNING
### Rotating Components!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

For multiple fan speed applications, the Tracer™ ZN controller offers additional fan configuration flexibility. See Table 19 for fan operation sequences. Separate default fan speeds for heating and cooling modes can be configured using Rover™ service software.

**Table 19. Tracer ZN520 fan configuration**

| | Auto fan operation | Fan speed default |
|---|---|---|
| Heating | Continuous | Off |
| | | Low |
| | | High |
| Cooling | Continuous | Off |
| | | Low |
| | | High |

The fan runs continuously at selected speeds, high 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 20 for Tracer™ ZN520 default fan configuration for heating and cooling modes. 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.

**Table 20. Fan sequence of operation**

| Fan speed | Tracer™ ZN controller | Sequence of operation |
|---|---|---|
| Off | ZN010, ZN510, ZN520 | • fan is off |
| | | • control valves and damper option are closed |
| | | • low air temperature detection open is still active |
| Low or high (continuous fan) | ZN010, ZN510 | • fan operates continuously at selected speed |
| | | • 2-position control valve option cycle as needed |
| | | • 2-position control valve option opens to an adjustable mechanical stop-position |
| Low or high (continuous fan) | ZN520 | • fan operates continuously at selected speed |
| | | • modulating control valve option cycles as needed |
| Auto (cycling) | ZN010, ZN510 | • fan, 2-position damper cycle, and control valve cycle as needed |
| | | • in cooling mode, fan cycles from off to high |
| | | • in heating mode, fan cycles from off to low |
| | | • when heating/cooling is not required, the fan is off and the 2-position damper option closes |
| Auto | ZN520 | • fan cycles between high and medium, and never turns off unless the controller is in unoccupied mode |
| | | • modulating or 2-position control open to maintain setpoint |

During dehumidification, when the fan is in auto, the fan speed can switch depending on the error. The 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 hardwired to any of the Tracer™ ZN controllers or communicated to the Tracer ZN510 or ZN520 controller. When both inputs are present, the communicated request has priority over the hardwired input. See Table 19, p. 52.

## Fan Speed Switch

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

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

## Tracer ZN010 and ZN510

**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. If the unit has a 2-speed fan, in cooling mode the fan cycles from off to high and in heating mode it cycles from off to low (factory default that can be field-adjusted using Rover™ service software). When no heating or cooling is required, the fan is off and the fresh air damper option closes. Units with 2-speed fans can also be field-configured using Rover to run at a defined speed when the fan speed switch is in the auto position.

**Low or High (Continuous Fan).** Fan operates continuously while control valve option cycles to maintain setpoint temperature. Fresh air damper option is open.

## Tracer ZN520

**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 (three-wire floating point) control valve option and single or two-speed fan to work cooperatively to meet precise capacity requirements, 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 high speed and the water valve repositions to maintain an equivalent capacity. The reverse sequence takes place with a decrease in required capacity.

**Units with 2-speed fans on low or high.** The fan will run continuously at the selected speed and the valve option will cycle to meet setpoint.

## 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, or low). When fan mode is auto, the fan operates at the default fan speed.

During unoccupied mode, the fan is off. While unoccupied, the controller will heat or cool to maintain the unoccupied heating and cooling setpoints. In unoccupied mode, the fan runs on high speed only, with heating or cooling. See Table 24, p. 55.

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. See Table 23, p. 55.

## 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™ ZN controller automatically holds the fan on for an additional 30 seconds. This 30-second delay allows the fan 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.

## Fan Start on High Speed

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

## Fan Operation During Occupied Heating Modes

The 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 or low position, the fan runs continuously at the selected speed. Refer to "Troubleshooting," p. 72 for more information on abnormal fan operation.

**Table 21. Fan mode operation, Tracer ZN010 and ZN510**

| | Heating mode | | Cooling mode | |
|---|---|---|---|---|
| **Fan mode** | **Occupied** | **Unoccupied** | **Occupied** | **Unoccupied** |
| Off | Off | Off | Off | Off |
| Low | Low | Off/high[(a)] | Low | Off/high[(a)] |
| High | High | Off/high[(a)] | High | Off/high[(a)] |
| Auto continuous | Heat default | Off/high[(a)] | Cool default | Off/high[(a)] |
| Cycling off | Off/heat default[(a)] | Off/high[(a)] | Off/cool default[(a)] | Off/high[(a)] |

**Notes:**
1. During the transition from off to any fan speed but high, Tracer™ ZN010 and ZN510 automatically start the fan on high speed and run for one-half of a second 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, ZN010 and ZN510 automatically control 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.

(a) 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 where there is a call for heating or cooling. The heat default is factory-configured for low fan speed, and the cool default is high.

**Table 22. Valid operating range and factor default setpoints, Tracer ZN010 and ZN510**

| Setpoint/parameter | Default setting | Valid operating range |
|---|---|---|
| Unoccupied cooling setpoint | 85°F | 40°F–115°F |
| Occupied cooling setpoint | 74°F | 40°F–115°F |
| Occupied heating setpoint | 71°F | 40°F–115°F |
| Unoccupied heating setpoint | 60°F | 40°F–115°F |
| Cooling setpoint high limit | 110°F | 40°F–115°F |
| Cooling setpoint low limit | 40°F | 40°F–115°F |
| Heating setpoint high limit | 105°F | 40°F–115°F |
| Heating setpoint low limit | 40°F | 40°F–115°F |
| Power up control wait | 0 sec | 0 sec–240 sec |

**Table 23. Local fan switch enabled**

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

**Table 24. Fan operation in heating and cooling modes**

| | Heating | | Cooling | |
|---|---|---|---|---|
| Fan mode | Occupied | Unoccupied | Occupied | Unoccupied |
| Off | Off | Off | Off | Off |
| Low | Low | Off/high | Low | Off/high |
| High | High | Off/high | High | Off/high |
| Auto (continuous) | Default fan speed | Off/high | Default fan speed | Off/high |

## Two- and Four-Pipe Changeover Operation

Tracer™ ZN controllers offer accurate and reliable unit changeover using 2-way valves and the controller's entering water temperature sampling function. Only units using the main hydronic coil for both heating and cooling (2-pipe and 4-pipe changeover units) use the entering water temperature sampling function.

Two-pipe and 4-pipe changeover applications require an entering water temperature sensor to allow the main coil to be used for heating and cooling. This sensor is factory-provided and should be field-installed on the entering water pipe.

The entering water temperature sampling function periodically opens the two-way valve to allow temporary water flow, producing reliable entering water temperature measurement. To ensure accurate unit changeover without sacrificing the benefits of 2-way, 2-position valves, Tracer™ ZN controllers periodically test the entering water temperature on all hydronic main coil changeover units. Hydronic heating/cooling changeover operation requires central plant operation, and the unit controller must use an entering water temperature sensor to verify delivery of the correct water temperature from the central plant.

### Entering Water Temperature Sampling Function

The entering water temperature (EWT) must be five degrees above the space temperature for hydronic heating and five degrees below the space temperature for hydronic cooling. When water flows normally and frequently through the coil, the controller does not invoke the sampling function because the EWT is satisfactory.

**Table 25. Unit mode as related to water temperature**

| Unit type | EWT sensor required? | Coil water temperature |
|---|---|---|
| 2-pipe changeover | Yes | • Can cool if: space temp - EWT ≥ 5°F<br>• Can heat if: EWT - space temp ≥ 5°F |
| 4-pipe changeover | Yes | • Can cool if: space temp - EWT ≥ 5°F<br>• Can heat if: EWT - space temp ≥ 5°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<br>• Hot water assumed in auxiliary coil |

However, when the controller detects an incorrect water temperature based on heating or cooling mode, it invokes the entering water temperature sampling function. For example, when the measured EWT is too cool to heat or too warm to cool. For cooling the EWT needs to be five degrees below the measured space temperature. For heating, the EWT should be five degrees above the measured space temperature.

After the controller invokes the function, the unit opens the main hydronic valve for no more than three minutes before considering the measured EWT. The controller allows an initial stabilization period, equal to 30 seconds plus 1/2 the valve stroke time, to flush the coil. Once the temperature stabilization period expires, the controller compares the EWT against the effective space temperature (either hardwired or communicated) to determine whether the EWT is correct for the desired heating or cooling mode. If the EWT is not usable for the desired mode, the controller continues to compare the EWT 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 EWT exceeds the high EWT limit (110°F). When the EWT is warmer than 110°F, the controller assumes the EWT is hot because it is unlikely the coil would drift to a high temperature unless the actual loop temperature was very high.

If the EWT 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 EWT 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

Tracer™ ZN controllers support 1-stage electric heat. Also, Tracer ZN520 supports 2-stage electric heat. Tracer ZN520 cycles the electric heat 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.

## Economizer Damper (Tracer ZN520 Only)

With a valid outdoor air temperature (either hardwired or communicated), Tracer™ ZN520 uses the modulating economizer damper as the highest priority cooling source. Economizer operation is only possible using a modulating damper during the occupied, occupied standby, unoccupied, and occupied bypass modes.

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

**Table 26. Relationship between outdoor temperature sensors and economizer damper position (Tracer ZN520 only)**

| Outdoor air temperature | Modulating fresh 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 | Closed |
| Present and economizer feasible | Economizing: minimum position to 100% | Economizing: between occupied standby minimum position to 100% | Open and economizing only when unit operating, closed otherwise |
| Present and economizer not feasible | Open to occupied minimum position | Open to occupied standby minimum position | Closed |

## Tracer Dehumidification (Tracer ZN520 Only)

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.

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

## Data Sharing (Tracer ZN510 or ZN520 Only)

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

Tracer™ ZN controllers have the following binary inputs, 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 (Tracer ZN520 only)

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

### BIP1: Low Temperature Detection Option

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

Fan: Off
Valves: Closed
Electric heat: Off

## BIP3: Occupancy Sensor

Binary input #3 (BIP3) on Tracer™ ZN 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 27, p. 58.

## BIP4: Fan Status (ZN520 Only)

Binary input #4 (BIP4) on Tracer™ ZN is available for sensor, such as a binary switch or a timeclock, to detect occupancy. The sensor defaults normally open but can be configured as either normally open or closed.

**Table 27. Binary input configurations**

| | | | Controller operation | |
|---|---|---|---|---|
| **Binary input** | **Description** | **Configuration** | **Contact closed** | **Contact open** |
| BI 1 | Low temperature detection[a] | NC | Normal | Diagnostic[b] |
| BI 2 | Condensate overflow[a] | NC | Normal | Diagnostic[b] |
| BI 3 | Occupancy | NO | Unoccupied | Occupied |
| BI 3 | Generic binary input | NO | Normal[c] | Normal[c] |
| BI 4 | Fan status[a] | NO | Normal | Diagnostic |

**Notes:**
1. 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.
2. 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.

(a) During low temperature, condensate overflow, and fan status diagnostics, the Tracer™ ZN520 control disables all normal unit operation of the fan, valves, and damper.
(b) The table below shows the controller's response to low temperature detection, condensate overflow, and fan status diagnostics.
(c) The generic binary input does not affect unit operation. A building automation system reads this input as a generic binary input.

| BIP | Description | Fan | Valve | Electric heat | Damper |
|---|---|---|---|---|---|
| BI 1 | Low temperature detection | Off | Open | Off | Closed |
| BI 2 | Condensate overflow | Off | Closed | Off | Closed |
| BI 4 | Fan status | Off | Closed | Off | Closed |

## Analog Inputs

See Table 28 for a complete description of analog inputs.

**Table 28. Analog inputs**

| Analog input | Terminal | Function | Range | ZN010 | ZN510 | ZN520 |
|---|---|---|---|---|---|---|
| Zone | TB3-1 | Space temperature input | 5° to 122°F (-15° to 50°C) | • | • | • |
| Ground | TB3-2 | Analog ground | N/A | • | • | • |
| Set | TB3-3 | Setpoint input | 40° to 115°F (4.4° to 46.1°C) | • | • | • |
| Fan | TB3-4 | Fan switch input | 4821 to 4919 W (Off)<br>2297 to 2342 W (Auto)<br>10593 to 10807 W (Low)<br>15137 to 16463 W (High) | • | • | • |
| Ground | TB3-6 | Analog ground | N/A | • | • | • |
| Analog Input 1 | J3-1<br>J3-2 | Entering water temperature<br>Analog ground | -40° to 212°F (-40° to 100°C)<br>N/A | • | • | • |
| Analog Input 2 | J3-3<br>J3-4 | Discharge air temperature<br>Analog ground | -40° to 212°F (-40° to 100°C)<br>N/A | • | • | • |
| Analog Input 3 | J3-6 | Fresh air temp/generic temp<br>Analog ground | -40° to 212°F (-40° to 100°C)<br>N/A | | | • |
| Analog Input 4 | J3-7 | Universal Input<br>Generic 4-20 ma<br>Humidity<br>$CO_2$ | 0 – 100%<br>0 – 100%<br>0 – 2000ppm | | | • |
| Ground | J3-8 | Analog ground | N/A | | | • |
| Ground | J3-9 | Analog ground | N/A | | | • |

**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.
3. Changeover units include an entering water temperature sensor.

## Binary Outputs

Binary outputs are configured to support the following:

- Two fan stages (when one or two fan stages are present, J1-2 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 fresh air damper (Tracer™ ZN520 only)
- One-stage baseboard heat

Table 29. Binary output configuration

| Binary output pin connection | Configuration | ZN010 | ZN510 | ZN520 |
|---|---|---|---|---|
| J1-1 | Fan high | • | • | • |
| J1-2 | N/A | • | • | • |
| J1-3 | Fan low | | | • |
| J1-4 | (Key) | | | • |
| | Fan low | • | • | |
| J1-5 | Main valve – open, or 2 pos. valve[(a)] | • | • | • |
| J1-6 | Aux. valve/elec. ht. | • | • | |
| | Aux. valve – close[(a)] | | | • |
| J1-7 | 2-pos. damper | • | • | |
| J1-9 | Heat valve – open, or 2 pos. valve, or first stage elec. ht.[(a)] | | | • |
| J1-10 | Heat valve – close or sec. stage elec. ht.[(a)] | | | • |
| J1-11 | Fresh air damper – open | | | • |
| J1-12 | Fresh air damper – close | | | • |
| TB4-1 | Generic / baseboard heat output | | | • |
| TB4-2 | 24 VAC | | | • |

**Notes:**
1. If no valves are ordered with the unit, the factory default for Tracer™ ZN010 and ZN510 controllers are: main valve configured as normally closed and aux. valve configured as normally open.
2. If the fresh air damper option is not ordered on the unit, 2-pos. damper is configured as none.
3. Pin J1-2 can be configured for an exhaust fan with the use of Rover™ software. Factory default is none.

