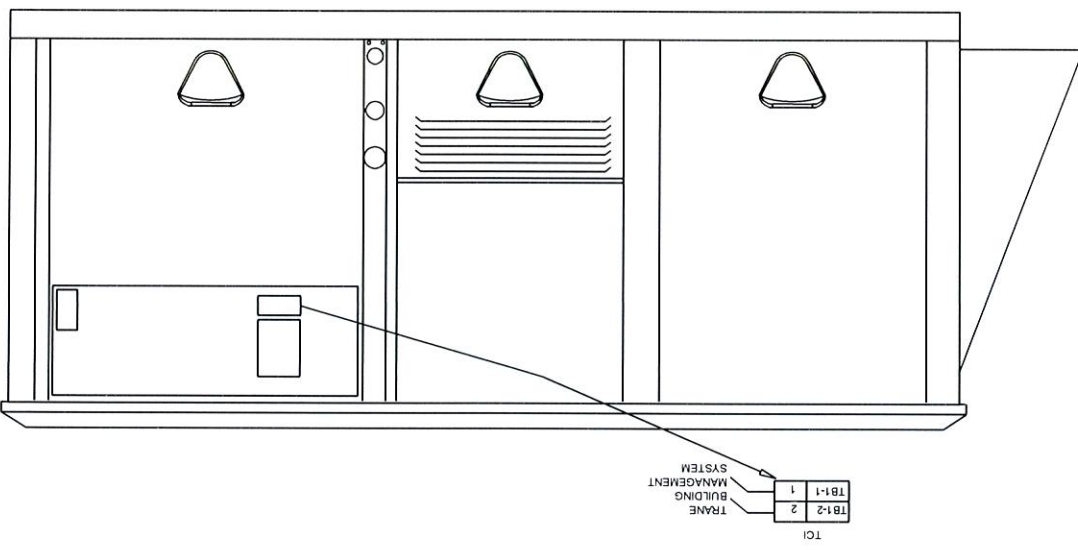




WIRE SIZE	MAXIMUM WIRE LENGTH
22 GAUGE	1800"
20 GAUGE	3000"
18 GAUGE	4500"
16 GAUGE	7200"
14 GAUGE	11700"

NOTE:

1. All wiring and devices shown dashed to be supplied and installed by the customer in accordance with national and local electrical codes.
2. Low voltage control wiring must not be run in conduit with power wiring.

Tag Data - Variable Air Volume Fan Powered Terminal Units (Qty: 7)

Item	Tag(s)	Qty	Description	Model Number
D1	FPB 4-1	1	VAV Fan Powered Terminal Units	VPEF1200Q**DD04AD220-R-WWFF10021W-01
D2	FPB 4-2	1	VAV Fan Powered Terminal Units	VPEF1200Q**DD04AD220-L-WWFF10021W-01
D3	FPB 4-3	1	VAV Fan Powered Terminal Units	VPEF1600T**DD04AD220-R-WWFF15021W-01
D4	FPB 4-4	1	VAV Fan Powered Terminal Units	VPEF0800P**DD04AD220-L-WWFF05021W-01
D5	FPB 4-5	1	VAV Fan Powered Terminal Units	VPEF1600T**DD04AD220-L-WWFF15021W-01
D6	FPB 4-6	1	VAV Fan Powered Terminal Units	VPEF1600T**DD04AD220-L-WWFF15021W-01
D7	FPB 4-7	1	VAV Fan Powered Terminal Units	VPEF1600T**DD04AD220-L-WWFF15021W-01

Product Data - Variable Air Volume Fan Powered Terminal Units

All Units

Parallel with electric heat
1/2" [13mm] matte faced insulation
Slip and drive connection
277/60/1 motor voltage
Single speed motor w/ SCR
DDC with on/off electric heat control
Standard actuator
Factory mounted wireless receiver
Disconnect switch
Power fuse
480 volt, 3 phase
2 stages of heat - equal increments
24 volt magnetic contactors
Electric heater air flow switch
Wireless zone sensor deg F (Fid)
1st year labor warranty - whole unit

Item: D1 Qty: 1 Tag(s): FPB 4-1

12"
03 super quiet fan
Right hand controls connection
10.0 kilowatt

Item: D2 Qty: 1 Tag(s): FPB 4-2

12"
03 super quiet fan
Left hand controls connection
10.0 kilowatt

Item: D3 Qty: 1 Tag(s): FPB 4-3

16"
06 super quiet fan
Right hand controls connection
15.0 kilowatt

Item: D4 Qty: 1 Tag(s): FPB 4-4

8"
02 super quiet fan
Left hand controls connection
5.0 kilowatt

Item: D5, D6, D7 Qty: 3 Tag(s): FPB 4-5, FPB 4-6, FPB 4-7

16"
06 super quiet fan
Left hand controls connection
15.0 kilowatt

Performance Data - Variable Air Volume Fan Powered Terminal Units

Tags	FPB 4-1	FPB 4-2	FPB 4-3,	FPB 4-4	FPB 4-6	FPB 4-7
Design cooling airflow (cfm)	1410	1335	3000	685	2450	3200
Min cooling airflow (cfm)	290	270	600	140	490	640
Valve heating airflow (cfm)	290	270	600	140	490	640
Cooling inlet diameter (in)	12.000	12.000	16.000	8.000	16.000	16.000
Cooling inlet velocity (ft/min)	1795	1700	2149	1962	1755	2292
APD @ cooling airflow (in H2O)	0.028	0.027	0.056	0.138	0.045	0.061
Fan airflow (cfm)	420	400	700	210	710	700
Downstream SP (in H2O)	0.350	0.350	0.350	0.350	0.350	0.350
Fan TSP (in H2O)	0.355	0.354	0.358	0.352	0.358	0.358
% of fan range (%)	21.00	19.00	6.00	48.00	7.00	6.00
Fan power (hp)	0.333	0.333	0.500	0.125	0.500	0.500
Plenum EAT (F)	65.00	65.00	65.00	65.00	65.00	65.00
Primary EDB (F)	55.00	55.00	55.00	55.00	55.00	55.00
Operating weight (lb)	114.0	114.0	147.0	110.0	147.0	147.0
Unit heating airflow (cfm)	710	670	1300	350	1200	1340
Coil heating capacity (MBh)	34.15	34.15	51.22	17.08	51.22	51.22
Room heat loss (MBh)	27.15	27.59	37.66	13.66	39.40	37.01
Room heating setpoint (F)	70.00	70.00	70.00	70.00	70.00	70.00
Coil EAT (F)	60.92	60.97	60.38	61.00	60.92	60.22
Unit LAT (F)	105.24	107.95	96.70	105.96	100.26	95.46
Coil LAT (F)	105.24	107.95	96.70	105.96	100.26	95.46
Full load amps (A)	13.63	13.63	21.84	6.71	21.84	21.84
Min circuit ampacity (A)	17.04	17.04	27.30	8.39	27.30	27.30
Max overcurrent protection (A)	20.00	20.00	30.00	15.00	30.00	30.00
Electric heater kW (kW)	10.00	10.00	15.00	5.00	15.00	15.00

Mechanical Specifications - Variable Air Volume Fan Powered Terminal Units
 Item: D1 - D7 Qty: 7 Tag(s): FPB 4-1, FPB 4-2, FPB 4-3, FPB 4-4, FPB 4-5, FPB 4-6, FPB 4-7

General Unit Information

Casing - The unit casing is 22 gauge galvanized steel. Outlet duct connection is flanged.
 Filter - A filter is provided on the plenum inlet.
 Agency Listing - UL and Canadian UL listed as environmental air terminal unit. UL Control #9N65. All Trane terminal units are AHRI 880 -98 certified.

General Unit Clearance

Leave a minimum of 36" on control box side of unit for adequate service access. Allow at least 12" on remaining sides for unit clearance. A minimum of one and one half duct diameters of straight duct work, upstream of the air inlet connection, should be present for optimum airflow measurement performance. Upstream duct work should be the same diameter as the primary inlet connection.

Electrical Installation Information

For electrical connections, consult field wiring section & equipment IOM.

1/2" Matte - Faced Insulation

The interior surface of the unit casing is acoustically and thermally lined with 1/2", 1.8 lb/cu. ft composite density glass fiber with high density facing. The insulation is UL listed and meets NFPA-90A and UL 181 standards. All insulation options will meet the 25/50 smoke developed and flame spread rating (per ASTM E 84 and UL 723 and CAN/ULC S102-M88) Meets NFPA- 90B. The insulation R-value is 1.9. All cut edges of insulation are completely encapsulated in metal to prevent erosion.

1203SQ Air Valve/Fan Combination Size (Parallel)

12" Inlet designed for up to 2000.0 cfm. Fan is 1100.0 cfm for Std Motor and 1085.0 cfm for ECM Motor.

Air Valve & Fan Description (Parallel) (Series)

The air inlet connection is an 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring is provided with balancing taps for measuring airflow within +/- 5% of unit cataloged airflow. Also provided with each unit is a calibration chart indicating airflow versus flow sensor pressure differential. The damper blade is constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly is connected through a composite nylon stub axle to a cast zinc shaft supported by self lubricating bearings. The shaft is cast with a damper position indicator. The valve assembly includes a mechanical stop to prevent over stroking.
 Air valve leakage < 1% at 4".

1606SQ Air Valve/Fan Combination Size (Parallel)

16" Inlet designed for up to 4000.0 cfm. Fan is 1875.0 cfm for Std Motor and 2075.0 cfm for ECM Motor.

0802SQ Air Valve/Fan Combination Size (Parallel)

8" Inlet designed for up to 900.0 cfm.

Fan is 510.0 cfm.

Fuse

Any electric heat unit with a calculated MCA greater or equal to 30 will have a fan fuse provided.

SCR-Variable Fan Speed Control Switch

The SCR speed control device allows the operator infinite fan speed adjustment so the fan output may be modified to achieve exact CFM requirements.

Motor

Single Speed, direct drive induction, permanent split capacitor type. Thermal overload protection provided. Motors will be designed specifically for use with an open SCR which is standard. Motors will accommodate anti-backward rotation at start up. Motor and Fan assembly are isolated from terminal unit.

Electric Heat Coil

Factory provided and mounted. Resistance open-type heater, a disc-type automatic thermal primary safety device and manual reset load thermal secondary device. Heater element material is nickel-chromium. The heater terminal box is provided with knockouts for customer power supply. Terminal connections are plated steel with ceramic or phenolic insulators. All fan-powered units with electric reheat are single-point power connections.

Magnetic Contactor

An electric heater 24 volt contact for use with Direct Digital Control (D.D.C.) or Analog Electronic VAV Controls.

Transformer

The 50 VA transformer is factory mounted in the fan control box to provide 24 VAC for controls.

Power Disconnect Switch (for VSEF & VPEF)

A factory provided interlocking door disconnect switch located on the electric heater control panel.

Airflow Switch

An air pressure device designed to disable the heater when the unit fan is off.

Power Fuse

Fuses provided on all energized lines of incoming power to interrupt circuit overcurrent conditions.

Slip & Drive Connection

A slip and drive connection has two straight flanges on the top and bottom, and two drive connections on the left and right sides. The drive sides are straight flanges which form a "U" shape. The mating ductwork has a similar setup. The two top and bottom pieces are shaped like a compressed "S" with sealant in the hollow of the "S". These pieces will slide over the top and bottom straight flanges. The top and bottom flanges of the mating ductwork will slide into the other side of these pieces. The two side pieces are shaped like a "C" and are called "Drives". These pieces will slide over the "U" shaped flanges so the connection can not be pulled apart. These pieces are usually hammered into place. No screws are required, and by removing the drives, the ducts may be disconnected.

Direct Digital Controller

The microprocessor based terminal unit controller provides accurate, pressure independent control through the use of a proportional integral control algorithm and direct control technology. The controller monitors zone temperature set points, zone temperature and its rate of change, and valve airflow, using a differential pressure signal. Optionally, the controller can monitor either supply duct air temperature or CO₂ concentration via appropriate sensors. The controller and pressure transducer are installed and factory wired in an enclosure with 7/8" knockouts for remote control wiring. A Trane zone sensor is required.