(a) Two-pipe hydronic heat/cool changeover units use terminals J1-5 and J1-6 to control the primary valve for both heating and cooling. Units configured and applied as 2-pipe hydronic heat/cool changeover with electric heat, use terminals J1-5 and J1-6 to control the primary valve (for both cooling and heating), and terminals J1-9 and J1-10 for the electric heat stage. For those 2-pipe changeover units, electric heat will not energize while the hydronic supply is hot (5 or more degrees above the space temperature). In a 4-pipe application, pin J1-5 is for cooling and pin J1-6 for heating.

## Zone Sensor

The Tracer™ ZN controller accepts the following zone sensor module inputs:

- Space temperature measurement (10kW thermistor)
- Local setpoint (either internal or external on the zone sensor module)
- Fan mode switch
- Timed override, using "on" and "cancel" buttons (Tracer ZN510 and ZN520 only)
- Communication jack (Tracer ZN510 and ZN520 only)

Table 30. Zone sensor wiring connections

| TB1 | Description |
|---|---|
| 1 | Space temperature |
| 2 | Common |
| 3 | Setpoint |
| 4 | Fan mode |
| 5 | Communications |
| 6 | Communications |

### Space Temperature Measurement

Zone sensors use a 10kW thermistor to measure the space temperature. Wall-mounted zone sensors include a space temperature thermistor. Unit-mounted zone sensors have a return air sensor mounted in the unit's return airstream. If both a hardwired and communicated space temperature value exists, the controller ignores the hardwired space temperature input and uses the communicated value.

## Local Setpoint

The zone sensor may be 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, high, or auto.

## External Setpoint Adjustment

Zone sensors with an external setpoint adjustment (1kW) provide the Tracer™ ZN 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

***Note:*** *Only units with ZN510 or ZN520 can receive a communicated setpoint from Tracer™ or other building automation system. However, Rover™ service software can communicate with all Tracer ZN controllers.*

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, 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.

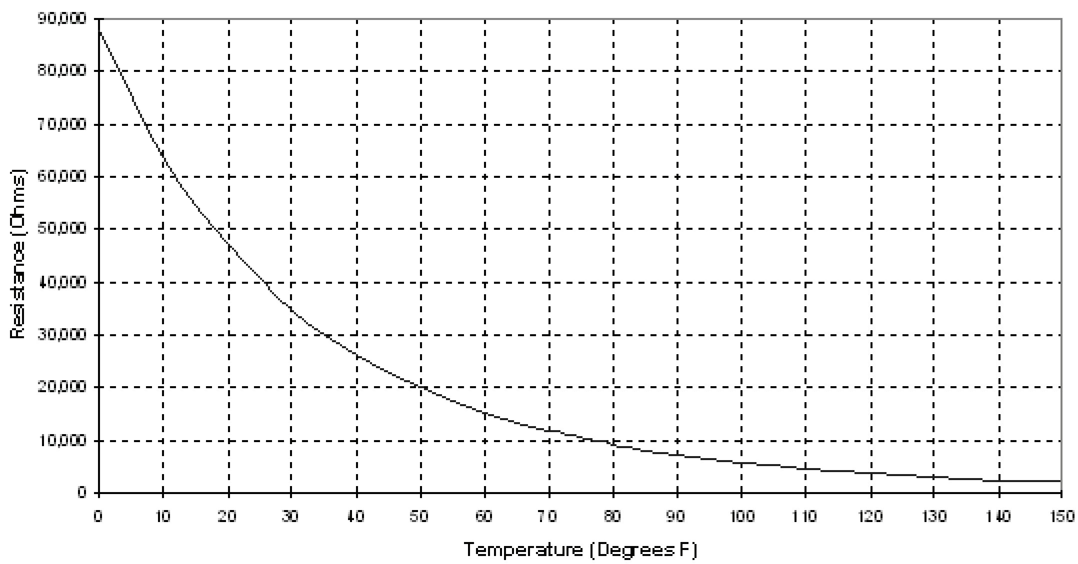
## On/Cancel Buttons

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 gain access to any controller on the link.

**Figure 14. Resistance temperature curve for the zone sensor, entering water temperature sensor, and discharge air sensor**



# Maintenance

## Maintenance Procedures

Perform the following maintenance procedures to ensure proper unit operation.

### Air Filters

Always install filters with directional arrows pointing toward the fan.

### Fan Bearings

Fan bearings are permanently sealed and lubricated and do not require additional lubrication.

### Fan Motors

Inspect fan motors periodically for excessive vibration or temperature. Operating conditions will vary the frequency of inspection and lubrication. Motor lubrication instructions are on the motor tag or nameplate. If for some reason these instructions are not available, contact the motor manufacturer. Some motor manufacturers may not provide oil tubes on motors with permanently sealed bearings.

**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

Before lubricating the motor:

1. Turn the motor off and disconnect power to the unit to ensure the motor doesn't accidentally start.
2. Use a No. 10 SAE, non-detergent automotive type oil. Do not over-oil.

### Sheave Alignment

To prevent interference of the fan frame with the belt, make sure that the belt edge closes to the motor has the proper clearance from the fan frame as shown in Figure 15, p. 64.

Align the fan and motor sheaves by using a straight–edge or taut string, as shown in Figure 16, p. 64. The straight-edge must be long enough to span the distance between the sheave outside edges.

When the sheaves are aligned, the straight–edge will touch both sheaves at points A through D, as shown in Figure 16. For uneven width sheaves, place a string in the center groove of both sheaves and pull tight. Adjust sheaves and tighten the sheave set screws to the correct torques recommended in Table 31.

Figure 15. Clearance recommendation to prevent fan frame and belt interface

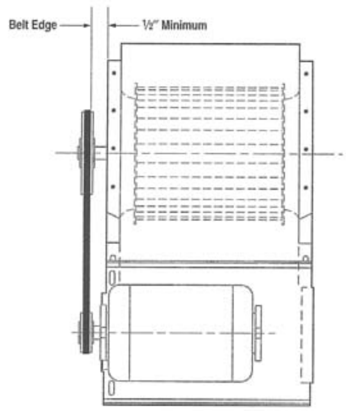



Figure 16. Correct sheave alignment

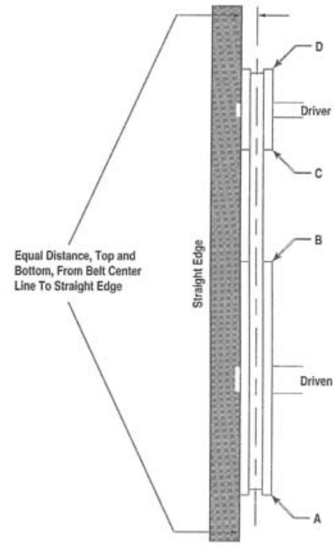



Table 31. Recommended torques for tightening sheaves and bearing thrust collar

| | Torque (in.-lb) | Ft-lb | N-m |
|---|---|---|---|
| Sheave setscrew | 144 | 12 | 16.3 |
| Bearing thrust collar | 66 | 5.5 | 7.5 |
| Fan wheel screw | 144 | 12 | 16.3 |

## Fan Assembly Set Screws

Check and adjust fan wheel, bearing, and sheave set screws whenever a component is removed or an adjustment is made. Refer to Table 31 for recommendations.

## Fan Belt Tension

Proper belt tension is necessary to endure maximum bearing and drive component life and is based on fan brake horsepower requirements. Replace belt when frayed or worn.

Fan belt tension should only be tight enough so the belt does not slip and maintains adequate airflow.

***Note:*** *Check fan belt tension at least twice during the first days of new belt operation since there is a rapid decrease in tension until belts are run-in.*

Be careful not to over-tension fan belt. Excessive tension will reduce fan and motor bearing life, accelerate belt wear and possibly cause shaft failure. Clean the sheaves and belt with a dry cloth. Keep oil and grease away from the belt because they may cause belt deterioration and slippage. Trane does not recommend belt dressing.

### *NOTICE*
### Belt tension!

**Do not over-tension belts. Excessive belt tension will reduce fan and motor bearing life, accelerate belt wear, and could result in shaft failure.**

**Table 32. BCHC/BCVC fan, filter, and mixing box general data**

| Unit size | 12 | 18 | 24 | 36 | 54 | 72 | 90 |
|---|---|---|---|---|---|---|---|
| Nominal cfm | 400 | 600 | 800 | 1200 | 1800 | 2400 | 3000 |
| **Air flow** | | | | | | | |
| Minimum cfm | 250 | 375 | 500 | 750 | 1125 | 1500 | 1875 |
| Maximum cfm | 500 | 675 | 1000 | 1600 | 2400 | 3000 | 4000 |
| **Fan data** | | | | | | | |
| Fan wheel, in. (dia. x width) | 9.5 x 4.5 | 9.5 x 4.5 | 9.5 x 9.5 | 9.5 x 9.5 | 12.6 x 9.5 | 12.6 x 9.5 | 12.6 x 9.5 |
| Maximum rpm | 2300 | 2300 | 1800 | 1800 | 1500 | 1500 | 1500 |
| Motor hp | 0.33–1.0 | 0.33–1.0 | 0.33–1.0 | 0.33–1.5 | 0.33–2.0 | 0.33–3.0 | 0.33–3.0 |
| **Unit flat filter** | | | | | | | |
| Qty. - size, in. | 1 - 12 x 24 | 1 - 12 x 24 | 1 - 16 x 25 | 2 - 16 x 20 | 2 - 20 x 20 | 1 - 20 x 20<br>1 - 20 x 25 | 3 - 16 x 25 |
| Area, sq. ft | 2.000 | 2.000 | 2.778 | 4.444 | 5.556 | 6.250 | 8.333 |
| Velocity, ft/min. | 200 | 300 | 288 | 270 | 324 | 384 | 360 |
| **Angle filter** | | | | | | | |
| Qty. - size, in. | 2 - 12 x 24 | 2 - 12 x 24 | 2 - 12 x 24 | 2 - 20 x 20 | 4 - 16 x 20 | 4 - 16 x 20 | 4 - 20 x 20 |
| Area, sq. ft | 4.000 | 4.000 | 4.000 | 5.556 | 8.889 | 8.889 | 11.111 |
| Velocity, ft/min. | 100 | 150 | 200 | 216 | 203 | 270 | 270 |
| **Bottom / top access filter box** | | | | | | | |
| Qty. - size, in. | 1 - 12 x 20 | 1 - 12 x 24 | 1 - 16 x 25 | 1 - 16 x 20<br>1 - 16 x 16 | 1 - 16 x 20<br>1 - 20 x 20 | 1 - 20 x 25<br>1 - 20 x 20 | 2 - 16 x 25<br>1 - 14 x 25 |
| Area, sq. ft | 1.700 | 2.000 | 2.800 | 4.000 | 5.000 | 6.300 | 8.000 |
| Velocity, ft/min. | 240 | 300 | 288 | 300 | 360 | 384 | 375 |
| **Mixing box** | | | | | | | |
| Damper opening width, in. | 15.5 | 19.5 | 19.5 | 31.5 | 31.5 | 31.5 | 31.5 |
| Damper opening height, in. | 7 | 7 | 7 | 7 | 12.75 | 12.75 | 12.75 |
| Area, sq. ft | 0.753 | 0.948 | 0.948 | 1.531 | 2.789 | 2.789 | 2.789 |
| Velocity, ft/min. | 531 | 633 | 844 | 784 | 645 | 861 | 1076 |

**Note:** Minimum air flow limits apply to units with hot water or electric heat only. There is no minimum airflow limit on cooling on units. Maximum airflow limits are to help prevent moisture carryover.