System Communications

The Controller is designed to send and receive data from a Central Control Panel or other Tracer family products, or a VarTrac CCP. Current unit status conditions and set points may be monitored and/or edited via this data communication feature. The network type is a twisted wire pair serial communication.

Override Commands

The following override commands may be received by the Unit Control Module (U.C.M.) from the Tracer System.

Set points in Nonvolatile Memory (9 Thru 15)

9. Heating Set point Offset - This determines at what point the 1st. stage of reheat turns on. Expressed in degrees below cooling set point, only applicable when local thumb wheel is enabled.
10. Zone temperature, auxiliary temperature, and zone set point calibration corrections (+/- 10.0 F).
11. Flow measurement calibration correction (50 - 150%).
12. Cooling Set point Low Limit - Applies low limit to programmed occupied cooling set point or zone sensor cooling set point (30.0 F - 100.0 F).
13. Heating Set point High Limit - Applies high limit to programmed occupied heating set point or zone sensor heating set point (30.0 F - 100.0 F).
14. RTD / Thermistor - Determines what type of zone temperature sensor will be used.
15. Occupied and Unoccupied Outside Air Requirements - Determines the percent of outdoor air required in the zone for air quality requirements.

D.D.C. Actuator

Trane 3 wire, 26 GA, 3.4 VA, 1.7W, 24 VAC, 50/60 Hz, with floating point quarter turn control actuator with linkage release button. Actuator has a constant drive rate independent of load, a rated torque of 35 in-lb, a 90-second drive time and is non-spring return. Travel is terminated by end stops at fully opened and closed positions. An integral magnetic clutch eliminates motor stall when Trane controls are not provided. An integral 3 screw terminal is provided for field wiring. Operating temperature 32.0 F to 125.0 F.

Additional Status Information (1 thru 8)

In addition to the above set points, the following status information can be transmitted to the Command Control Unit and Tracer.

1. Active cooling temperature set point.
2. Active heating temperature set point.
3. Current unit primary airflow.
4. Current zone temperature.
5. Re-heat status (On/Off).
6. Auxiliary Air Temperature - Available only if the unit has an auxiliary temperature sensor.
7. Failure Indicators - The U.C.M. will indicate the following:
 - *Temperature Sensor Failure
 - *Flow Sensor Failure
 - *Local Zone Sensor Set point Failure
8. Ventilation Ratio.

Additional Status Information (9 thru 12)

9. Fan Status (on/off)
10. Calibration Status (calibrating/not-calibrating)
11. BIP state
12. CO2 Concentration - available only if the unit has an auxiliary CO2 sensor. This mode and auxiliary air temperature are mutually exclusive.

D.C. Sequence of Operation

The unit controller continuously monitors the zone temperature against its set point and varies the primary airflow as required to meet zone set points. Airflow is limited by minimum and maximum airflow set points.

Parallel Unit Fan Energization

As the zone temperature reaches the heating set point, the microprocessor controls airflow to the heating temperature set point and energizes the auxiliary fan when necessary. At or below the heating set point, reheat is energized. The heating minimum airflow set point is factory set, field adjustable, and is separate from the cooling minimum set point. Parallel unit fan energization is a function of primary airflow or zone temperature.

1. Primary Airflow - The fan energizes when primary airflow drops below the fan set point airflow. The fan automatically starts when the zone temperature drops to the heating temperature set point.
2. Zone Temperature - The fan energizes when the zone temperature drops to a selectable number of degrees above the heating temperature set point.

Control Mode, Action, & Offset (1 thru 12)

1. Control Mode - The U.C.M. Control Mode may be edited from occupied to unoccupied to accommodate night setback/setup.
2. Control Action- The Control Action may be edited from cooling to heating, changing the primary air damper to a heating source. This will accommodate a cooling/heating changeover system.
3. Control Offset- Enabling Control Offset will increase the cooling temperature set point and decrease the heating temperature set point by a control offset value stored at the U.C.M. This function facilitates demand limiting in the occupied mode.

4. Drive damper fully open.
5. Drive damper fully closed.
6. Drive damper to maximum airflow set point.
7. Drive damper to minimum airflow set point.
8. Disable unit fan.
9. Disable unit heat.
10. Reset- Enabling the reset function forces the controller and the flow sensor to recalibrate.
11. Programmable hot water valve drive time.
12. Programmable air valve drive time.

Following Unit Set points

The following unit set points reside in the U.C.M. in nonvolatile memory. These set points are editable from the Command Unit or Tracer via the communications link.

Set points in Nonvolatile Memory (1 thru 8)

1. Occupied cooling temperature set point 60.0 F - 80.0 F.
2. Occupied heating temperature set point 60.0 F - 80.0 F.
3. Unoccupied cooling temperature set point 60.0 F - 100.0 F.
4. Unoccupied heating temperature set point 30.0 F - 100.0 F.
5. Minimum cooling flow set point (0, 10 - 100% of unit equivalent cataloged airflow).
6. Minimum heating flow set point (0, 10 - 100% of unit equivalent cataloged airflow).
7. Maximum flow set point (0, 10 - 100% of unit equivalent cataloged airflow).
8. Fan Control Offset - This determines at what operating point the fan in a parallel fan powered unit is energized. This can be specified as a function of temperature, degrees above heating set point, or primary airflow. 0.0 F - 10.0 F or 0, 10 - 100% of unit equivalent cataloged airflow).

Set points in Nonvolatile Memory (16 thru 21)

16. Series Fan Configuration- allows option of series fan powered box to shut off fan and close air valve when unit is unoccupied. Fan will operate in unoccupied mode if reheat is active.
17. Heating set point low limit.
18. Cooling set point high limit.
19. Local heating flow set point enable/disable & set point.
20. Auxiliary analog input mode select for either auxiliary temperature sensor or CO2 detector.
21. Binary input mode select for either generic or occupancy detector.

DDC Controls Option DD04, DD14, DD44 & DD74

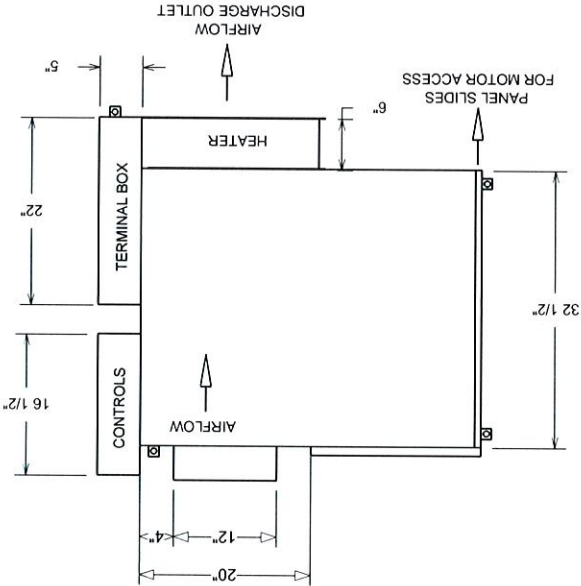
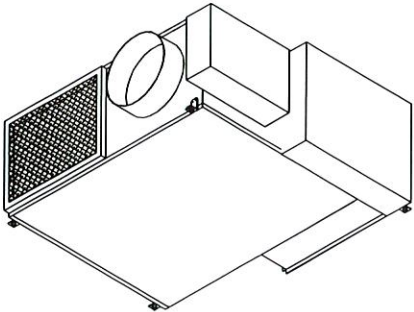
Basic Operation: On/Off Staged Electric Heat (Normally Open Outputs) (DDC/UCM)
(Parallel Units)

A voltage signal from the zone sensor indicates the zone temperature is used by the unit controller to determine an error from the set point. This error, as well as primary flow differential pressure, is used to determine damper position within minimum and maximum cooling airflow set points. As the zone temperature drops to the heating set point, primary airflow is controlled to minimum heating flow set point. The fan operation is intermittent in both modes. Staged electric heat is energized.

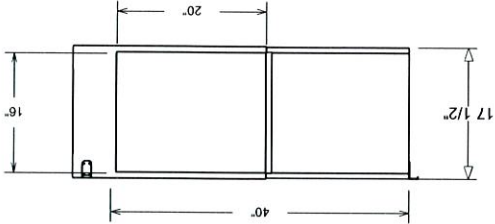
Wireless Zone Sensor/Receiver

Factory installed, wired and tested Receiver with field mounted Sensor accessory eliminates the need for the wiring between the zone sensor and unit level controller. The zone sensor houses the space temperature sensor, local setpoint adjustment, OCCUPIED/UNOCCUPIED button, signal strength and battery life indicators, and spread spectrum transmitter. The receiver functions as a communication translator between spread spectrum radio communications and the VAV analog inputs.

Unit Size	VPEF1203SQ
Nominal Valve Size & Depth	12" Dia. x 4" Depth
Nominal Fan Size	03SQ Fan
Filter Size	16" x 20" x 1" (QTY 1)



TOP VIEW



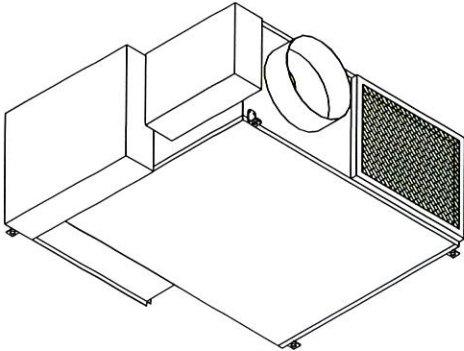
DISCHARGE VIEW

- NOTES:
1. Allow a minimum 6" plenum inlet clearance for un-ducted installations.
 2. Filter is secured in filter frame located in unit inlet.
 3. For Motor access, remove bottom screws on hanger brackets to slide panel as shown in drawing.
 4. See Installation Documents for exact hanger bracket location.
 5. Air valve centered between top & bottom panel.
 6. Heating coil un-insulated. External insulation may be field supplied and installed as required.
 7. All high & low voltage controls have same-side NEC jumpback clearance.
 8. Allow 48" of straight duct downstream of unit before first runout and inside of the duct should be equal discharge size.
 9. Terminal box access door is side hinged. Allow for clearance.
 10. A 4 wire power supply required for 480V3 & 575V3 single point connection units.

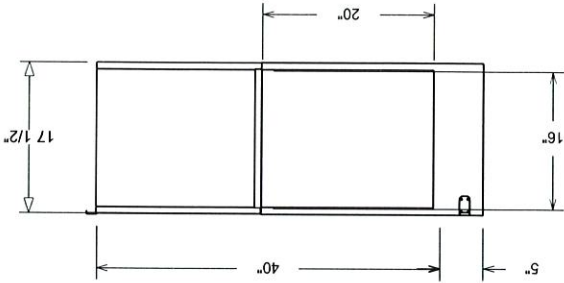
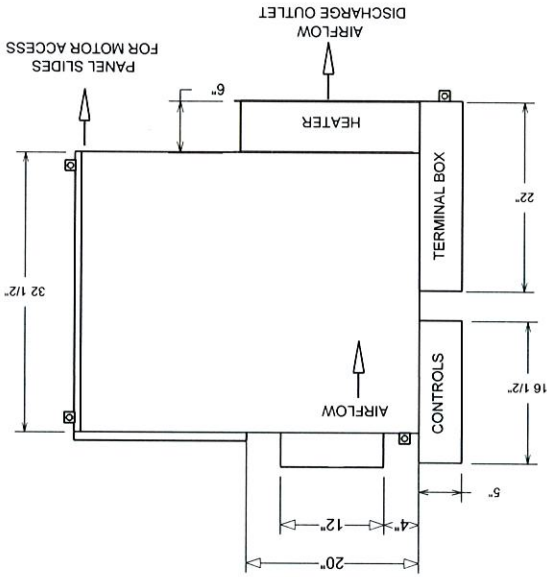
Approximate Dry Weight	114.0 lb
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Weights reflected may vary ± 5.0 lb based upon options selected.

Unit Size	VPEF1203SQ
Nominal Valve Size & Depth	12" Dia. x 4" Depth
Nominal Fan Size	03SQ Fan
Filter Size	16" x 20" x 1" (QTY 1)



TOP VIEW



DISCHARGE VIEW

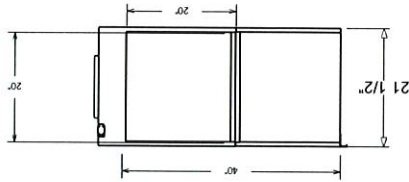
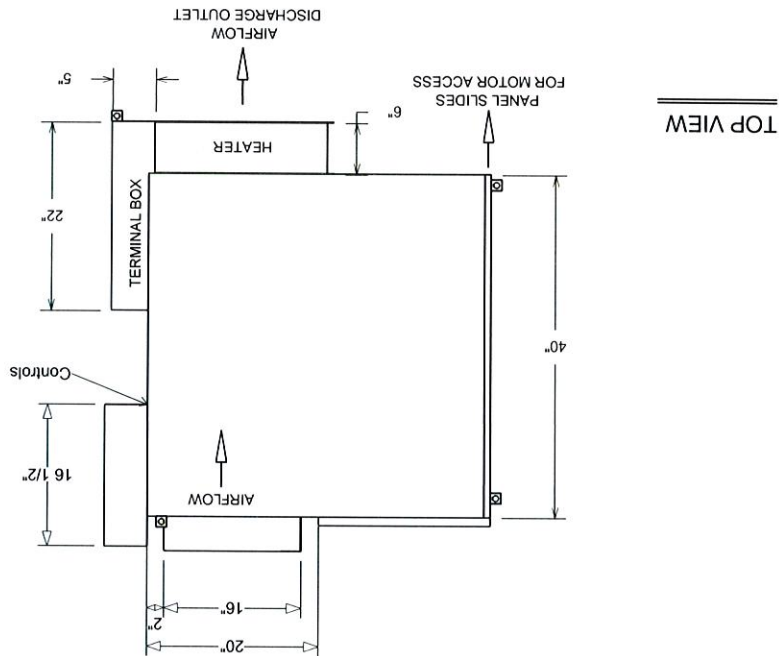
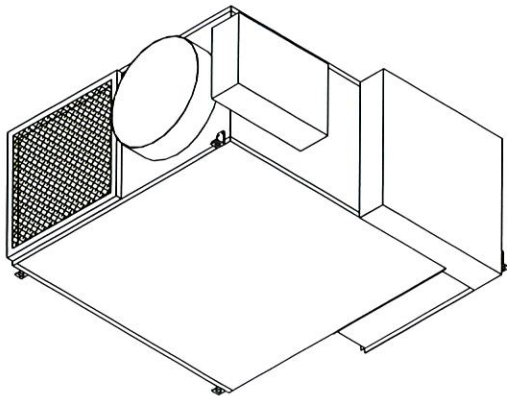
NOTES:

1. Allow a minimum 6" plenum inlet clearance for un-ducted installations.
2. Filter is secured in filter frame located in unit inlet.
3. For Motor access, remove bottom screws on hanger brackets to slide panel as shown in drawing.
4. See Installation Documents for exact hanger bracket location.
5. Air valve centered between top & bottom panel.
6. Heating coil un-insulated. External insulation may be field supplied and installed as required.
7. All high & low voltage controls have same-side NEC jumpback clearance.
8. Allow 48" of straight duct downstream of unit before first runout and inside of the duct should be equal discharge size.
9. Terminal box access door is side hinged. Allow for clearance.
10. A 4 wire power supply required for 480V3 & 575V3 single point connection units.

Approximate Dry Weight	114.0 lb
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Weights reflected may vary ± 5.0 lb based upon options selected.

Unit Size	VPEF1606SQ
Normal Valve Size & Depth	16" Dia. x 4" Depth
Normal Fan Size	06SQ Fan
Filter Size	20" x 20" x 1" (QTY 1)



DISCHARGE VIEW

- NOTES:
1. Allow a minimum 6" plenum inlet clearance for un-ducted installations.
 2. Filter is secured in filter frame located in unit inlet.
 3. For Motor access, remove bottom screws on hanger brackets to slide panel as shown in drawing.
 4. See Installation Documents for exact hanger bracket location.
 5. Air valve centered between top & bottom panel.
 6. Heating coil un-insulated. External insulation may be field supplied and installed as required.
 7. All high & low voltage controls have same-side NEC jumpback clearance.
 8. Allow 48" of straight duct downstream of unit before first runout and inside of the duct should be equal discharge size.
 9. Terminal box access door is side hinged. Allow for clearance.
 10. A 4 wire power supply required for 480V3 & 575V3 single point connection units.
- Weights reflected may vary ± 5.0 lb based upon options selected.

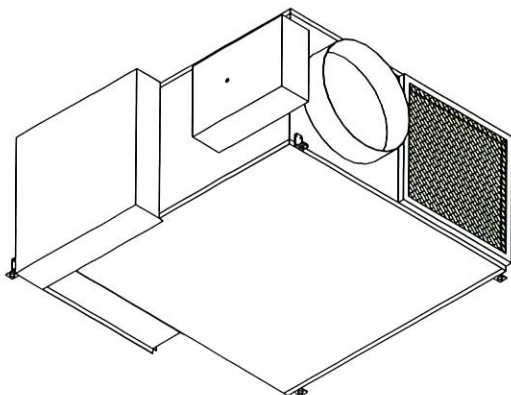
Approximate Dry Weight	147.0 lb
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A 3D perspective line drawing of a rectangular platform. The platform has a raised backrest on the left side. On the right side, there is a circular opening or hole. The platform is supported by four small legs or feet at the corners.

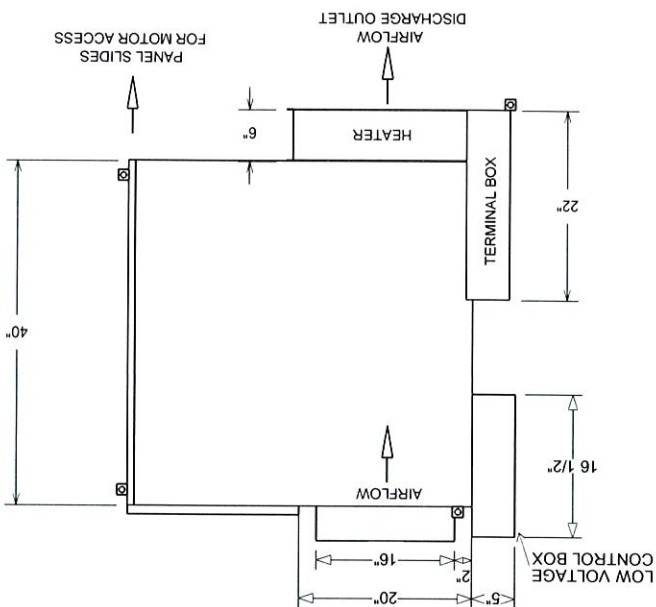
Technical drawing of a rectangular object with dimensions: 40 inches wide, 15 1/2 inches high, and 20 inches wide. A small circular feature is located on the right side, 5 inches from the right edge.

- Weights reflected may vary ± 5.0 lb based upon options selected.

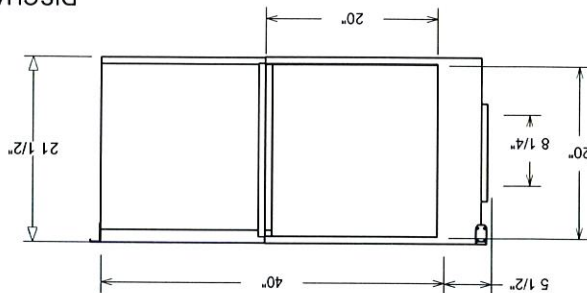
Page 54 of 88



TOP VIEW



DISCHARGE VIEW



NOTES:

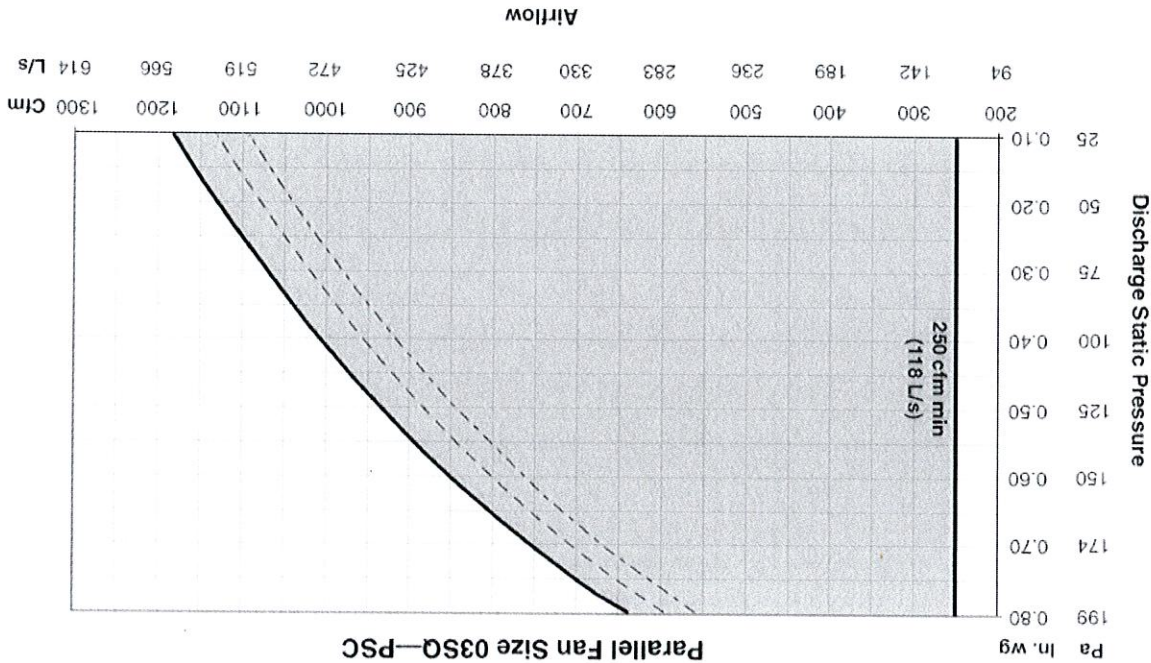
1. Allow a minimum 6" plenum inlet clearance for un-ducted installations.
2. Filter is secured in filter frame located in unit inlet.
3. For Motor access, remove bottom screws on hanger brackets to slide panel as shown in drawing.
4. See Installation Documents for exact hanger bracket location.
5. Air valve centered between top & bottom panel.
6. Heating coil un-insulated. External insulation may be field supplied and installed as required.
7. All high & low voltage controls have same-side NEC jumpback clearance.
8. Allow 48" of straight duct downstream of unit before first runout and inside of the duct should be equal discharge size.
9. Terminal box access door is side hinged. Allow for clearance.
10. A 4 wire power supply required for 480V/3 & 575V/3 single point connection units.

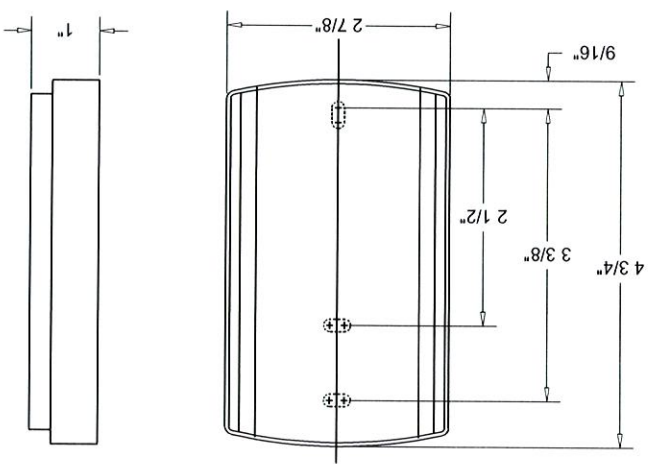
Approximate Dry Weight	147.0 lb
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Weights reflected may vary ± 5.0 lb based upon options selected.