**Table 33. BCBH/BCVC valve package waterflow limits**

| Tube size (in.) | gpm |
|---|---|
| 1/2 | 8.6 |
| 3/4 | 19.3 |
| 1 | 34.3 |
| 1-1/4 | 53.5 |

Table 34. BCHC/BCVC coil general data

| Unit size | 12 | 18 | 24 | 36 | 54 | 72 | 90 |
|---|---|---|---|---|---|---|---|
| **Nominal cfm** | **400** | **600** | **800** | **1200** | **1800** | **2400** | **3000** |
| **Hydronic & DX coil data** | | | | | | | |
| Area - $ft^2$ | 0.89 | 1.11 | 1.67 | 2.67 | 4.00 | 5.00 | 6.67 |
| Width - in. [(a),(b)] | 8 | 8 | 12 | 12 | 18 | 18 | 24 |
| Length - in. [(c)] | 16 | 20 | 20 | 32 | 32 | 40 | 40 |
| Velocity - ft/min. | 450 | 540 | 480 | 450 | 450 | 480 | 450 |
| **Hydronic coil data** | | | | | | | |
| **• High-capacity** | | | | | | | |
| Area - $ft^2$ | 0.89 | 1.11 | 1.67 | 2.67 | 3.89 | 4.86 | 6.25 |
| Width - in. [(a),(d)] | 8 | 8 | 12 | 12 | 17.5 | 17.5 | 22.5 |
| Length - in. [(c)] | 16 | 20 | 20 | 32 | 32 | 40 | 40 |
| Velocity - ft/min. | 450 | 540 | 480 | 450 | 463 | 494 | 480 |
| **1-row coil** | | | | | | | |
| Minimum gpm [(e)] | 1.0 | 1.0 | 1.0 | 1.0 | 6.1 | 6.1 | 7.9 |
| Maximum gpm [(f)] | 5.2 | 5.2 | 5.2 | 5.2 | 32.6 | 32.6 | 42.0 |
| Dry coil weight - lb | 4.4 | 5.2 | 6.6 | 9.3 | 17.6 | 20.4 | 25.8 |
| Wet coil weight - lb | 5.1 | 6.0 | 7.8 | 11.0 | 22.4 | 26.0 | 32.9 |
| Internal volume - $in^3$ | 19.4 | 22.2 | 33.2 | 47.1 | 132.9 | 155.1 | 196.6 |
| **2-row coil** | | | | | | | |
| **• High-capacity** | | | | | | | |
| Minimum gpm [(e)] | 1.0 | 1.0 | 2.0 | 2.0 | 6.1 | 6.1 | 7.9 |
| Maximum gpm [(f)] | 5.2 | 5.2 | 10.4 | 10.4 | 32.6 | 32.6 | 42.0 |
| Dry coil weight - lb | 5.9 | 7.0 | 9.9 | 14.1 | 27.2 | 32.1 | 39.4 |
| Wet coil weight - lb (kg) | 7.2 | 8.4 | 12.3 | 17.6 | 36.1 | 42.5 | 52.6 |
| Internal volume - $in^3$ | 36.0 | 38.8 | 66.5 | 96.9 | 246.5 | 288.0 | 365.5 |
| **4-row coil** | | | | | | | |
| **• Standard capacity** | | | | | | | |
| Minimum gpm [(e)] | N/A | N/A | N/A | N/A | 8.8 | 8.8 | 11.7 |
| Maximum gpm [(f)] | N/A | N/A | N/A | N/A | 47.0 | 47.0 | 62.6 |
| Dry coil weight - lb [(g)] | N/A | N/A | N/A | N/A | 37.2 | 44.5 | 58.5 |
| Wet coil weight - lb [(g)] | N/A | N/A | N/A | N/A | 48.3 | 57.7 | 77.0 |
| Internal volume - $in^3$ [(g)] | N/A | N/A | N/A | N/A | 307.4 | 365.5 | 512.3 |
| **• High-capacity** | | | | | | | |
| Minimum gpm [(e)] | 2.0 | 2.0 | 2.9 | 2.9 | 6.1 | 6.1 | 7.9 |
| Maximum gpm [(f)] | 10.4 | 10.4 | 15.7 | 15.7 | 32.6 | 32.6 | 42.0 |
| Dry coil weight - lb | 10.5 | 12.4 | 17.7 | 25.5 | 47.0 | 56.3 | 73.1 |
| Wet coil weight - lb | 13.1 | 15.5 | 22.5 | 32.5 | 62.7 | 74.9 | 97.9 |
| Internal volume - $in^3$ | 72.0 | 85.8 | 132.9 | 193.8 | 433.0 | 516.7 | 688.3 |

**Table 34. BCHC/BCVC coil general data (continued)**

| Unit size | 12 | 18 | 24 | 36 | 54 | 72 | 90 |
|---|---|---|---|---|---|---|---|
| **Nominal cfm** | **400** | **600** | **800** | **1200** | **1800** | **2400** | **3000** |
| **6-row coil** | | | | | | | |
| **• Standard capacity** | | | | | | | |
| Minimum gpm (e) | N/A | N/A | N/A | N/A | 8.8 | 8.8 | 11.7 |
| Maximum gpm (f) | N/A | N/A | N/A | N/A | 47.0 | 47.0 | 62.6 |
| Dry coil weight - lb (g) | N/A | N/A | N/A | N/A | 52.4 | 63.1 | 82.7 |
| Wet coil weight - lb (g) | N/A | N/A | N/A | N/A | 68.1 | 82.0 | 108.7 |
| Internal volume - $in^3$ (g) | N/A | N/A | N/A | N/A | 434.8 | 523.4 | 720.0 |
| **• High-capacity** | | | | | | | |
| Minimum gpm (e) | 2.0 | 2.0 | 2.9 | 2.9 | 6.1 | 6.1 | 7.9 |
| Maximum gpm (f) | 10.4 | 10.4 | 15.7 | 15.7 | 32.6 | 32.6 | 42.0 |
| Dry coil weight - lb | 14.6 | 17.4 | 24.7 | 36.1 | 65.4 | 78.6 | 101.5 |
| Wet coil weight - lb | 18.2 | 21.8 | 31.5 | 46.1 | 87.8 | 105.6 | 137.0 |
| Internal volume - $in^3$ | 99.7 | 121.8 | 188.3 | 276.9 | 620.4 | 745.9 | 983.1 |
| **• Steam coil data** | | | | | | | |
| Area - $ft^2$ | 0.71 | 0.88 | 1.75 | 2.75 | 4.13 | 5.13 | 6.83 |
| Width - in. (a) | 6 | 6 | 12 | 12 | 18 | 18 | 24 |
| Length - in. (c) | 17 | 21 | 21 | 33 | 33 | 41 | 41 |
| Velocity - ft/min. | 26 | 25 | 18 | 17 | 17 | 16 | 16 |
| **1-row coil** | 3 | 3 | 5 | 5 | 14 | 14 | 9 |
| Minimum steam press - psig | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Maximum steam press - psig | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |
| Dry coil weight - lb | 16.7 | 18.7 | 32.5 | 41.1 | 57.4 | 64.8 | 84.9 |
| Wet coil weight - lb | 18.2 | 20.4 | 36.0 | 45.8 | 64.5 | 73.2 | 96.1 |
| Internal volume - $in^3$ | 41.7 | 47.7 | 95.3 | 130.8 | 196.1 | 231.6 | 308.7 |

(a) Coil width = Length in the direction of a coil header, typically vertical.
(b) "**Hydronic and DX coil data**" width dimensions apply only to DX coils (all unit sizes), 1-row standard capacity hydronic coils (unit sizes 012 through 036), and 4- and 6-row standard capacity hydronic coils (54 through 90).
(c) Coil length = Length of coil in direction of the coil tubes, typically horizontal and perpendicular to airflow.
(d) "**High-capacity hydronic coil data**" width dimensions apply only to 1-row standard capacity hydronic coils (unit sizes 054 through 090) and 2-, 4-, and 6-row high capacity hydronic coils (all unit sizes).
(e) The minimum waterflow at 1.5 fps tubeside velocity is to ensure the coil self-vents properly. There is no minimum waterflow limit for coils that do not require self venting.
(f) Maximum gpm limits are to prevent erosion and noise problems.
(g) DX coil height and width dimensions are same as comparable hydronic coils. Four- and six-row DX coil dry weight dimensions are same as comparable 4- and 6-row hydronic coils. A 3-row DX coil dry weight is 25% less than a comparable 4-row hydronic coil. Internal volumes are approximately 6% less than comparable hydronic coils.

**Table 35. Drive data**

| | | | Motor sheave | | Fan sheave | | Belt | | Fan rpm range Motor speed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit size | Motor watts | HP | Browning | Trane | Browning | Trane | Browning | Trane | 1750 (60 Hz) | 1450 (50 Hz) | Drive letter |
| 12, 18 | 186–1119 | 1/3 to 1-1/2 | 1VL40x5/8 | X10090082090 | AK74x3/4 | X10070173270 | A41 | X10200254160 | 619–878 | 513–727 | D |
| | | | | | AK64x3/4 | X10070173030 | A39 | X10200254140 | 727–109 | 602–853 | E |
| | | | | | AK54x3/4 | X10070172C40 | A37 | X10200254120 | 879–1245 | 728–1031 | F |
| | | | | | AK46x3/4 | X10070172A20 | A36 | X10200254110 | 1000–1417 | 829–1174 | G |
| | | | | | AK39x3/4 | X10070172700 | A35 | X10200254100 | 1200–1700 | 994–1409 | H |
| | | | | | AK34x3/4 | X10070172640 | A34 | X10200254090 | 1313–1859 | 1088–1541 | J |
| | | | | | AK28x3/4 | X10070172440 | A34 | X10200254090 | 1615–2288 | 1338–1896 | K |
| 24, 36 | 186–1119 | 1/3 to 1-1/2 | 1VL40x5/8 | X10090082090 | AK114x3/4 | X10070173A30 | A53 | X10200254280 | 390–552 | 323–457 | A |
| | | | | | AK94x3/4 | X10070173630 | A48 | X10200254230 | 478–678 | 396–562 | B |
| | | | | | AK84x3/4 | X10070173450 | A46 | X10200254210 | 540–765 | 447–634 | C |
| | | | | | AK74x3/4 | X10070173270 | A45 | X10200254200 | 619–878 | 513–727 | D |
| | | | | | AK64x3/4 | X10070173030 | A43 | X10200254180 | 727–1029 | 602–853 | E |
| | | | | | AK54x3/4 | X10070172C40 | A41 | X10200254160 | 879–1245 | 728–1031 | F |
| | | | | | AK46x3/4 | X10070172A20 | A39 | X10200254140 | 1000–1417 | 829–1174 | G |
| | | | | | AK39x3/4 | X10070172700 | A38 | X10200254130 | 1200–1700 | 994–1409 | H |
| | | | | | AK34x3/4 | X10070172640 | A37 | X10200254120 | 1313–1859 | 1088–1541 | J |
| | | | | | AK28x3/4 | X10070172440 | A36 | X10200254110 | 1615–2288 | 1338–1896 | K |
| | 1492–2238 | 2 and 3[(a)] | 1VM50x5/8 | X10090082170 | AK94x3/4 | X10070173630 | A48 | X10200254230 | 678–877 | 562–727 | L |
| | | 3[(a)] | 1VM50x7/8 | X10090082190 | AK84x3/4 | X10070173450 | A46 | X10200254210 | 765–990 | 634–820 | M |
| | | | | | AK74x3/4 | X10070173270 | A45 | X10200254200 | 878–1136 | 727–941 | N |
| | | | | | AK64x3/4 | X10070173030 | A43 | X10200254180 | 1029–1332 | 853–1104 | P |
| | | | | | AK54x3/4 | X10070172C40 | A41 | X10200254160 | 1245–1611 | 1031–1335 | R |
| | | | | | AK46x3/4 | X10070172A20 | A40 | X10200254150 | 1174–1519 | | T |
| 54, 72 | 186–1119 | 1/3 to 1-1/2 | 1VL40x5/8 | X10090082090 | AK114x3/4 | X10070173A30 | A53 | X10200254280 | 390–552 | 323–457 | A |
| | | | | | AK94x3/4 | X10070173630 | A50 | X10200254250 | 478–678 | 396–562 | B |
| | | | | | AK84x3/4 | X10070173450 | A48 | X10200254230 | 540–765 | 447–634 | C |
| | | | | | AK74x3/4 | X10070173270 | A46 | X10200254210 | 619–878 | 513–727 | D |
| | | | | | AK64x3/4 | X10070173030 | A45 | X10200254200 | 727–1029 | 602–853 | E |
| | | | | | AK54x3/4 | X10070172C40 | A43 | X10200254180 | 879–1245 | 728–1031 | F |
| | | | | | AK46x3/4 | X10070172A20 | A41 | X10200254160 | 1000–1417 | 829–1174 | G |
| | | | | | AK39x3/4 | X10070172700 | A40 | X10200254150 | 1200–1700 | 994–1409 | H |
| | | | | | AK34x3/4 | X10070172640 | A40 | X10200254150 | 1313–1859 | 1088–1541 | J |
| | 1492–2238 | 2 and 3[(a)] | 1VM50x5/8 | X10090082170 | AK94x3/4 | X10070173630 | A51 | X10200254260 | 678–877 | 562–727 | L |
| | | 3[(a)] | 1VM50x7/8 | X10090082190 | AK84x3/4 | X10070173450 | A49 | X10200254240 | 765–990 | 634–820 | M |
| | | | | | AK74x3/4 | X10070173270 | A48 | X10200254230 | 878–1136 | 727–941 | N |
| | | | | | AK64x3/4 | X10070173030 | A46 | X10200254210 | 1029–1332 | 853–1104 | P |
| | | | | | AK54x3/4 | X10070172C40 | A45 | X10200254200 | 1245–1611 | 1031–1335 | R |
| | | | | | AK46x3/4 | X10070172A20 | A43 | X10200254180 | 1174–1519 | | T |
| 90 | 186–1119 | 1/3 to 1 1/2 | 1VL40x5/8 | X10090082090 | AK114x3/4 | X10070173A30 | A59 | X10200254340 | 390–552 | 323–457 | A |
| | | | | | AK94x3/4 | X10070173630 | A56 | X10200254310 | 478–678 | 396–562 | B |
| | | | | | AK84x3/4 | X10070173450 | A53 | X10200254280 | 540–765 | 447–634 | C |
| | | | | | AK74x3/4 | X10070173270 | A53 | X10200254280 | 619–878 | 513–727 | D |
| | | | | | AK64x3/4 | X10070173030 | A50 | X10200254250 | 727–1029 | 602–853 | E |
| | | | | | AK54x3/4 | X10070172C40 | A49 | X10200254240 | 879–1245 | 728–1031 | F |
| | | | | | AK46x3/4 | X10070172A20 | A48 | X10200254230 | 1000–1417 | 829–1174 | G |
| | | | | | AK39x3/4 | X10070172700 | A46 | X10200254210 | 1200–1700 | 994–1409 | H |
| | | | | | AK34x3/4 | X10070172640 | A46 | X10200254210 | 1313–1859 | 1088–1541 | J |
| | 1492–2238 | 2 and 3[(a)] | 1VM50 X 5/8 | X10090082170 | AK94x3/4 | X10070173630 | A56 | X10200254310 | 678–877 | 562–727 | L |
| | | 3[(a)] | 1VM50 X 7/8 | X10090082190 | AK84x3/4 | X10070173450 | A56 | X10200254310 | 765–990 | 634–820 | M |
| | | | | | AK74x3/4 | X10070173270 | A53 | X10200254280 | 878–1136 | 727–941 | N |
| | | | | | AK64x3/4 | X10070173030 | A53 | X10200254280 | 1029–1332 | 853–1104 | P |
| | | | | | AK54x3/4 | X10070172C40 | A50 | X10200254250 | 1245–1611 | 1031–1335 | R |
| | | | | | AK46x3/4 | X10070172A20 | A49 | X10200254240 | 1174–1519 | | T |

(a) 2 hp 60 Hz motors have 5/8” bore sheaves. 2 hp 50 Hz motors have 7/8” bore sheaves. All 3 hp motors have 7/8” bore sheaves with the exception of 575V, which has the 5/8” bore.