Notes:
1. When attenuator is required, add inlet attenuator pressure to discharge static pressure for final fan performance.

-----	2-row coil maximum
-----	1-row coil maximum
-----	Minimum
-----	VPCF and VPEF maximum





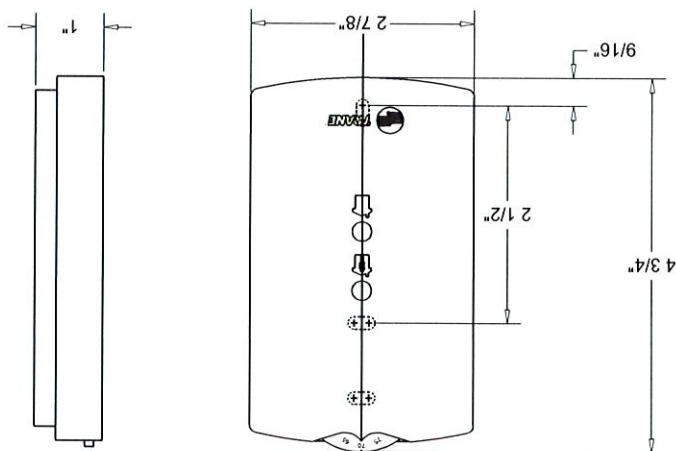
WIRELESS ZONE SENSOR RECEIVER

(INSTALLED, WIRED & TESTED ON UNIT)

Wireless specifications
Receiver works with Wireless Zone Sensor only
Does not work with Air-F!™ Communications Sensor.

Receiver operating temperature	-40 to 158°F (-40 to 70°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Storage and operating humidity range	5% to 95%, non-condensing
Resolution	±0.125°F over a range of 60 to 80°F (15.56 to 26.67°C) ±0.25 °F when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	< 1 VA
Housing	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box
Range(t)	Open range - 2,500 ft (packet error rate = 2) Usable - 200 ft (61 m) Typical - 75 ft (23 m) 100 mW - North America
Output power	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	000-999
RoHS compliance	Yes
Agency Listing	UL 916 Energy Management Equipment CSA - C22.2 No. 205-M1983 Signal Equipment

(t) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.



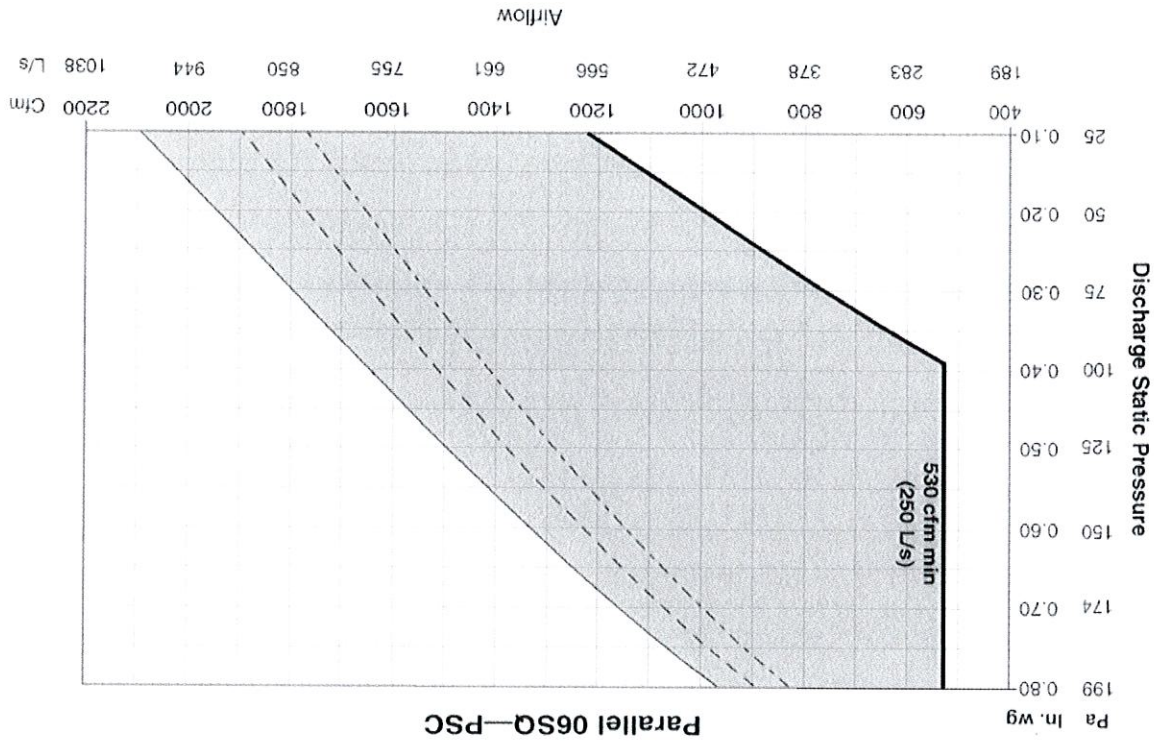
Storage temperature	-40 to 185°F (-40 to 85°C)
Sensor operating temperature	32 to 122°F (0 to 50°C)
Storage and operating humidity range	5% to 95%, non-condensing
Accuracy	0.5 °F over a range of 55 to 85°F (12.8 to 29.4 °C)
Resolution	±0.125°F over a range of 60 to 80°F (15.56 to 26.67°C) ±0.25 °F when outside this range
Setpoint functional range	45 to 95°F (7.22 to 35°C)
Setpoint thumbwheel markings	50 to 85°F (stamped every 5°F) and °, °°, °° 11 to 29°C (stamped every 3°C) and °, °°, °°
Housing	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected. UL 94: 5 VA flammability rating
Mounting	3.375 in (82.73 mm) for 2 mounting screws (supplied)
Sensor battery	(2) AA, 1.5 V, 2800 mAh, Lithium, 5-year life
Range(1)	Open range - 2,500 ft (packet error rate = 2 Usable - 200 ft (61 m) Typical - 75 ft (25 m)
Output power	100 mW - North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	000-999
Minimum time between transmissions	30 seconds
Maximum time between transmissions	15 minutes
RoHS compliance	Yes
Agency Listing	UL916 Energy Management Equipment CSA - C22.2 No. 205-M1983 Signal Equipment

Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper signal and ceiling light quality. It is more greatly affected by walls, barriers, and general clutter. In general, aluminum wall and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.

Accessory - Variable Air Volume Fan Powered Terminal Units
Item: D3, D5 - D7 Qty: 4 Tag(s): FPB 4-3, FPB 4-5, FPB 4-6, FPB 4-7

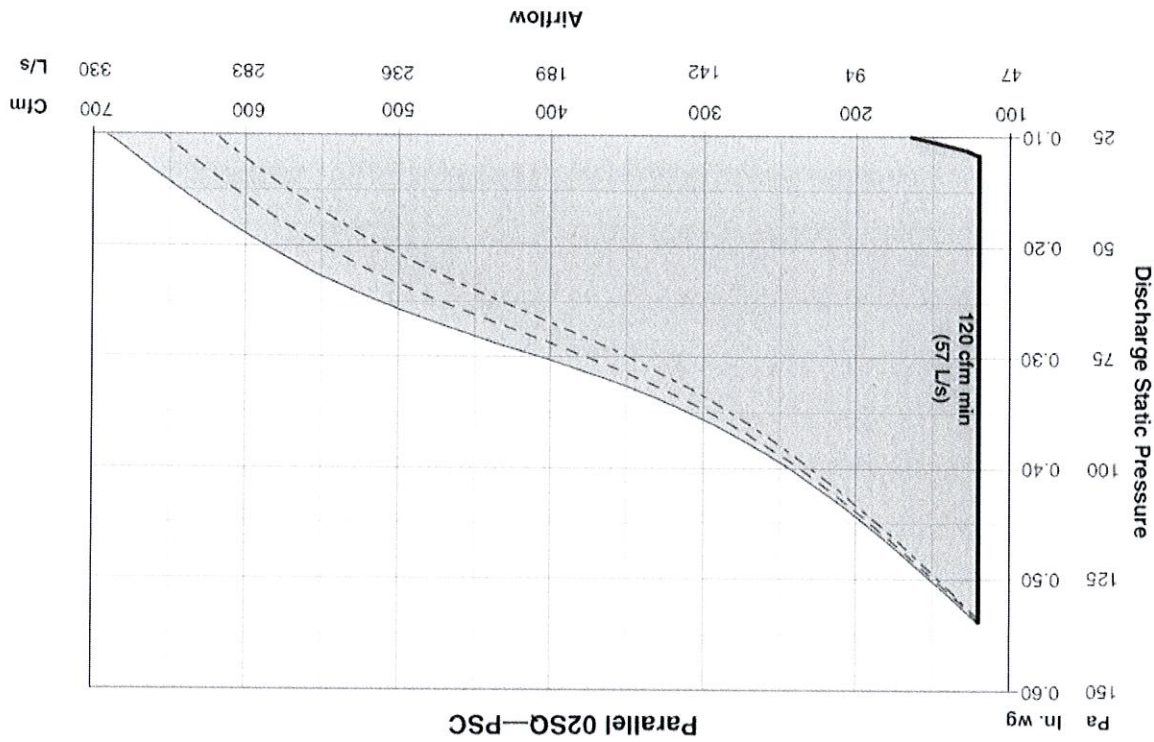
Notes:
1. When attenuator is required, add inlet attenuator pressure to discharge static pressure for final fan performance.

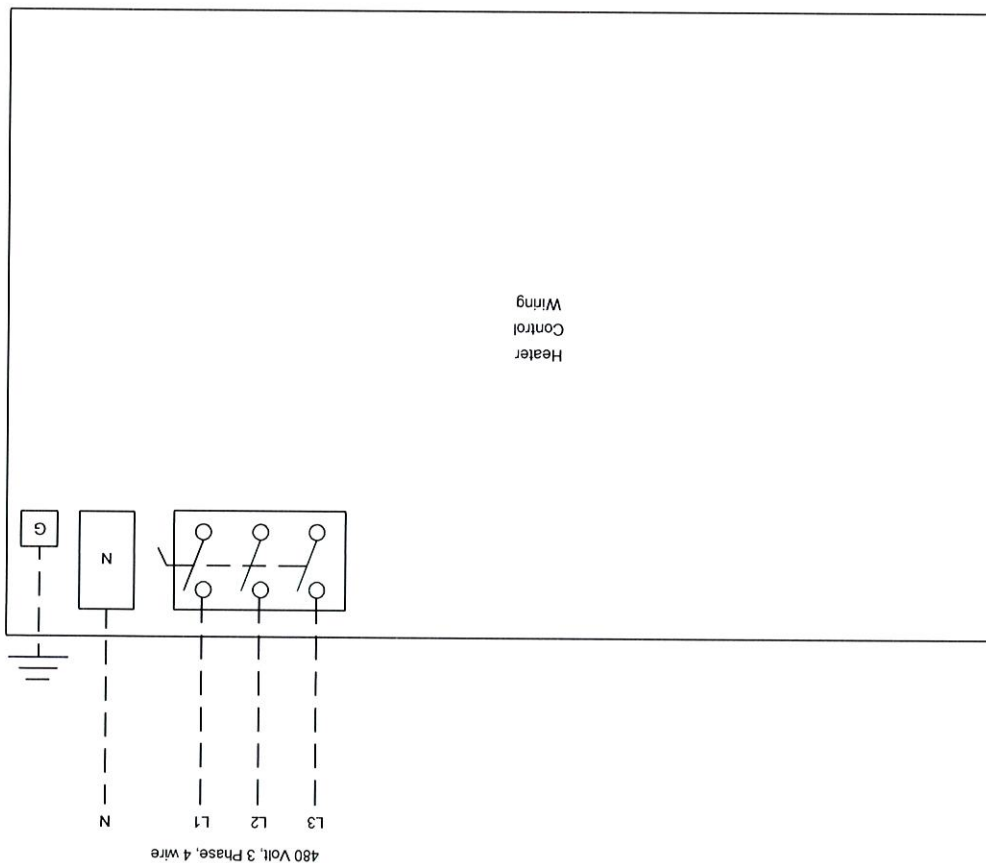
—	VPCF and VPEF maximum
—	Minimum
- - - -	1-row coil maximum
- - - -	2-row coil maximum



Notes:
1. When attenuator is required, add inlet attenuator pressure to discharge static pressure for final fan performance.