## 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 per 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. Rinse coils thoroughly after cleaning. Clean the coil fins using one of these methods:

- steam with detergent
- hot water spray and detergent
- commercially available chemical coil cleaner

***NOTICE***

**Potential unit damage from coil cleaners!**

**Do not use acidic chemical coil cleaners. Also, do not use alkaline chemical coil cleaners with a pH value greater then 8.5 (after mixing) without using an aluminum corrosion inhibitor in the cleaning solution. Using these types of cleaners could result in equipment damage.**

### 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 and can cause 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 is the suggested method below:

### Steam, Hot Water, and Cooling Coil Cleaning Procedure

1. Don the appropriate personal protective equipment (PPE).
2. Gain access to both sides of the coil section.
3. Use a soft brush to remove loose debris from both sides of the coil.
4. 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.
5. Repeat Step 4 as necessary. Confirm that the drain line is open following completion of the cleaning process.
6. Allow the unit to dry thoroughly before putting the system back into service.
7. Straighten any coil fins that may be damaged with a fin rake.
8. Replace all panels and parts and restore electrical power to the unit.
9. Ensure that contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solutions.

**⚠ 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.**

### Winterizing the Coil

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

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

***NOTICE***
**Potential coil-freeze condition!**

**Make provisions to drain the coil when not in use to prevent coil freeze-up. Failure to follow this procedure could result in equipment damage.**

## Periodic Maintenance Checklists

### Monthly Checklist

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

**⚠ WARNING**
**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

**⚠ WARNING**
**Rotating parts!**

**Secure drive sheaves to ensure motor cannot freewheel. Failure to follow this procedure could result in death, personal injury or equipment damage.**

1. Inspect unit air filters. Clean or replace if airflow is blocked or if filters are dirty.
2. Check the condition and tension of fan belts. Adjust tension if belts are floppy or squeal continually. Replace worn or fraying belts in matched sets.

   ***Note:*** *Check and adjust belt tension at least twice daily the first days of new belt operation. Belt tension will rapidly decrease until the belts are run in.*
3. Re-lubricate motor bearings, if motor is fitted with oil tubes and operating conditions include moist or dirty air, continuous duty and/or high temperatures.

### Semi-Annual Maintenance

1. Verify the fan motor is properly lubricated. Follow lubrication recommendations on the motor tag or nameplate. Contact the motor manufacturer for more information.
2. With power disconnected, manually rotate the fan wheel to check for obstructions in the housing or interference with fan blades. Remove any obstructions and debris.
3. Check the fan assembly sheave alignment. Tighten set screws to their proper torques.
4. Check fan belt tension. Adjust if belt is slipping. Replace if belt is worn or frayed.
5. Inspect the coils for dirt build-up. Clean fins if airflow is clogged.

### Annual Maintenance

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

1. Inspect, clean, and tighten all electrical connections and wiring.

2. Visually inspect the entire unit casing for chips or corrosion. Remove rust or corrosion and repaint surfaces.
3. Clean fan wheels and fan shaft. Remove any rust from the fan shaft with an emery cloth and recoat with L.P.S. 3 or equivalent.
4. Inspect the drainpan for sludge or other foreign material. Clear the drain openings and drain line to ensure adequate flow.
5. Rotate the fan wheel and check for obstructions in the fan housing. The wheel should not rub on the fan housing or cutoff. Adjust to center if necessary and tighten the wheel set screws per the torque recommendations in Table 31, p. 64.
6. Examine flex connector for cracks or leaks.
7. Repair or replace any damaged duct material.

# Diagnostics

## Troubleshooting

### LED Activity

#### Red Service LED

The red LED normally indicates if the unit controller is operating properly or not. Refer to Table 36.

**Table 36. Red service LED activity'**

| LED activity | Description |
|---|---|
| Off continuously after power is applied to the controller. | Normal operation |
| On continuously, even when power is first applied to the controller. | Someone is pressing the Service button or the controller has failed. |
| LED flashes about once every second. | Uninstall (normal controller mode). Use Rover™ service tool to restore normal unit operation. |
| Black Service push button. | Use the Service button to install the Tracer™ ZN520 controller in a communication network. |

#### Green Status LED

The green LED normally indicates whether the controller is powered on (24 VAC supplied). Refer to Table 37.

**Table 37. Green status LED activity**

| Green LED activity | Description |
|---|---|
| On continuously | Power on (normal operation). |
| Blinks (one blink) | The controller is in manual output test mode.<br>No diagnostics present. |
| Blinks (two blinks) | The controller is in manual output test mode.<br>One or more diagnostics are present. |
| LED blinks (1/4 second on, 1/4 second, off for 10 seconds) | Wink mode.(a) |
| LED off | Power is off.<br>Controller failure.<br>Test button is pressed. |

(a) The Wink feature allows you to identify a controller. By sending a request from Rover™ service tool, you can request the controller to wink (blink on and off as a notification that the controller received the signal). The green LED blinks (1/4 second on, 1/4 second off for 10 seconds) during Wink mode.

#### Yellow Comm LED

The yellow comm LED blinks at the rate the controller receives communication. The yellow LED does not blink when the controller is transmitting communication data. Refer to Table 38.

**Table 38. Yellow comm LED activity**

| LED activity | Description |
|---|---|
| Off continuously | The controller is not detecting any communication.<br>(Normal for standalone applications.) |
| LED blinks or flickers | The controller detects communication.<br>(Normal for communicating applications, including data sharing.) |
| LED on continuously | Abnormal condition or extremely high traffic on the link.<br>High traffic on the link. |

**Note:** *If the service push button is held down for more than 15 seconds, the Tracer™ ZN controller will uninstall itself from the ICS communication network and shut down all unit operation. This mode is indicated by the red Service LED flashing once every second. See the Red*

*Service LED section. Use Rover™ service tool to restore the unit to normal operation. Refer to the Rover product literature for more information.*

## 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:

- 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, or ZN520 controller.

1. Press and hold the Test button for at least two seconds (not exceeding five 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 39. Tracer ZN010 and ZN510 test sequence for 1-heat/1-cool configurations**

| | Fan | Cool output[a] | Heat output | Damper |
|---|---|---|---|---|
| **Steps** | **J1-1, J1-3** | **J1-** | **J1-** | **J1-** |
| 1. Off | Off | Off | Off | Closed |
| 2. Fan high | High | Off | Off | Closed |
| 3. Exhaust fan | [b] | Off | Off | Closed |
| 4. Fan | Low | Off | Off | Closed |
| 5. Cool | High | On | Off | Closed |
| 6. Heat | High | Off | On | Closed |
| 7. Two-position damper[c] | High | Off | Off | Open |
| 8. Exit | [d] | | | |

**Note:** The 2-position damper energizes during this step if the controller is configured for a 2-position damper.

(a) At the beginning of step 2, the controller attempts to clear all diagnostics.
(b) Tracer™ ZN010 and ZN510 have a binary output default as “none” on J1-X from the factory. If the unit has a 2-speed fan, step 3 will energize the low fan speed. If the unit has a single speed fan, step 3 will continue to energize the high fan speed. This binary output can be reconfigured as an exhaust fan, with the use of Rover™ software.
(c) 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.
(d) For all 1-heat/1-cool applications including 2-pipe changeover, the cooling and heat test stage energize. This occurs even though during normal 2-pipe changeover operation binary output controls the unit valve for both cooling and heating.

**Table 40. Tracer ZN520 test sequence**

| | Fan | | Main valve | Electric heat or aux. valve | | Fresh air damper | Generic/baseboard heat | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Step** | **J1-1** | **J1-2** | **J1-3** | **J1-5** | **J1-6** | **J1-9** | **J1-10** | **J1-11** | **J1-12** | **TB4-1** |
| 1. Off[a] | Off | Off | Off | Off | On<br>EH: off | Off | aux: on | Off | On | Off |
| 2. Fan high[b] | High | Off | Off | Off | Off | Off | Off | Off | Off | Off |
| 3.[c] | Off | | Off | Off | Off | Off | Off | Off | Off | Off |
| 4. Fan low | Off | Off | Low | Off | Off | Off | Off | Off | Off | Off |
| 5. Main open | High | Off | Off | On | Off | Off | Off | Off | Off | Off |
| 6. Main close, EH1 on | High | Off | Off | Off | On | On | Off | Off | Off | Off |
| 7. Aux. open | High<br>EH1 on | Exh[d] | Off | Off | Off | On | Off | Off | Off | Off |
| 8. Aux. close, damper open | High | Off | Off | Off | Off | Off<br>EH1 off | On<br>EH2 on | On | Off | Off |
| 9. Damper close | High | Off | Off | Off | Off | Off | Off | Off | On | Off |
| 10. Generic/baseboard heat energized | High | Off | Off | Off | Off | Off | Off | Off | Off | On |
| 11. Exit[e] | Exit | | | | | | | | | |

(a) Upon entering manual output test mode, the controller turns off all fan and electric heat outputs and drives.
(b) At the beginning of step 2, the controller attempts to clear all diagnostics.
(c) The low fan speed output energizes at step 3. If the unit is configured for a 1 speed fan, the fan remains on high speed at step 3.
(d) If the unit is configured for a 1- or 2-speed fan, and BOP2 is configured for an exhaust fan, the exhaust fan output energizes on step 7. The exhaust fan output is shared with medium speed.
(e) After step 10, the test sequence performs an exit. This initiates a reset and attempts to return the controller to normal operation.

# 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 failure[1]
- Entering water temp failure[1]
- Discharge air temp failure
- Outdoor air temp failure[1]
- Local setpoint failure[1]
- Local fan mode failure[1]
- $CO_2$ sensor failure[1]
- Generic AIP failure[1]
- Humidity input failure[1]
- Defrosting compressor lockout[1]
- Maintenance required
- Invalid Unit Configuration
- Generic temperature failure
- Discharge air low limit

## Resetting Diagnostics

There are seven ways to reset unit diagnostics:

1. Automatically by the controller
2. By initiating a manual output test at the controller
3. By cycling power to the controller
4. By using a building automation system (Tracer™ ZN510 or ZN520 only)
5. By using the Rover™ service tool
6. By using any other communicating device able to access the controller's diagnostic reset input (Tracer ZN510 or ZN520 only)
7. By cycling the fan switch from off to any speed setting (Tracer ZN520 only)

### Automatic Reset by the Controller

The controller includes an automatic diagnostic reset function which 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.*

After the controller detects the first low temperature 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.

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

## Manual Output Test

You can use the Test button on the controller either during installation to verify proper end device operation or during troubleshooting. When you press the Test button, the controller exercises all outputs in a predefined sequence. The first and last outputs of the sequence reset the controller diagnostics. See p. 73 for more information about the manual output test.

## Cycling Power

When someone turns off the controller's 24 VAC power, then re-applies power, the unit cycles through a power up sequence. By default, the controller attempts to reset all diagnostics at power up. Diagnostics present at power-up and those that occur after power-up are handled according to the defined unit diagnostics sequences (see Table 41, p. 77 and Table 42, p. 77).

## Building Automation System (Tracer ZN510 or ZN520 Only)

Some building automation systems can reset diagnostics in the Tracer™ ZN510 or ZN520 controller. For more complete information, refer to the product literature for the building automation system.

## Rover Service Tool

Rover™ service tool can reset diagnostics in the Tracer™ ZN520 controller. For more complete information, refer to the Rover Installation, Operation, and Programming manual.

## Diagnostic Reset (Tracer ZN510 or ZN520 Only)

Any device that can communicate the network variable nviRequest (enumeration "clear_alarm") can reset diagnostics in the Tracer™ ZN510 or ZN520 controller. The controller also attempts to reset diagnostics whenever power is cycled.

## Cycling the Fan Switch (Tracer ZN520 Only)

If the user cycles the fan speed switch from off to any speed, the controller resets all diagnostics. Diagnostics may recur immediately if the problem still exists.

The green LED normally indicates whether or not the controller is powered on (24 VAC).

## Trane's Service Tool, Rover

Rover™, Trane's service tool, can reset diagnostics present in the controller. For complete information about Rover, refer to Trane publication *EMTX-IOP-2 Rover Installation, Operation and Programming Guide*.

## Alarm Reset

Any device that can communicate alarm reset information can reset diagnostics present in the controller.

**Table 41. Tracer ZN010 and ZN510 controller diagnostics**

| Diagnostic | Latching | Fan | Valves | Electric heat | Damper |
|---|---|---|---|---|---|
| Auxiliary temperature failure | No | Enabled | No action | No action | No action |
| Condensate overflow detection | Yes | Off | Closed | Off | Closed |
| Entering water temperature | No | Enabled | Enabled | Enabled | Enabled |
| Fan mode failure | No | Enabled | Enabled | Enabled | Enabled |
| Invalid unit configuration failure | Yes | Disabled | Disabled | Disabled | Disabled |
| Low temperature 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 temperature failure | No | Off | Closed | Off | Closed |

**Notes:**
1. 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.
2. 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.
3. Enabled: End device is allowed to run if there is a call for it to run.
4. Disabled: End device is not allowed to run even if there is a call for it to run.
5. No Action: The diagnostic has no affect on the end device.

**Table 42. Tracer ZN520 diagnostics**

| Diagnostic | Fan | Other outputs[a] |
|---|---|---|
| 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 temperature failure | On | Valves enabled[b], fresh air damper enabled[b], electric heat enabled[b], baseboard heat off |
| Discharge air temperature low limit | Off | Valves open, fresh air damper closed, electric heat off, baseboard heat off |
| Discharge air temperature failure | Off | Valves closed, fresh air damper closed, electric heat off, baseboard heat off |
| Fresh air temperature failure | On | Valves enabled, fresh air damper minimum position[c], 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 |

(a) The generic binary output (TB4-1, TB4-2) state is unaffected by all unit diagnostics.
(b) 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.
(c) 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.