—	VPCF and VPEF maximum
—	Minimum
- - - -	1-row coil maximum
- - - -	2-row coil maximum





WARNING

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

CAUTION

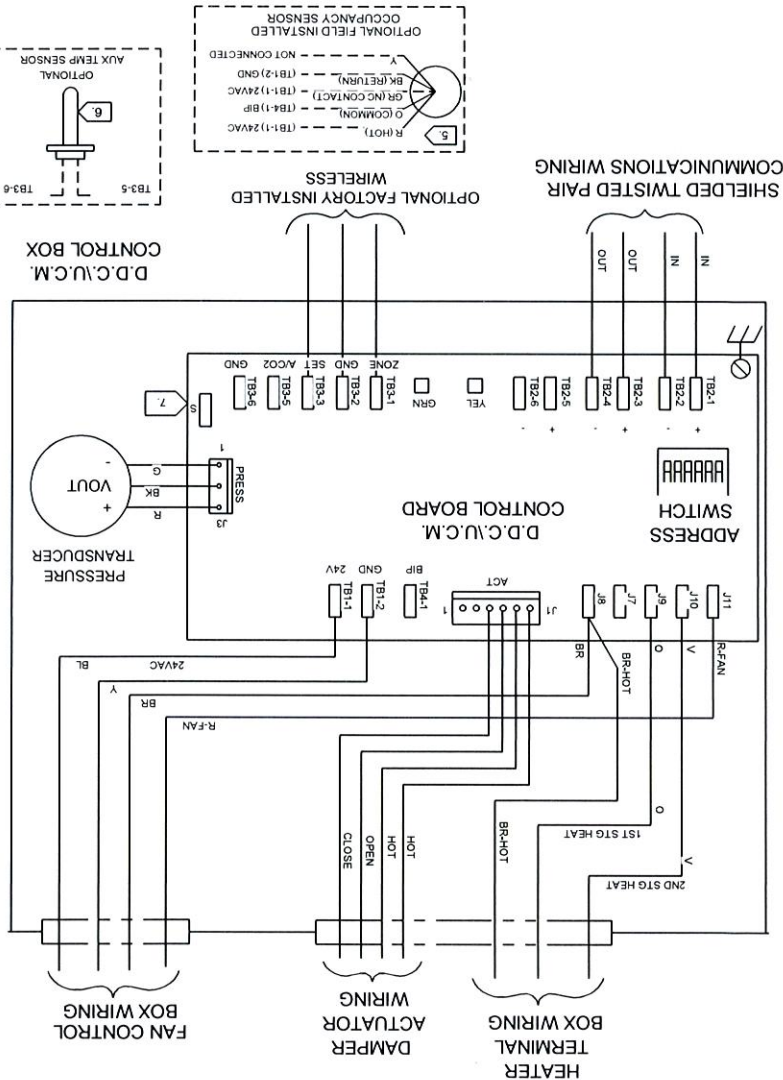
USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED
TO ACCEPT OTHER TYPES OF
CONDUCTORS.
FAILURE TO DO SO MAY CAUSE
DAMAGE TO THE EQUIPMENT.

Customer Notes:

1. _____ Factory installed.
_____ Optional or installed by others.

Field Wiring - Variable Air Volume Fan Powered Terminal Units

Item: D1 - D7 Qty: 7 Tag(s): FPB 4-1, FPB 4-2, FPB 4-3, FPB 4-4, FPB 4-5, FPB 4-6, FPB 4-7



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FAILURE TO DO SO MAY CAUSE
DAMAGE TO THE EQUIPMENT.

NOTE:

1. FACTORY WIRING
2. 1/4" QUICK CONNECT REQUIRED FOR ALL FIELD CONNECTIONS.
3. ZONE SENSOR TERMINALS 1 (-) AND 2 (+) REQUIRE SHIELDED TWISTED PAIR WIRING FOR COMMUNICATIONS JACK EQUIPPED ZONE SENSOR OPTION.
4. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
5. THE OPTIONAL BINARY INPUT CONNECTS BETWEEN TB4-1 (BIP) AND 24VAC (HOT) FROM TRANSFORMER. INPUT CAN BE RECONFIGURED AS AN OCCUPANCY INPUT VIA THE COMMUNICATIONS INTERFACE.
6. AS SHIPPED, THE AUX INPUT IS CONFIGURED AS AN AUX TEMP INPUT. THE AUX INPUT CAN BE RECONFIGURED AS A CO2 SENSOR INPUT VIA THE COMMUNICATIONS INTERFACE.
7. S TERMINAL NOT TO BE USED WITH VARI-TRANE.
8. ZONE SENSOR TERMINALS 6 AND 7 REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.

Tag Data - Variable Air Volume Single Duct Terminal Units (Qty: 2)

Item	Tag(s)	Qty	Description	Model Number
E1	VAV 4-8	1	Variable Air Volume Single Duct Terminal	VCEF12
E2	VAV 4-9	1	Variable Air Volume Single Duct Terminal	VCEF12

Product Data - Variable Air Volume Single Duct Terminal Units

All Units

Single duct with electric heat
 12" inlet size, 2000 cfm
 Matte faced insulation - 1/2"
 DDC, controls on/off electric heat control
 Standard actuator
 Right/Left hand universal orientation
 Factory Mounted Wireless Receiver
 480/24 volt transformer
 Disconnect switch
 Power Fuse
 480 volt, 3 phase
 Electric heater kW - 12.0
 Stages - 2 - equal
 Magnetic contactors - 24 volt
 Wireless zone sensor deg F (Fid)
 1st year labor warranty whole unit

Performance Data - Variable Air Volume Single Duct Terminal Units

Tags			
VAV 4-8	VAV 4-9		
Design cooling airflow (cfm)	1800	1650	
Min cooling airflow (cfm)	360	330	
Valve heating airflow (cfm)	900	840	
Cooling inlet diameter	12"	12"	
Cooling inlet velocity (ft/min)	2292	2101	
APD @ cooling airflow (in H2O)	0.062	0.053	
Full load amps (A)	14.43	14.43	
Min circuit ampacity (A)	18.04	18.04	
Max fuse size (A)	20.00	20.00	
Operating weight (lb)	52.0	52.0	
Max inlet SP (in H2O)	0.750	0.750	
Discharge transfer function	AHRI 885-08	AHRI 885-08	
Radiated transfer function	AHRI 885-08	AHRI 885-08	fiber mineral fiber
Coil heating capacity (MBh)	40.98	40.98	
Room heat loss (MBh)	28.29	29.13	
Room heating setpoint (F)	68.00	68.00	
Primary EDB (F)	55.00	55.00	
Unit LAT (F)	96.97	99.96	
Electric heat kW (kW)	12.00	12.00	

Mechanical Specifications - Variable Air Volume Single Duct Terminal Unit

Item: E1, E2 Qty: 2 Tag(s): VAV 4-8, VAV 4-9

General Unit Information

The unit casing is comprised of 22 gauge galvanized steel. Outlet connection is slip and drive. Agency Listing - The unit is UL and Canadian UL listed as a room air terminal unit. UL Control # 9N65. All Trane terminal units are AHRI 880 - 98 certified.

General Unit Clearance

Allow adequate clearance to meet NEC on control box side of unit to meet NEC. A minimum of one and one half duct diameters of straight duct work, upstream of the air inlet connection, must be present for optimum airflow measurement performance. Upstream duct work should be the same diameter as the primary inlet connection. Allow access to the bottom of unit if Optional Bottom Access Door is selected.

1/2" Matte - Faced Insulation

The interior surface of the unit casing is acoustically and thermally lined with 1/2" 1.50 lb./cu. ft. [24.00 kg./cu. m.] composite density glass fiber with 4.0 lb. cu. ft. [64 kg./cu. m.] high density facing. The insulation is UL listed and meets NFPA-90A and UL 181 standards. The insulation R-value is 1.9. All cut edges of insulation are completely encapsulated in metal to prevent erosion.

Air Valve Size - 12

Air Valve is 2000.0 cfm 12" inlet.

Air Valve Round

The air inlet connection is an 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring is provided with balancing taps for measuring within +/- 5% of unit cataloged airflow. An airflow versus pressure differential calibration chart is provided. The damper blade is constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly is connected through a composite nylon stub axle to a cast zinc shaft supported by self lubricating bearings. The shaft is cast with a damper position indicator. The valve assembly includes a mechanical stop to prevent over stroking. At 4.0" w.g. air valve leakage does not exceed 1% of cataloged airflow.

Electric Heat Coil

Factory provided and mounted, UL recognized, resistance open-type heater with airflow switch, a disc-type automatic pilot duty thermal primary cutoff, and manual reset load carrying thermal secondary device. Heater element material is nickel-chromium. The heater terminal box is provided with 7/8" knockouts for customer power supply. Terminal connections are plated steel with ceramic insulators. Unit is Flipable for both Left and Right hand control access.

Power Disconnect Switch (for VCEF)

A factory provided interlocking door disconnect switch located on the electric heater control panel.

Line Fuse - VCEF

For VCEF units, fuses provided on all energized lines of incoming power to interrupt circuit in overcurrent conditions.

Slip & Drive Connection

A slip and drive connection has two straight flanges on the top and bottom, and two drive connections on the left and right sides. This is a standard option on all VAV single duct terminal units.

Magnetic Contactor

An electric heater 24 volt contact for use with Direct Digital Control (D.D.C.) or Analog Electronic VAV Controls.

Electric Heat Transformer

A 50VA or 75VA transformer will be an integral component of the heater control panel dependent on unit load requirements to provide 24 VAC for controls.

System Communications

The controller is designed to send and receive data from a Tracer Summit or other Trane Controllers, or a VariTrac Central Control Panel. Current unit status conditions and set points may be monitored and/or edited via this data communication feature. The network type is a twisted wire pair serial communication.

Direct Digital Controller

The microprocessor based terminal unit controller provides accurate, pressure independent control through the use of a proportional integral control algorithm and direct digital control technology. The controller monitors zone temperature set points, zone temperature and its rate of change, and valve airflow using a differential pressure signal. Optionally, the controller can monitor either supply duct air temperature or CO₂ concentration via appropriate sensors. The controller is provided in an enclosure with 7/8" knockouts for remote control wiring. A Trane zone sensor is required.

Override Commands

The following override commands may be received by the Unit Control Module (U.C.M.) from the Tracer System.

Control Mode, Action, Offset & Commands

- * Control Mode - Occupied or Unoccupied
- * Control Action - Heating or Cooling
- * Control Offset - Enabling Control Offset will increase the cooling temperature setpoint and decrease the heating temperature setpoint by a control offset value.
- * Drive damper fully open.
- * Drive damper fully closed.
- * Drive damper to maximum airflow setpoint.
- * Drive damper to minimum airflow setpoint.
- * Disable unit heat.
- * Reset - Enabling the reset function forces the controller and the flow sensor to recalibrate.

Editable Set points and Functions

- Occupied and unoccupied cooling temperature set point 30.0 F-100.0 F.
- Occupied and unoccupied heating temperature set point 30.0 F-100.0 F.
- Maximum flow set point (10-100% of unit equivalent cataloged airflow)
- Minimum heating and cooling flow set point (0, 10-100% of unit equivalent cataloged airflow)
- Cooling set point low and high limit
- Low 30.0 F-100.0 F.
- High 30.0 F-102.0 F.

Heating set point high and low limit 30.0 F-100.0 F.

Hot water valve drive time

Air valve drive time

D.D.C. Actuator

Trane 3 wire, 26 GA, 3.4 VA, 1.7W, 24 VAC, 50/60 HZ, with floating point quarter turn control actuator with linkage release button. Actuator has a constant drive rate independent of load, a rated torque of 35 in-lb, a 90-second drive time and is non-spring return. Travel is terminated by end stops at fully opened and closed positions. An integral magnetic clutch eliminates motor stall when Trane controls are not provided. An integral 3 screw terminal is provided for field wiring. Operating temperature 32.0 F to 125.0 F.

Fan Control Offset - determines at what point a parallel fan is energized. This can be a function of temperature (degrees above heating set point) or primary airflow

Series Fan Configuration - allows series fan powered to shut off fan and close air valve when unit is unoccupied. Fan will operate in unoccupied mode if reheat is active.

Local heating flow set point enable/disable and set point

Analog input mode - auxiliary temperature sensor or CO₂ detector

Binary input mode - generic or occupancy detector

Zone temperature, auxiliary temperature, and zone set point calibration corrections ($\pm 10^\circ \text{ F}$) [$\pm 12^\circ \text{ C}$]

Flow measurement calibration correction (60-150%)

Additional Status Information Available

Active cooling set point

Active heating set point

Current unit primary airflow

Current zone temperature

Reheat status (on/off)

Fan status (on/off)

Calibration status (calibrating/not calibrating)

DDC Sequence of Operation

The unit controller continuously monitors the zone temperature against its set point and varies the primary airflow as required to meet zone set points. Airflow is limited by minimum and maximum airflow set points.

DDC Controls Option DD04, DD14, DD44 & DD74

Basic Operation: On/Off Staged Electric Heat (Normally Open Outputs) (DDC/UCM)

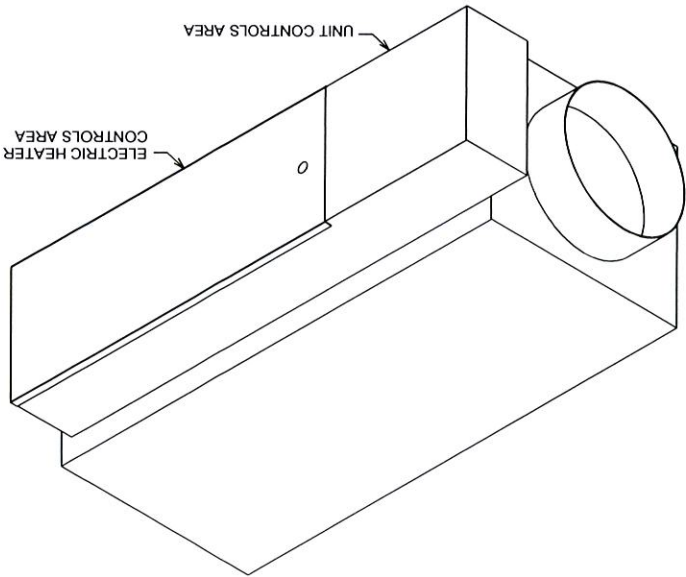
A voltage signal from the zone sensor indicates the zone temperature is used by the unit controller to determine an error from the set point. This error, as well as primary flow differential pressure, is used to determine damper position within minimum and maximum cooling airflow set points. As the zone temperature drops to the heating set point, primary airflow is controlled to minimum heating flow set point. Staged electric heat is energized.

Auxiliary air temperature (if unit has auxiliary temperature sensor) Not available if CO2 sensor used.
CO2 concentration (if unit has CO2 sensor) Not available if auxiliary temperature sensor used.

- Ventilation ratio
- BIP state
- Failure indicators
- Temperature sensor failures
- Flow Sensor failure
- Local zone sensor set point failure

Wireless Zone Sensor/Receiver

Factory installed, wired and tested Receiver with field mounted Sensor accessory eliminates the need for the wiring between the zone sensor and unit level controller. The zone sensor houses the space temperature sensor, local setpoint adjustment, OCCUPIED/UNOCCUPIED button, signal strength and battery life indicators, and spread spectrum transmitter. The receiver functions as a communication translator between spread spectrum radio communications and the VAV analog inputs.



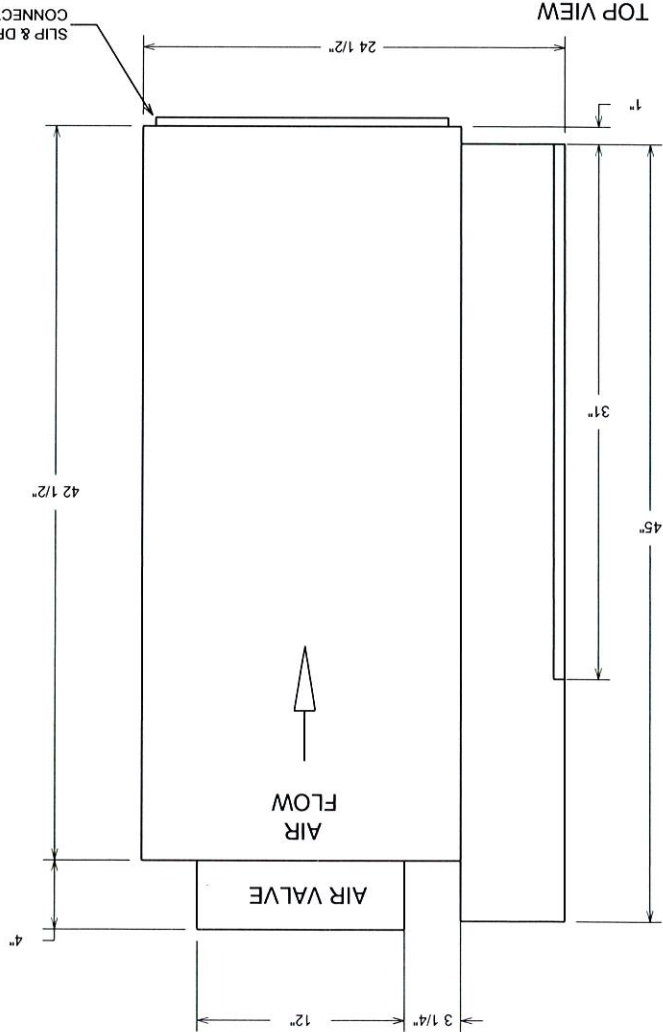
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation

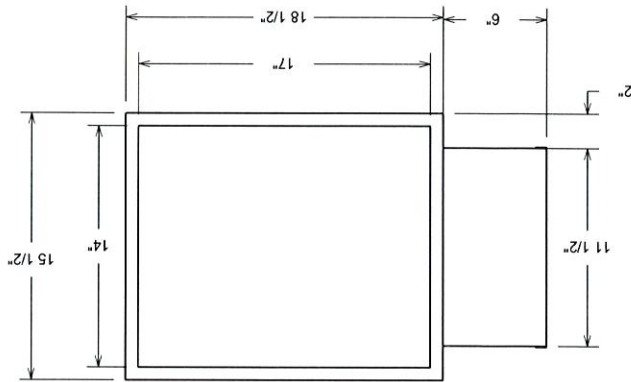
Approximate Dry Weight	52.0 lb
------------------------	---------

Weights reflected may vary ± 5.0 lb based upon options selected.

SLIP & DRIVE CONNECTION



TOP VIEW



BACK VIEW

WIRELESS ZONE SENSOR

Wireless specifications
Sensor works with Wireless Communications Interface or Wireless Zone Sensor Receiver.
(Does not work with Air-FIT™ WCI)

Sensor operating temperature	32 to 122°F (0 to 50°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Storage and operating humidity range	5% to 95%, non-condensing
Accuracy	0.5 °F over a range of 55 to 85°F (12.8 to 29.4 °C)
Resolution	±0.125°F over a range of 60 to 80°F (15.56 to 26.67°C) ±0.25 °F when outside this range
Selfpoint functional range	45 to 95°F (7.22 to 35°C)
Selfpoint thumbwheel markings	50 to 85°F (stamped every 5°F) and ", ** 11 to 29°C (stamped every 3°C) and ", **
Housing	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	3.375 in (82.73 mm) for 2 mounting screws (supplied)
Sensor battery	(2) AA, 1.5 V, 2800 mAh, Lithium, 5-year life
Range(t)	Open range - 2,500 ft (usable - 200 ft (61 m) Typical - 75 ft (25 m) 100 mW - North America
Output power	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio frequency	16
Radio channels	000-999
Address range	30 seconds
Minimum time between transmissions	15 minutes
Maximum time between transmissions	Yes
RoHS compliance	UL916 Energy Management Equipment CSA - C22.2 No. 205-M1983 Signal Equipment
Agency Listing	

(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little resistance to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.

WIRELESS ZONE SENSOR RECEIVER

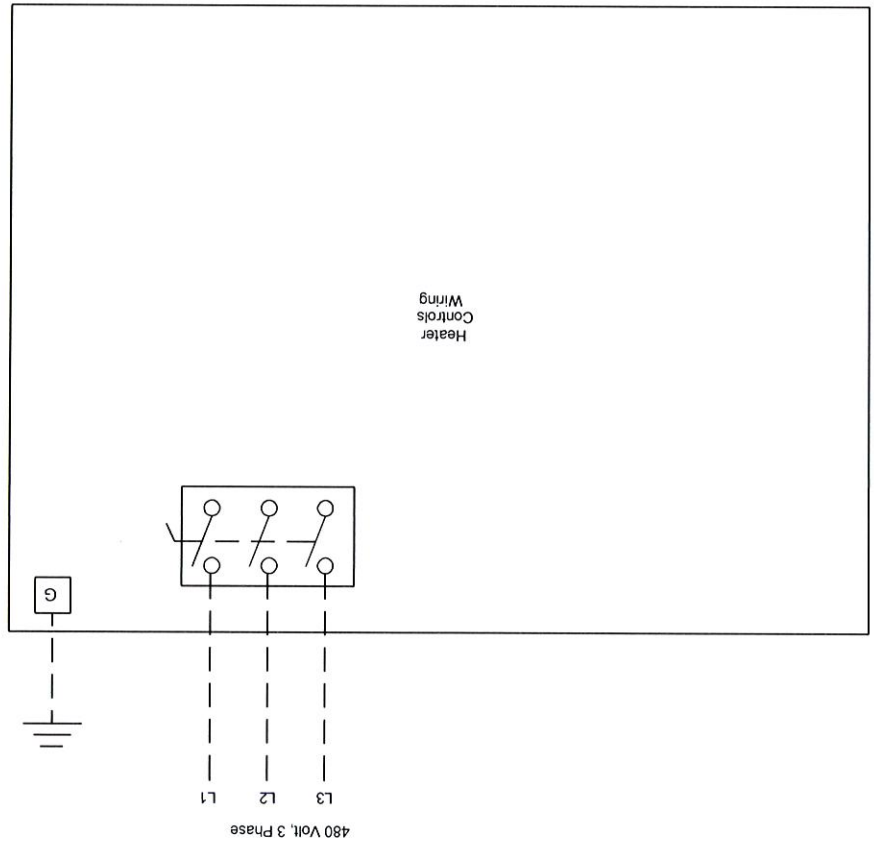
(INSTALLED, WIRED & TESTED ON UNIT)

Wireless specifications
Receiver works with Wireless Zone Sensor only
Does not work with Air-F!™ Communications Sensor.

Receiver operating temperature	-40 to 158°F (-40 to 70°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Storage and operating humidity range	5% to 95%, non-condensing
Resolution	±0.125°F over a range of 60 to 80°F (15.56 to 26.67°C) ±0.25 °F when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	< 1 VA
Housing	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box
Range(i)	Open range - 2,500 ft (packet error rate = 2 Usable - 200 ft (61 m) Typical - 75 ft (25 m) 100 mW - North America
Output power	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	000-999
RoHS compliance	Yes
Agency Listing	UL916 Energy Management Equipment CSA - C22.2 No. 205-M1983 Signal Equipment

(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.