## Common Diagnostics

### Table 43. Fan outputs do not energize

| Probably cause | Explanation |
|---|---|
| Random start observed | After power-up, the controller always observes a random start that varies between 0 and 30 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:<br>1. The controller exits power-up control wait once it receives communicated information.<br>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 diagnostics 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 affects fan operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| No power to the controller | If the controller does not have power, the unit fan does not operate. For the Tracer™ ZN 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 has failed. |
| 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 devices, the valves may not work correctly. |
| 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 "Manual Output Test," p. 73. |
| 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 specific unit wiring diagrams on the unit. |

### Table 44. 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 affects 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," p. 73. |
| Diagnostic present | A specific list of diagnostics affects valve operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| 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 "Entering Water Temperature Sampling Function," p. 55. |
| 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 unit fan does not operate. For the Tracer™ ZN010, 510 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 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 unit wiring diagrams on the unit. |

**Table 45. 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," p. 73. |
| Diagnostic present | A specific list of diagnostics affects valve operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| 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 "Entering Water Temperature Sampling Function," p. 55. |
| 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 unit wiring diagrams on the unit. |

**Table 46. 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," p. 73. |
| Diagnostic present | A specific list of diagnostics affects electric heat operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| 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, the unit fan does not operate. For the Tracer™ ZN010, 510 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 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 unit wiring diagrams on the unit. |

**Table 47. Fresh air damper stays closed**

| Probable cause | Explanation |
|---|---|
| Warm-up and cool-down | 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," p. 73. |
| Diagnostic present | A specific list of diagnostics effects fresh air damper operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| 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 unit fan does not operate. For the Tracer™ ZN010, 510 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 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 unit wiring diagrams on the unit. |

### Table 48. 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 wiring. However, based on the current step in the test sequence, the fresh air damper may be open. Refer to the "Manual Output Test," p. 73. |
| 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 unit wiring diagrams on the unit. |

### Table 49. Valves stay closed

| Probable cause | Explanation |
|---|---|
| Requested mode off | You can communicate a desired operating mode (such as off, heat, and cool) to the controller. When off is communicated to the controller, the unit controls the fan off. There is no heating or cooling (valves are closed). |
| Power-up control wait | When power up control wait is enabled (non-zero time), the controller remains off until one of two conditions occurs:<br>The controller exits power up control wait once it receives communicated information.<br>The controller exits power up control wait once the power up control wait time expires. |
| Manual output test | The controller includes a manual output test sequence you can use to verify output operation and associated output wiring. However, based on the current step in the test sequence, the valve(s) may not be open. Refer to the "Manual Output Test," p. 73. |
| Fan mode off | When a local fan mode switch (provided on the Trane zone sensor) determines the fan operation, the off position controls the unit off and valves to close. |
| Sampling logic | The controller includes entering water temperature sampling logic which is automatically invoked during 2-pipe and 4-pipe changeover when the entering water temperature is either too cool or too hot for the desired heating or cooling. Refer to "Entering Water Temperature Sampling Function," p. 55. |
| Diagnostic present | A specific list of diagnostic affects valve operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| 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 devices, the valves may not work correctly.<br>Example: A 2-pipe heat/cool changeover unit will not cool if the entering water temperature is too warm for cooling or if the entering water sensor is not present. The unit will not heat if the entering water temperature is too cool for heating. |
| Unit wiring | The wiring between the controller outputs and the valve(s) must be present and correct for normal valve operation. |
| Random start observed | After power up, the controller always observes a random start from 0 to 25 seconds. The controller remains off until the random start time expires. |

### Table 50. DX or electric outputs do not energize

| Probable cause | Explanation |
|---|---|
| Unit wiring | The wiring between the controller outputs and the end devices must be present and correct for normal operation. |
| 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 devices, the unit may not work correctly. |
| Diagnostic present | A specific list of diagnostic affects valve operation. For more information, see Table 41, p. 77 and Table 42, p. 77. |
| Manual output test | The controller includes a manual output test sequence you can use to verify output operation and associated output wiring. However, based on the current step in the test sequence, the valve(s) may not be open. Refer to the "Manual Output Test," p. 73. |
| Freeze avoidance | When the fan is off with no demand for capacity (0%) and the outdoor air temperature is below is below the freeze avoidance setpoint, the controller disables compressors and electric heat outputs. This includes unoccupied mode when there is no call for capacity or any other time the fan is off. |
| Normal operation | The controller energizes the outputs only as needed to meet the unit capacity requirements. |

# Wiring Diagrams

## Two-Pipe BCXC with Tracer ZN510

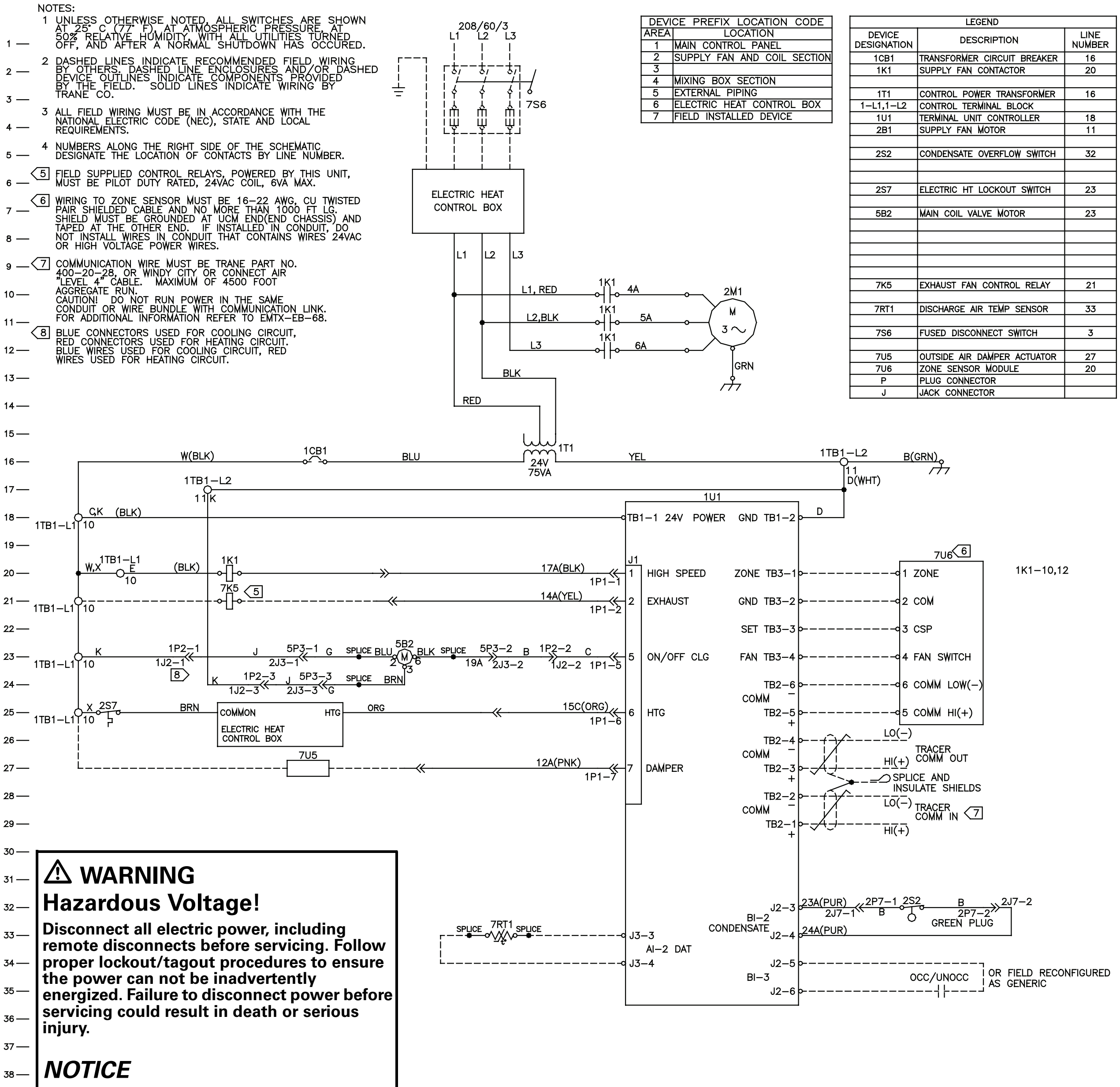
- 208 volt/3 phase
- 2-position damper
- single stage electric heat
- 2-position valve
- condensate overflow
- wall-mounted zone sensor

NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.
7. COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.
8. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | ELECTRIC HEAT CONTROL BOX |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1–L1,1–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | TERMINAL UNIT CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| 2S7 | ELECTRIC HT LOCKOUT SWITCH | 23 |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| 7RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| 7U5 | OUTSIDE AIR DAMPER ACTUATOR | 27 |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |




**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

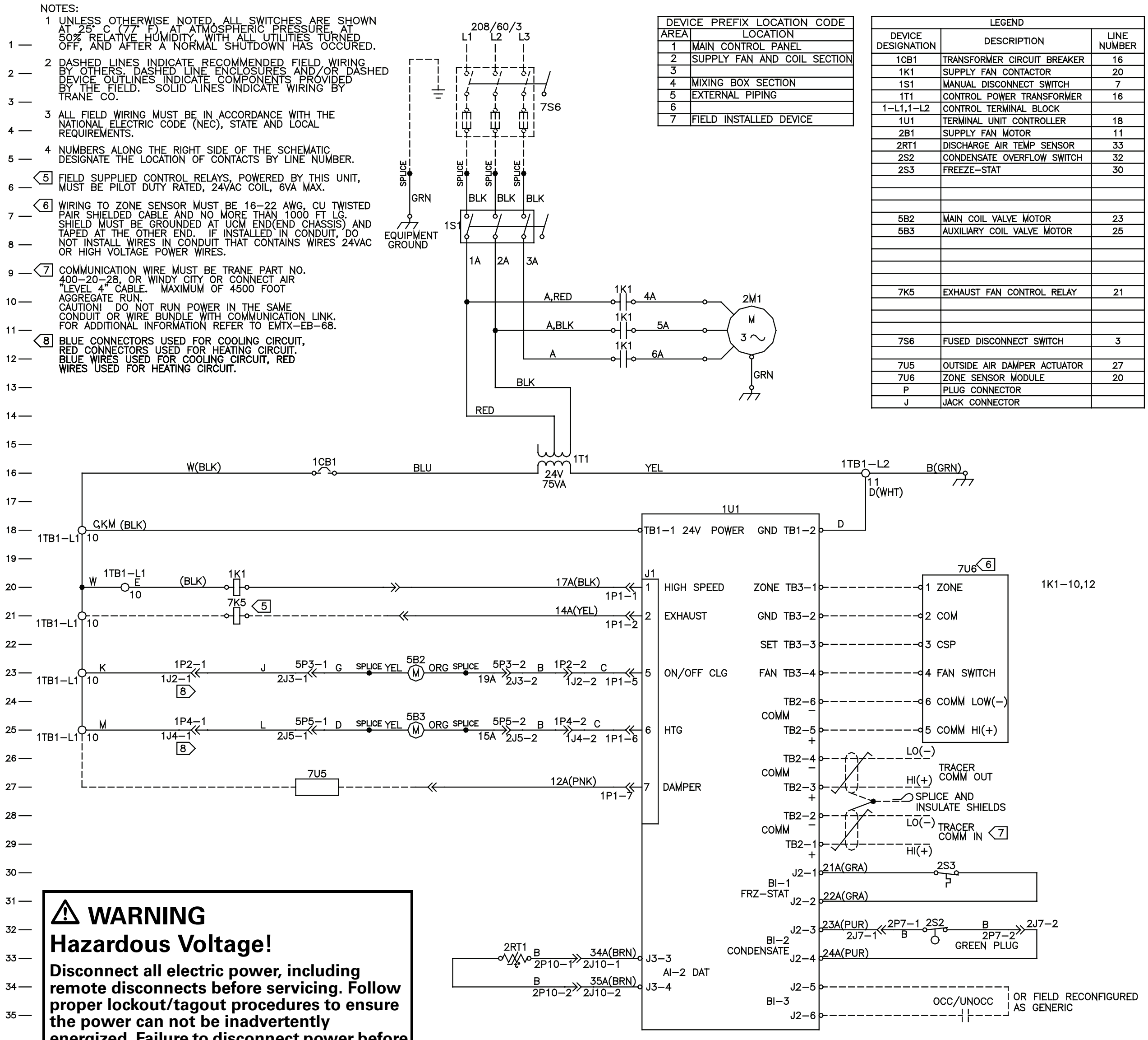
***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Tracer ZN510

- 208 volt/3 phase
- 2-position valves
- 2-position damper
- condensate overflow
- low limit protection
- wall-mounted zone sensor




NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.
7. COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.
8. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

DEVICE PREFIX LOCATION CODE

| AREA | LOCATION |
|---|---|
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

LEGEND

| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
|---|---|---|
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1–L1,1–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | TERMINAL UNIT CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| 2S3 | FREEZE–STAT | 30 |
| | | |
| | | |
| | | |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| | | |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| 7U5 | OUTSIDE AIR DAMPER ACTUATOR | 27 |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |

**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Tracer ZN510

- 115 volt/1 phase
- 2-position valves
- 2-position damper
- 2-speed motor
- condensate overflow

NOTES:

1 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 OCCURED.

2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.

3 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

4 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.

5 FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.

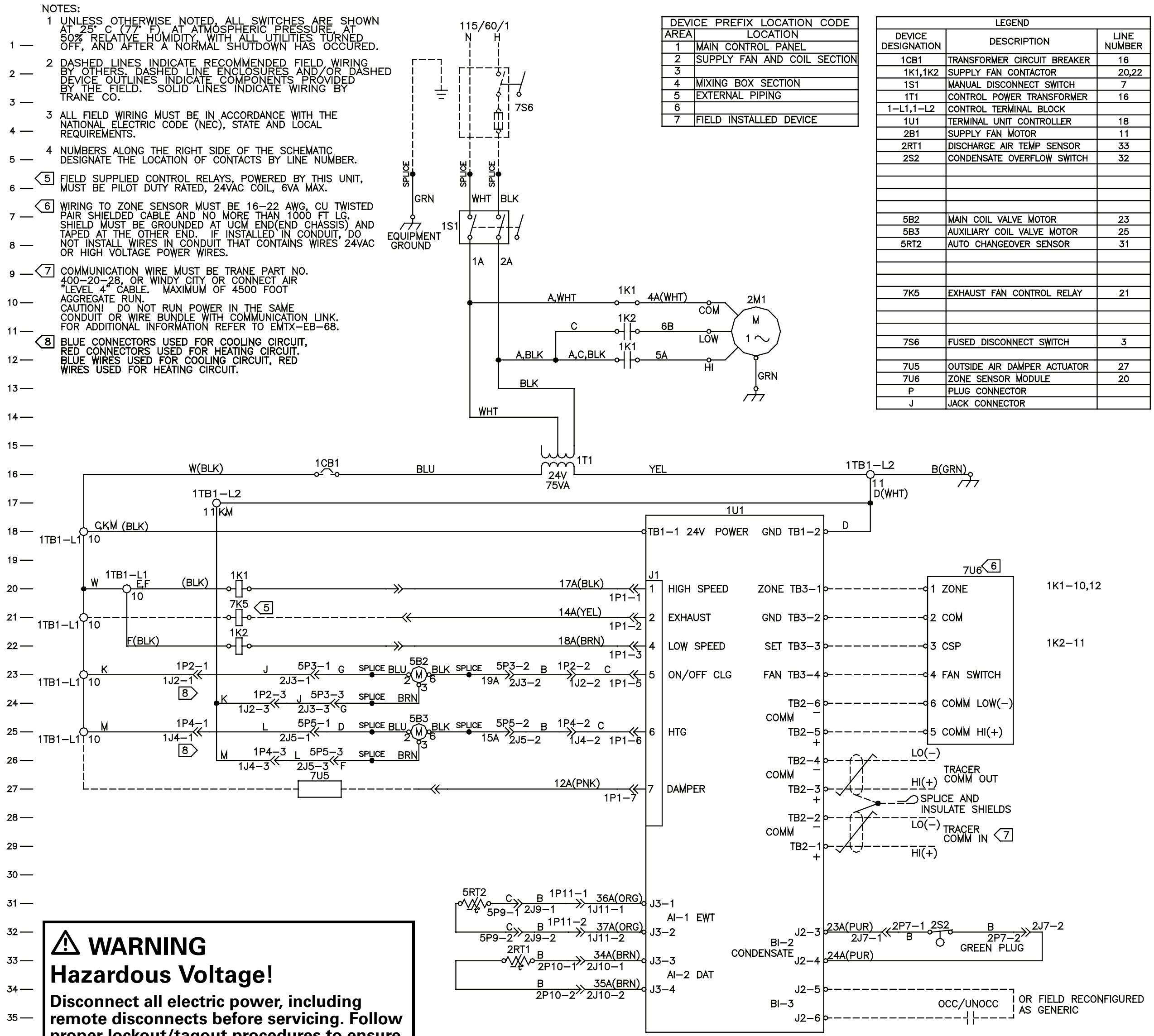
6 WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.

7 COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.

8 BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1,1K2 | SUPPLY FAN CONTACTOR | 20,22 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1–L1,1–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | TERMINAL UNIT CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| | | |
| | | |
| | | |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| 5RT2 | AUTO CHANGEOVER SENSOR | 31 |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| | | |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| 7U5 | OUTSIDE AIR DAMPER ACTUATOR | 27 |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |




**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Two-Pipe BCXC with Tracer ZN520

- 460 volt/3 phase
- 2-position valve
- economizer damper
- 2-stage electric heat
- fan status switch
- condensate overflow
- wall-mounted zone sensor

NOTES:

1 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 OCCURED.

2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.

3 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

4 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.

5 FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.

6 WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.

7 COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN.
CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.

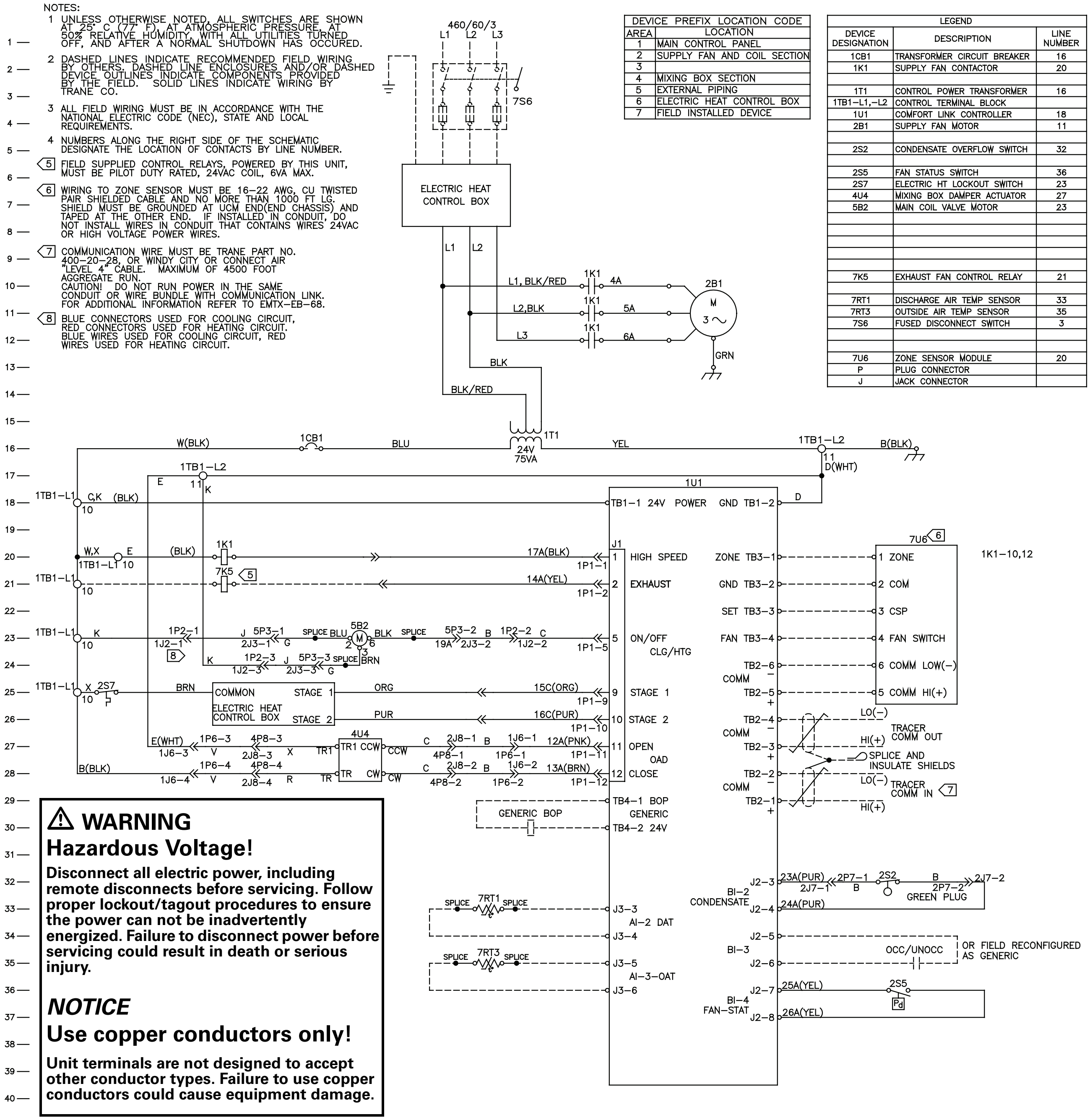
8 BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

DEVICE PREFIX LOCATION CODE

| AREA | LOCATION |
|---|---|
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | ELECTRIC HEAT CONTROL BOX |
| 7 | FIELD INSTALLED DEVICE |

LEGEND

| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
|---|---|---|
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| | | |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1–L1,–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | COMFORT LINK CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| | | |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| 2S5 | FAN STATUS SWITCH | 36 |
| 2S7 | ELECTRIC HT LOCKOUT SWITCH | 23 |
| 4U4 | MIXING BOX DAMPER ACTUATOR | 27 |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| | | |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| 7RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| | | |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |



**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Tracer ZN520

- 460 volt/3 phase
- 2-position valves
- condensate overflow
- fan status switch

NOTES:

1 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 OCCURED.

2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.

3 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

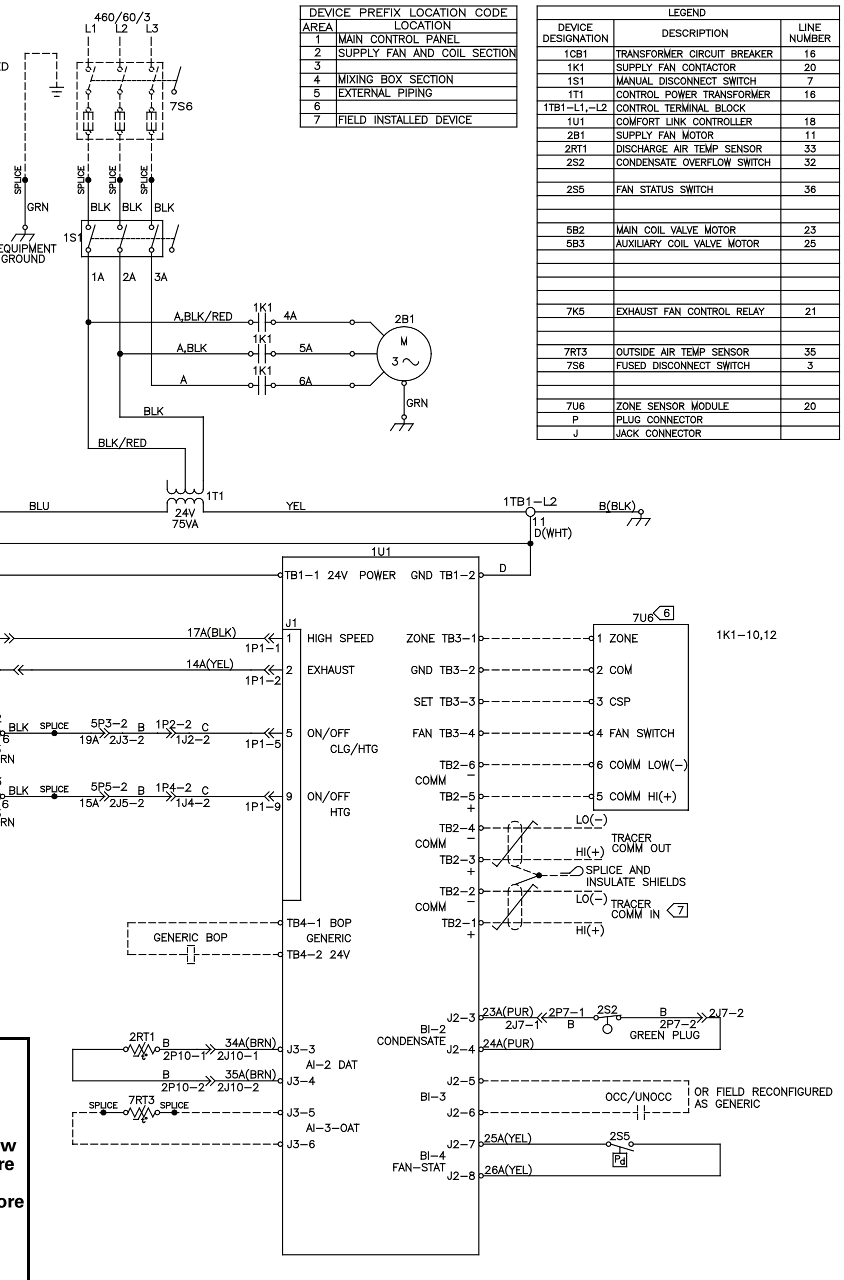
4 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.

5 FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.

6 WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.

7 COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN.
CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.

8 BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.



| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1–L1,–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | COMFORT LINK CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| 2S5 | FAN STATUS SWITCH | 36 |
| | | |
| | | |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| | | |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |

**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

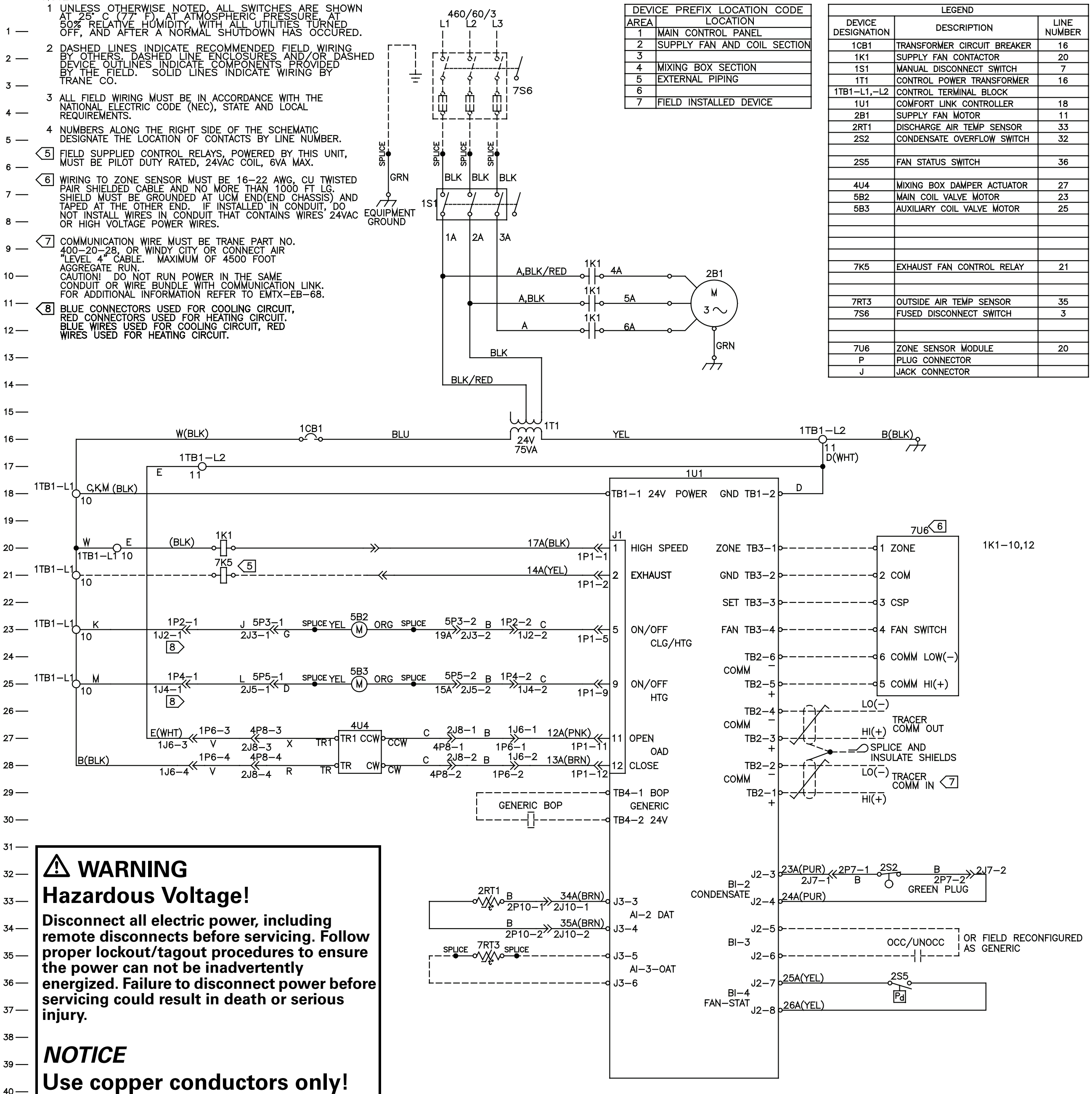
***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Tracer ZN520