Tag Data - VAV Changeover/Bypass-System Controllers (Qty: 1)

Item	Tag(s)	Qty	Description
F1	CCP	1	VAV System Controllers

Product Data - VAV Changeover/Bypass-System Controllers

Item: F1 Qty: 1 Tag(s): CCP w/ Display
Standard Ship Cycle = Production Shipping Cycle
1 X13650939010 - CCP with Operator Display

CCP III W/LCD

Program options:

Each central control panel is individually configurable as either an air conditioner controller or heat pump controller for a Varitrac system.

Outputs:

Binary outputs (optional relay board) contacts rated at 0.5 A, 30VAC, 12 VA pilot duty.

Inputs:

Binary inputs are provided for occupied/unoccupied and priority shutdown. Each input requires, should the function be desired, an isolated, ungrounded, remote contact. The contacts must be capable of passing 15 mA of DC current.

Dimensions:

8.67 inches (220mm) high, 10.24 inches (260mm) wide, 2.61 inches (66mm) deep in a plastic enclosure.

Power:

20 to 30 VAC, 30 VA, dedicated external transformer required.

Operating Temperature Range:

32-120F (1-49C)

Operating Humidity Range:

10-90% non-condensing

System control:

The central control panel scans the Varitrac unit control modules to determine the deviations from temperature setpoint, time of deviation, time from last changeover and number of unit control modules requiring heating or cooling. Based upon this information, the system heat/cool mode is selected. The central control panel also monitors the system air temperature to determine capacity staging and to ensure that high and low temperature limits are not violated.

System temperature control is accomplished by switching relays to sequence either the heat pump or air conditioning unit; alternatively, system temperature control may be accomplished through a communications link when a Voyager or other Reliabel control equipped unit is used.

The central control panel also controls system static air pressure to the design pressure by opening and closing the bypass damper. Bypass damper control is accomplished via a communications link.

The systems sixth binary output can be configured to disable outside air ventilation during the unoccupied mode, reflect the system heat/cool status, or be controlled by an ICS system.

Control options:

The following control options are selectable at the central control panel:

Energy saver mode:

Energy saver mode releases all Varitrac dampers from their minimum position settings when the system is in active operation, allowing zone dampers receiving undesirable supply air temperature to completely shut off thereby, preventing the overheating or overcooling of the space.

Ventilation mode:

Ventilation mode allows enhanced ventilation by driving all zone dampers to four times their cooling minimum, limited by their maximum position when the system air handler is operating in a fan only mode.

Priority shutdown:

The central control panel will go into priority shutdown when the supply air temperature sensor fails, when communication to the communicating sensor/bypass control is lost, or when contacts connected to the priority shutdown binary input are closed.

Air conditioning unit control:

When configured as a 2 heat/2 cool controller, the binary outputs are designated as follows:

1. Fan
2. Cool 1
3. Cool 2
4. Heat 1
5. Heat 2
6. Outside air, heat/cool, or ICS

Grouping:

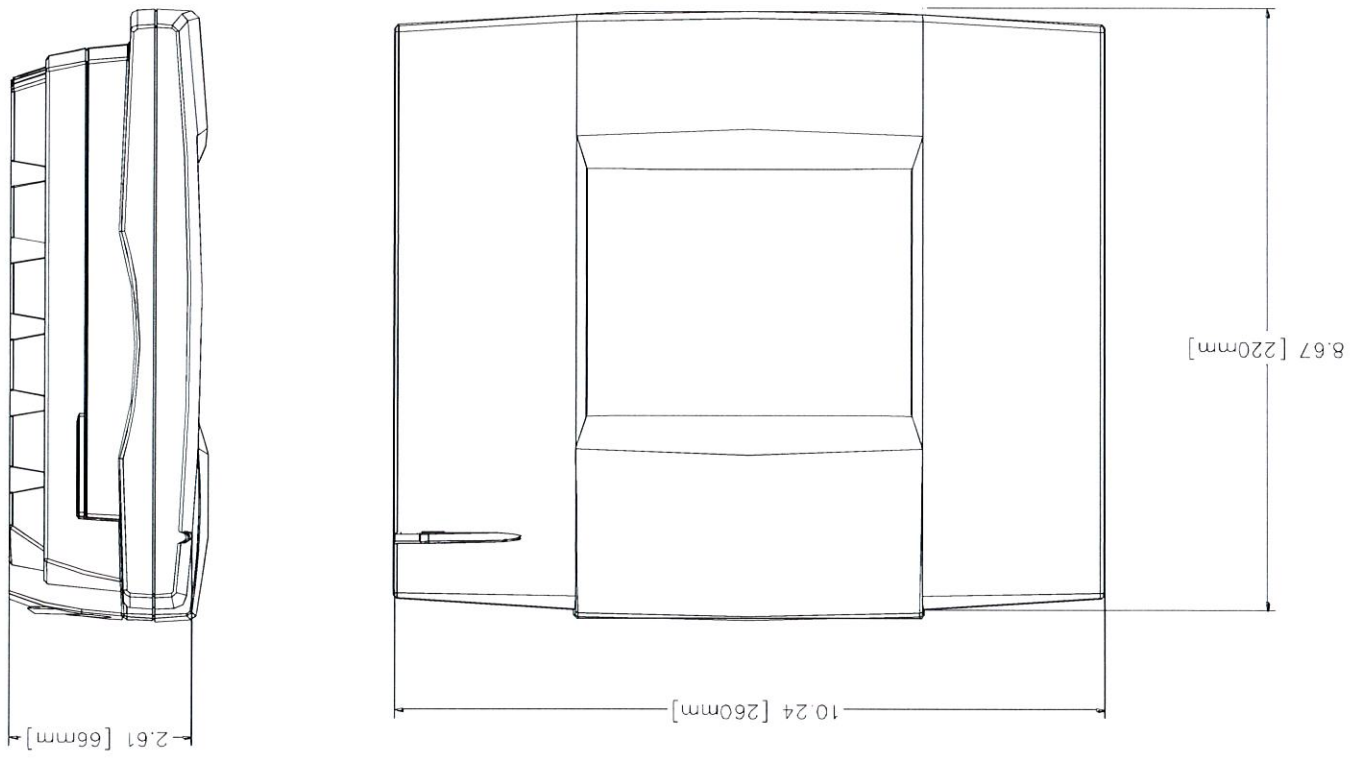
Groups can provide greater flexibility for multiple tenant buildings. The central control panel can have up to four groups of zones. Overrides may be applied to groups.

Optional Operator Display

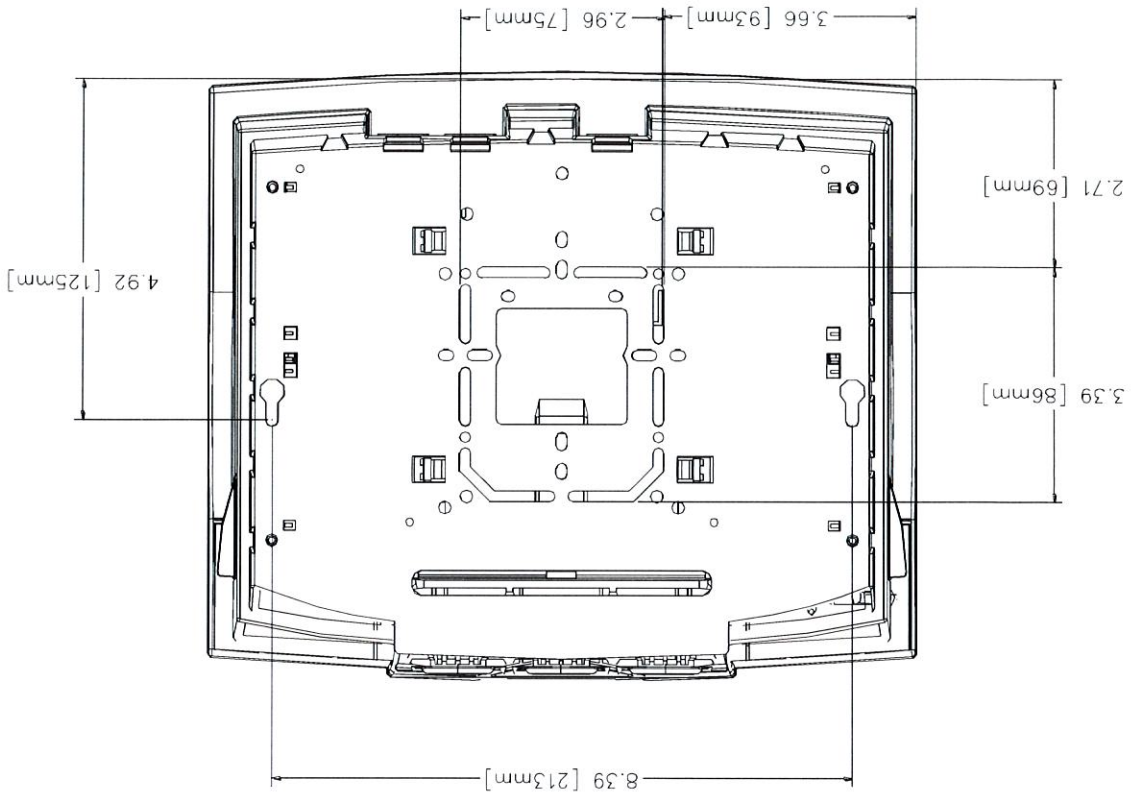
The optional operator display is a backlit, liquid crystal display with touchscreen programming capability. The operator can access system and zone status through the display and perform basic setup of zone VAV UCMs and CCP system operating parameters. The display allows an installer to commission a Varitrac system without using a PC. The operator display has a seven-day time clock for stand-alone scheduling capability.

Operator Display Feature Summary

- Backlit LCD touch-screen display for easy operator interface
- Combination of icon- and menu-based navigation provides intuitive operation
- Provides a level of control for the daily operator, and a second level for commissioning and service
- Three levels of security are available to protect system settings
- Seven-day time clock for stand-alone, time-of-day scheduling



Back View Mounting



⚠ WARNING

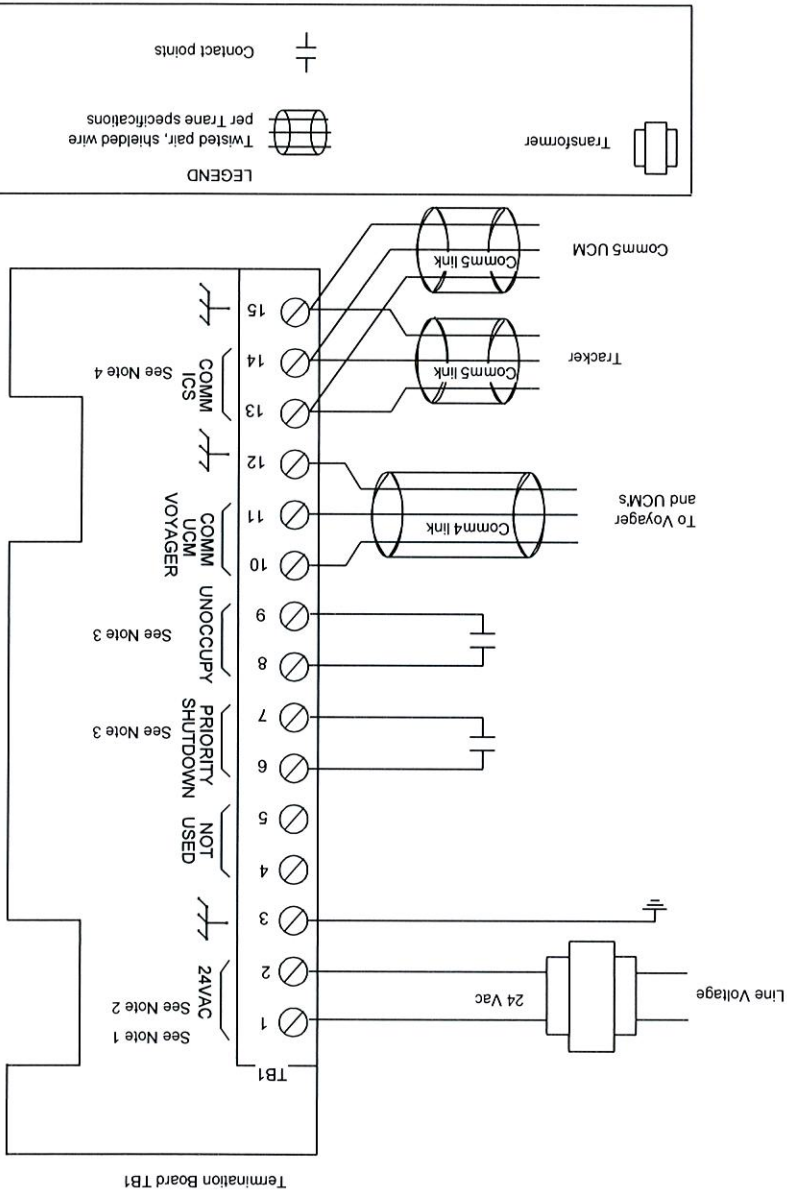
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT

VOLTAJE HAZARDEUX!
DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN. FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.