- 460 volt/3 phase
- economizer damper
- condensate overflow
- fan status switch
- wall-mounted zone sensor




NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.
7. COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.
8. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1–L1,–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | COMFORT LINK CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| 2S5 | FAN STATUS SWITCH | 36 |
| | | |
| 4U4 | MIXING BOX DAMPER ACTUATOR | 27 |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| | | |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |

**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Tracer ZN520

- 460 volt/3 phase
- 3-wire floating point valves
- economizer damper
- condensate overflow
- fan status switch
- wall-mounted zone sensor

NOTES:

1 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 OCCURED.

2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.

3 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

4 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.

5 FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.

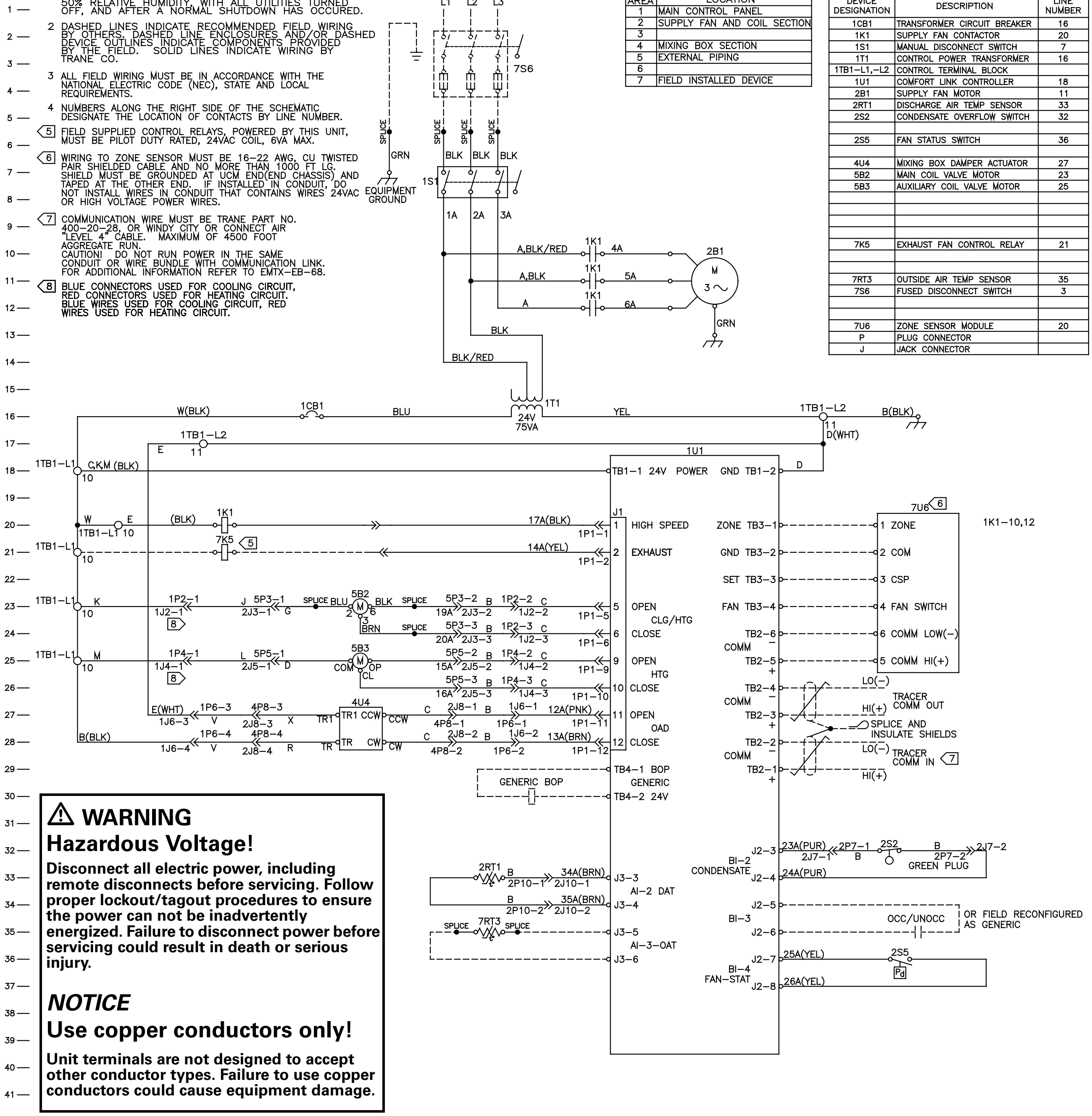
6 WIRING TO ZONE SENSOR MUST BE 16–22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.

7 COMMUNICATION WIRE MUST BE TRANE PART NO. 400–20–28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX–EB–68.

8 BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1–L1,–L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | COMFORT LINK CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| 2S5 | FAN STATUS SWITCH | 36 |
| | | |
| 4U4 | MIXING BOX DAMPER ACTUATOR | 27 |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| | | |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |




## ⚠ WARNING

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

## *NOTICE*

**Use copper conductors only!**

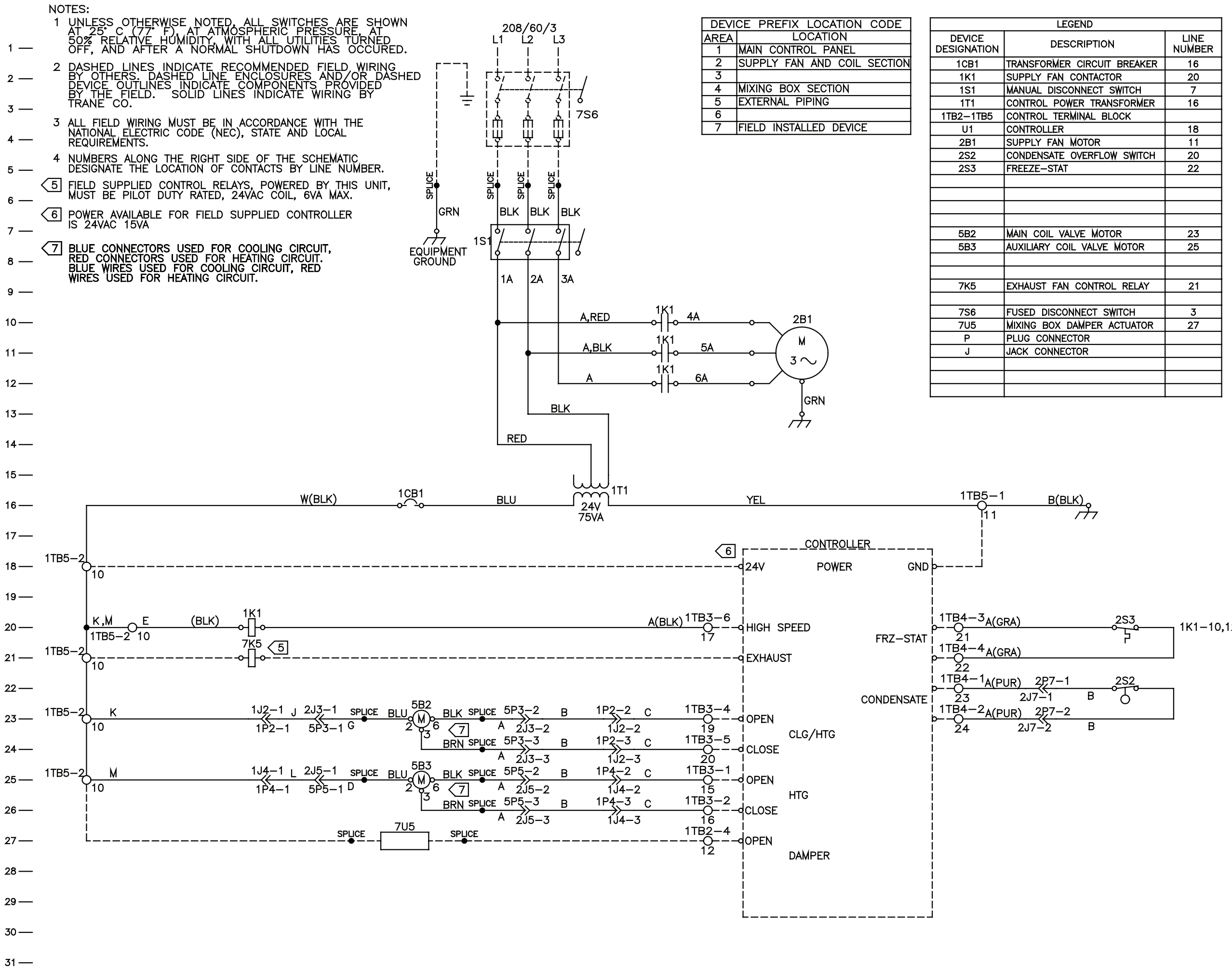
**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Control Interface

- • 208 volt/3 phase
- • 3-wire floating point valves
- • 2-position damper
- • low limit protection
- • condensate overflow

NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. POWER AVAILABLE FOR FIELD SUPPLIED CONTROLLER IS 24VAC 15VA
7. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.




| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB2–1TB5 | CONTROL TERMINAL BLOCK | |
| U1 | CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 20 |
| 2S3 | FREEZE–STAT | 22 |
| | | |
| | | |
| | | |
| | | |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| 7U5 | MIXING BOX DAMPER ACTUATOR | 27 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |
| | | |
| | | |
| | | |

**⚠ WARNING**

**Hazardous Voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

***NOTICE***

**Use copper conductors only!**

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# Four-Pipe BCXC with Control Interface

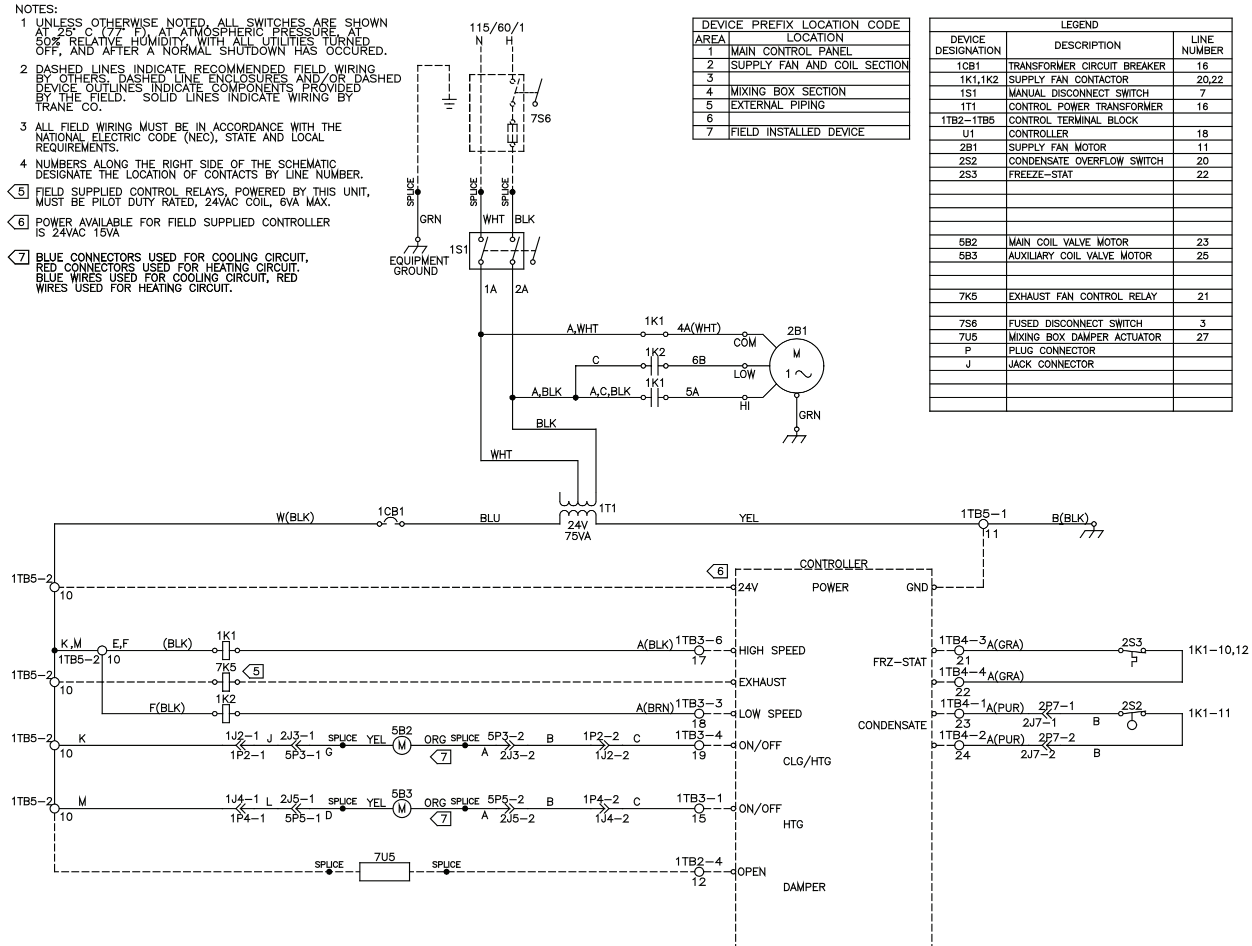
- 115 volt/1 phase
- 2-position damper
- 2-speed motor
- condensate overflow
- low limit protection

NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. POWER AVAILABLE FOR FIELD SUPPLIED CONTROLLER IS 24VAC 15VA
7. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1,1K2 | SUPPLY FAN CONTACTOR | 20,22 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB2–1TB5 | CONTROL TERMINAL BLOCK | |
| U1 | CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 20 |
| 2S3 | FREEZE–STAT | 22 |
| | | |
| | | |
| | | |
| | | |
| 5B2 | MAIN COIL VALVE MOTOR | 23 |
| 5B3 | AUXILIARY COIL VALVE MOTOR | 25 |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| 7U5 | MIXING BOX DAMPER ACTUATOR | 27 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |
| | | |
| | | |
| | | |




## ⚠ WARNING

### Hazardous Voltage!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

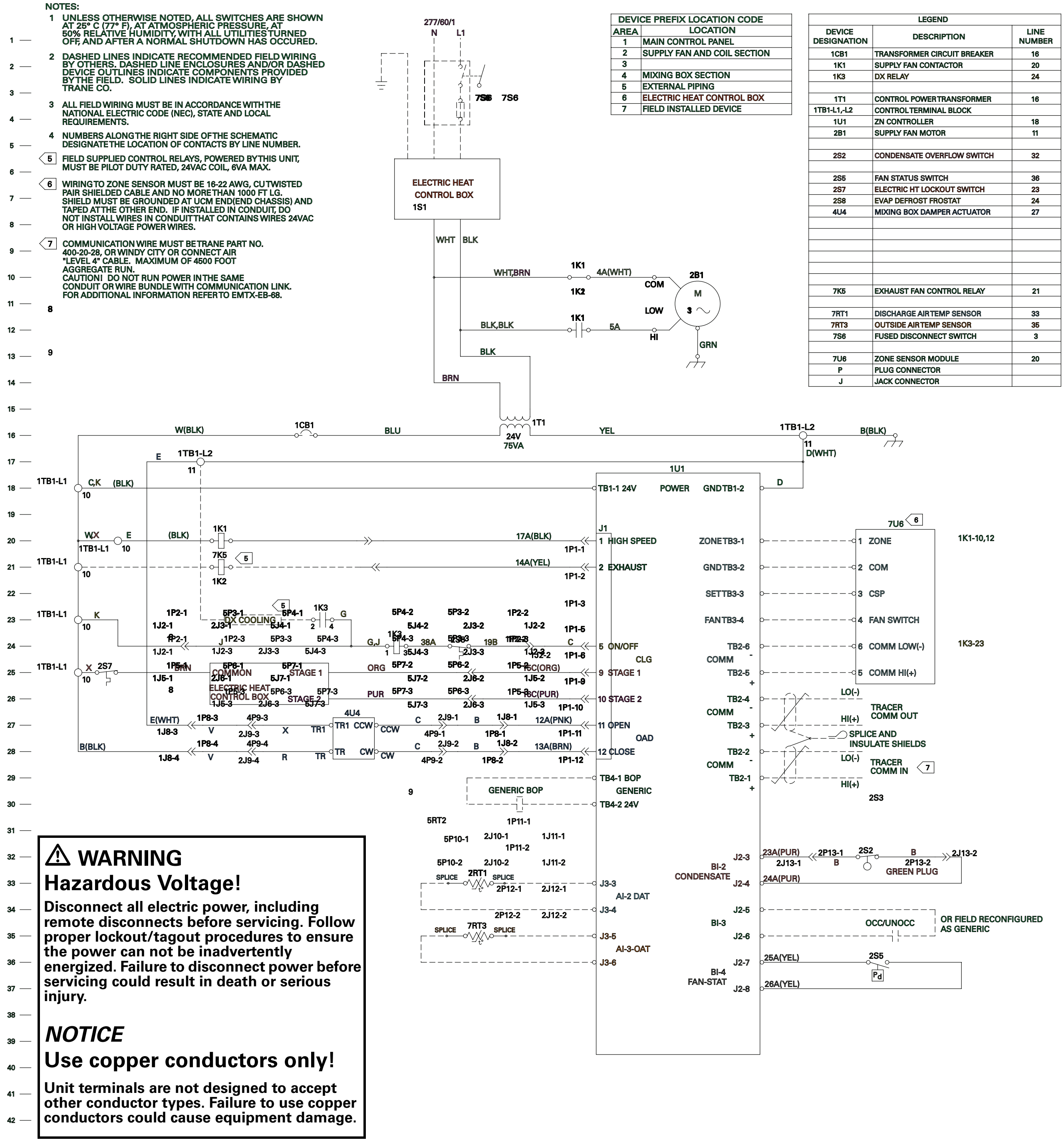
## *NOTICE*

### Use copper conductors only!

**Unit terminals are not designed to accept other conductor types. Failure to use copper conductors could cause equipment damage.**

# BCXC with DX Coil and Tracer ZN520

- 277 volt/1 phase
- economizer damper
- condensate overflow
- wall-mounted zone sensor




NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. WIRING TO ZONE SENSOR MUST BE 16-22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.
7. COMMUNICATION WIRE MUST BE TRANE PART NO. 400-20-28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX-EB-68.
8.
9.

| DEVICE PREFIX LOCATION CODE | |
|---|---|
| AREA | LOCATION |
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | ELECTRIC HEAT CONTROL BOX |
| 7 | FIELD INSTALLED DEVICE |

| LEGEND | | |
|---|---|---|
| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1K3 | DX RELAY | 24 |
| | | |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1-L1,-L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | ZN CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| | | |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| | | |
| 2S5 | FAN STATUS SWITCH | 36 |
| 2S7 | ELECTRIC HT LOCKOUT SWITCH | 23 |
| 2S8 | EVAP DEFROST FROSTAT | 24 |
| 4U4 | MIXING BOX DAMPER ACTUATOR | 27 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| 7RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| | | |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |

**⚠ WARNING**

**Hazardous Voltage!**

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***NOTICE***

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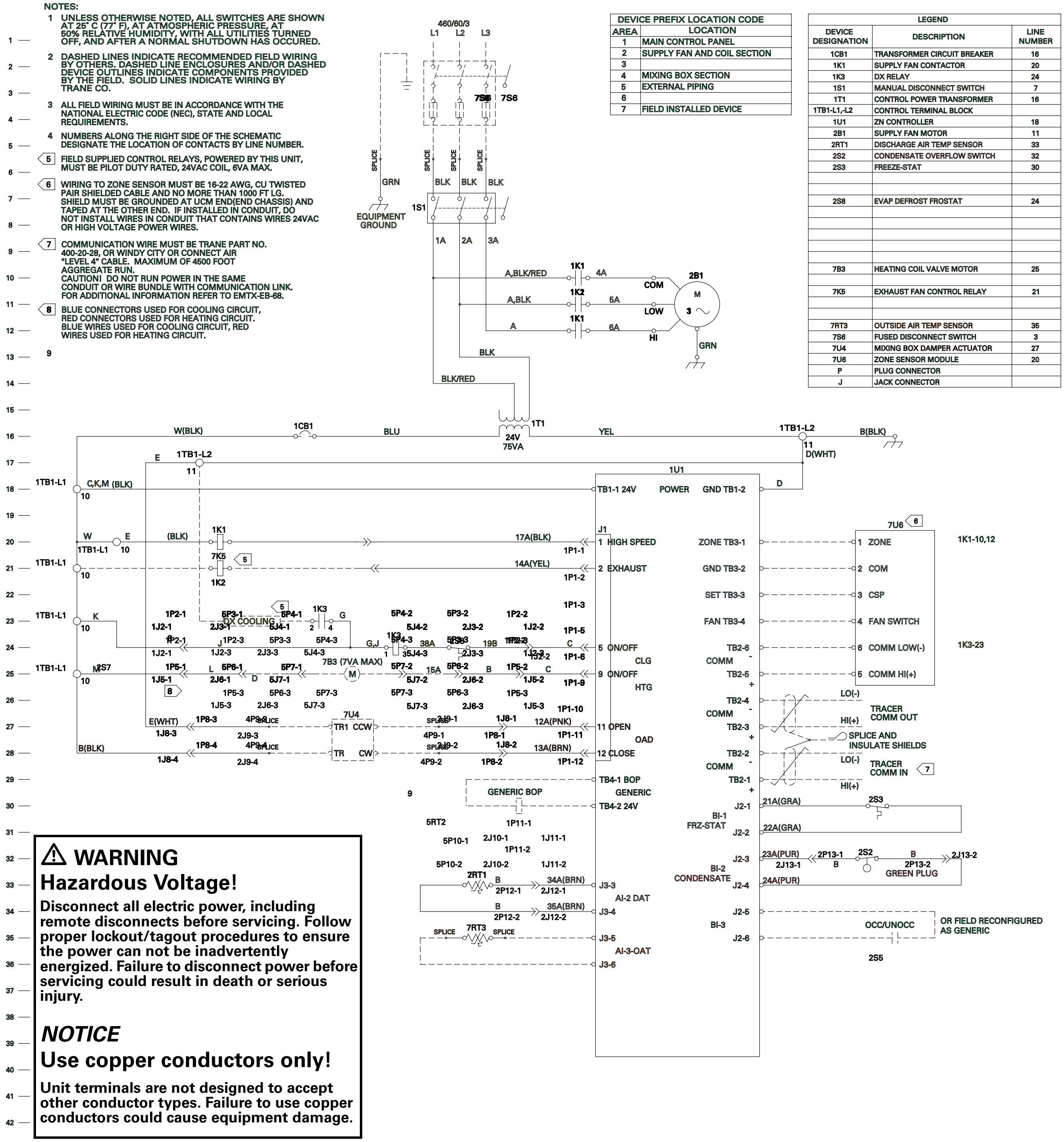
# BCXC with DX Coil, Hydronic Heating, and Tracer ZN520

- 460 volt/3 phase
- economizer damper
- condensate overflow
- wall-mounted zone sensor



NOTES:

1. 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 OCCURED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
4. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER.
5. FIELD SUPPLIED CONTROL RELAYS, POWERED BY THIS UNIT, MUST BE PILOT DUTY RATED, 24VAC COIL, 6VA MAX.
6. WIRING TO ZONE SENSOR MUST BE 16-22 AWG, CU TWISTED PAIR SHIELDED CABLE AND NO MORE THAN 1000 FT LG. SHIELD MUST BE GROUNDED AT UCM END(END CHASSIS) AND TAPED AT THE OTHER END. IF INSTALLED IN CONDUIT, DO NOT INSTALL WIRES IN CONDUIT THAT CONTAINS WIRES 24VAC OR HIGH VOLTAGE POWER WIRES.
7. COMMUNICATION WIRE MUST BE TRANE PART NO. 400-20-28, OR WINDY CITY OR CONNECT AIR "LEVEL 4" CABLE. MAXIMUM OF 4500 FOOT AGGREGATE RUN. CAUTION! DO NOT RUN POWER IN THE SAME CONDUIT OR WIRE BUNDLE WITH COMMUNICATION LINK. FOR ADDITIONAL INFORMATION REFER TO EMTX-EB-68.
8. BLUE CONNECTORS USED FOR COOLING CIRCUIT, RED CONNECTORS USED FOR HEATING CIRCUIT. BLUE WIRES USED FOR COOLING CIRCUIT, RED WIRES USED FOR HEATING CIRCUIT.
9.

DEVICE PREFIX LOCATION CODE

| AREA | LOCATION |
|---|---|
| 1 | MAIN CONTROL PANEL |
| 2 | SUPPLY FAN AND COIL SECTION |
| 3 | |
| 4 | MIXING BOX SECTION |
| 5 | EXTERNAL PIPING |
| 6 | |
| 7 | FIELD INSTALLED DEVICE |

LEGEND

| DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER |
|---|---|---|
| 1CB1 | TRANSFORMER CIRCUIT BREAKER | 16 |
| 1K1 | SUPPLY FAN CONTACTOR | 20 |
| 1K3 | DX RELAY | 24 |
| 1S1 | MANUAL DISCONNECT SWITCH | 7 |
| 1T1 | CONTROL POWER TRANSFORMER | 16 |
| 1TB1-L1,-L2 | CONTROL TERMINAL BLOCK | |
| 1U1 | ZN CONTROLLER | 18 |
| 2B1 | SUPPLY FAN MOTOR | 11 |
| 2RT1 | DISCHARGE AIR TEMP SENSOR | 33 |
| 2S2 | CONDENSATE OVERFLOW SWITCH | 32 |
| 2S3 | FREEZE-STAT | 30 |
| | | |
| | | |
| 2S8 | EVAP DEFROST FROSTAT | 24 |
| | | |
| | | |
| | | |
| | | |
| | | |
| 7B3 | HEATING COIL VALVE MOTOR | 25 |
| | | |
| 7K5 | EXHAUST FAN CONTROL RELAY | 21 |
| | | |
| | | |
| 7RT3 | OUTSIDE AIR TEMP SENSOR | 35 |
| 7S6 | FUSED DISCONNECT SWITCH | 3 |
| 7U4 | MIXING BOX DAMPER ACTUATOR | 27 |
| 7U6 | ZONE SENSOR MODULE | 20 |
| P | PLUG CONNECTOR | |
| J | JACK CONNECTOR | |

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C UL US

www.trane.com

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

| | |
|---|---|
| Literature Order Number | BCXC-SVX01B-EN |
| Date | April 2008 |
| Supersedes | BCXC-SVX01A-EN September 2002 |

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.