Note 1: All customer wiring must be in accordance with national, state, and local electrical codes.
Note 2: Trane requires a dedicated transformer for 24 Vac power.
Note 3: Do not apply voltage to the priority shutdown or unoccupy.
Note 4: See product literature for Comm5 wire connection details.

Tag Data - Light Commercial (Qty: 1)				
Item	Tag(s)	Qty	Description	Model Number
G1	Tracker	1	Tracker Panels	BMTK000ABB0110

Product Data - Light Commercial Unitary System Panels

Item: G1 Qty: 1 Tag(s): Tracker

Standard Ship Cycle = Production Shipping Cycle
BMTK Tracker Bldg Mgmt Panel
Ethernet and Modem
Model 12
Operator Display
English
Tracker PC Software

Tracker 12, Tracker 24, WSHF Mechanical Specs

Simple Building Control

The Tracker Version 12 building automation system (BAS) is a heating, ventilating, and air conditioning (HVAC) energy management system for small- to medium-size buildings. It provides reliable, centralized control for HVAC equipment, managing it for optimal comfort and efficiency.

The Tracker BAS includes a controller with a liquid crystal display (LCD) touch screen. The Tracker BAS also includes optional Windows-based software that can be installed on a PC workstation.

The Tracker BAS is LonMark® compliant. It communicates with supported devices over a Trane Comm5 link. The Trane Comm5 link is a communication link that implements LonTalk and a LonTalk FTT-10A network. LonTalk is an open, industry-standard protocol.

Remote Communications

Modem - Both the controller and the PC (in its recommended hardware configuration) provide a modem. The modem enables off-site connections over standard phone lines. It enables remote operation of the Tracker BAS and provides the means to deliver alarms and messages to the workstation PC, email address, and pagers.

Ethernet LAN - Both the controller and typical PC are available with an Ethernet card option. This option allows the Tracker panel and PC workstation running Tracker PC Software to reside on an existing LAN (supplied by others). The panel and software allow for a static or DHCP IP address.

Both the touch screen and the PC provide an easy-to-use visual interface. The interfaces enable an operator to set up and change HVAC operating parameters and collect and display building information.

The Tracker BAS is a reliable and easy-to-install, operate, and service building management system. It simplifies the work of the building operator and the installing contractor.

System components

Currently, all equipment that makes up a comprehensive Tracker system is available from Trane. In addition to a Tracker BAS, a Tracker system can include the following Trane HVAC components:

- Trane Voyager constant-volume rooftop units (RTUs)
- Trane Precident constant-volume RTUs with ReliaTel controls
- Trane VariTrac central control panels (CCPs)
- Trane Voyager III variable air volume (VAV) RTU (with CCP)
- Trane Tracer ZN517 unitary controllers - used to control and incorporate non-Trane equipment into the system
- Trane Tracer MP503 I/O modules
- Trane Tracer loop controller
- Trane ZN510 and ZN511 controller - used to control and incorporate water-source heat pumps
- Trane ZN524 controller - used to control and incorporate water-source heat pumps

The Tracer MP503 I/O modules in a Tracker system are used to monitor and control building equipment such as lights, exhaust fans, ventilation fans, and humidity control equipment. The components of the Tracker network are connected in a daisy chain or star configuration.

Features

Both the controller and the PC software of the Tracker BAS offer these features:

- Intuitive LCD touch screen user interface
- 365-day scheduling and 10 schedules
- Capability of including all equipment and devices in one schedule
- Temporary schedule override
- Easy-to-administer security system with two levels of access
- Automatic daylight savings time changeover
- Error and alarm messaging
- Setpoint viewing and editing
- Auto configuration
- Alarm log
- Global PC workstation software Alarm log - accepting remote alarms from capable panels.
- Trending of any point available in the system, 10 trends with up to 64 samples each
- Optimal start to insure space is to desired temperature at occupied time

Reports are available to review and print. Standard reports include timed-override usage and energy reports. Timed override will calculate the actual minutes per month of timed-override use; energy report which will indicate today's, yesterdays, this month, last month, this years, and last years energy usage

Features exclusive to the controller

- Auto-configuration
- Pager notification for error and alarm messages
- LCD touch screen

Features exclusive to the PC software

- Dial-in connection
- Backup and restore capability
- Standard graphics and HTML graphical interface
- Binary output programming capability
- Operator-defined custom alarms capability
- Printer support
- Setting up and viewing trends and reports

Note: The Tracker PC software is not needed to set up and operate a typical building.

The Tracker is available in several models. Each model is distinguished by it's approvals and by the number and type of devices that it can communicate with and control.

Auto-configuration

Auto-configuration

When Trane Comms devices are used as a system and power is applied to the controller, the Tracker BAS automatically configures itself. It is no longer necessary to program the building management system. During auto configuration, the controller:

- Discovers all devices on the communication link
- Loads all devices into a non-erasable memory database
- Turns to On or Occupied all discovered HVAC equipment except the binary output relays of the Tracer MP503 I/O module, which remain de-energized (Off)

After auto configuration, the building is under the control of the Tracker controller and its factory defaults. At this point, the controller can run the building with no further involvement of personnel. The installer or operator can choose, now or later, to replace the device IDs (Neuron IDs set at the factory) with descriptive names and provide a building schedule.

Models/Capacities

Tracker 12:

12 SCC (Space Comfort Controllers as defined by LonMark) + 5 CCP (Varitrac Central Control Panels) + 4 MP503 (Input/Output Modules).

Tracker ZN517 unitary controller

The Tracker ZN517 unitary controller is a standalone HVAC controller. When connected to a Tracker controller, the Tracker ZN517 unitary controller becomes a communicating LonMark®-compliant device with an SCC profile. The Tracker controller, through the Tracer ZN517, can then communicate with and control the equipment.

Devices controlled by the Tracer ZN517 unitary controller include electro-mechanically controlled 2H/2C or 4C rooftop units, heat pumps, and split systems. The Tracer ZN517 controls temperature and other comfort-related conditions. Connecting a Tracker controller to it enables an operator to schedule, route alarms, and monitor the entire system.

Tracker ZN517 unitary controller I/O capacities

- Binary inputs
- Enable/Disable or Occupancy
- Status: Fan or Generic

Analog Inputs

- Space Temperature
- Setpoint input
- Discharge air temperature
- Universal input (thermistor, 4-20mA)
- Outdoor air temperature

FLD = Furnished by Trane U.S. Inc. dba Trane /
Installed by Others

Binary outputs

- Supply fan
- Cool 1/Compressor 1
- Cool 2/Compressor 2
- Heat 1/Reversing Valve/Cool3
- Heat 2/Auxiliary Heat/Cool 4
- Exhaust Fan/Generic/Occupancy
- Economizer Open/Close

Tracer ZN517 Features

- Minimum on/off timer: to protect equipment from duty cycling
- Fan status: to protect equipment from overheating
- Economizing
- Timed override
- Manual output test button
- Filter maintenance alarm: when used with a Tracker
- Discharge air tempering
- Demand control ventilation using CO2

Note: Each output is rated for a maximum of 1 Amp at 24 Vac. One normally open (Form A) relay contact will be provided. 24 Vac will be wired in common to one side of all relay contacts.

Tracer MP503 I/O module

The Tracer MP503 input/output module accepts electrical signals from a variety of sensors. It also controls the state of binary outputs by energizing and de-energizing relays. Changing the state of a relay enables the I/O module to turn a device on or off.

Using the Tracker PC software, the binary outputs can be programmed to energize and de-energize the relays in response to system conditions and schedules.

The module has universal inputs that can receive and interpret binary (on/off), and analog (range) values. Connecting to the module enables the Tracker controller to monitor Trane temperature, relative humidity (RH), and CO2 sensors.

Tracer MP503 I/O module I/O capacities

Universal inputs (4)

- Thermistor (10K W at 77°F [25°C])
- Trane CO2 sensor (0 to 10 Vdc)
- Trane relative humidity (RH) sensor (4 to 20 mA)
- Binary input

Binary outputs (4)

- Each output is rated for a maximum of 1 Amp at 24 Vac. One normally open (Form A) relay contact will be provided. 24 Vac will be wired in common to one side of all relay contacts

Tracer ZN510 and ZN511

The Tracer ZN510 (factory installed on water-source heat pump) and ZN511 (field installed on water-source heat pumps) controllers operate as stand-alone devices or as part of a Trane Tracker WSHHP system. The ZN510/511 controls the water-source heat pump to provide accurate temperature control in the space.

ZN510 and ZN511 input/output capability:

Analog inputs

- Zone temperature
- Entering or leaving water temperature
- Discharge air temperature
- Zone temperature setpoint
- Fan mode switch

Binary inputs

- Occupancy
- Condensate overflow
- Fan status

FLD = Furnished by Trane U.S. Inc. dba Trane /
Installed by Others

- Low water temperature
- Low pressure protection
- High pressure protection

Binary outputs

- Compressor 1
- Compressor 2
- Two-position outside air damper
- Reversing valve
- Fan on/off

ZN510 and ZN511 Features

- Minimum on/off timer: to protect equipment from duty cycling
- Fan status: to protect equipment from overheating
- Refrigerant high and low pressure protection
- Timed override
- Manual output test button
- Filter maintenance alarm: when used with a Tracker
- Random start
- Entering water temperature sampling

Tracker ZN524

The Tracker ZN524 (factory installed on water-source heat pumps) controllers operate as stand-alone devices or as part of a Trane Tracker WSHF system. The ZN524 controls the water-source heat pump to provide accurate temperature control in the space.

ZN524 input/output capabilities

Analog inputs

- Zone temperature
- Entering or leaving water temperature
- Discharge air temperature
- Zone temperature setpoint
- Fan mode switch
- Outside air temperature
- Relative Humidity

Binary inputs

- Occupancy
- Condensate overflow
- Fan status
- Low water temperature
- Low pressure protection
- High pressure protection

Binary outputs

- Compressor 1
- Compressor 2
- Isolation valve 1 and 2
- Outside air damper (2-position)
- Reversing valve
- Fan on/off
- Electric Heat
- Reheat
- Waterside economizing (2-position)

ZN524 Features

- Minimum on/off timer: to protect equipment from duty cycling
- Fan status: to protect equipment from overheating
- Refrigerant high and low pressure protection
- Timed override

Tracer loop controller (TLC)
The Tracer loop controller is a configurable direct digital controller (DDC) that provides control and monitoring for water-source heat pump systems. The system components controlled directly by the TLC include the pump, boiler, cooling tower (open or closed circuit), mixing valves, and individual water-source heat pumps. The TLC can be stand alone or used in a Tracker system. When used with Tracker the TLC has the ability to auto-detect and setup of heatpumps, centralized system alarming, centralized diagnostic and alarm resetting, loop water temperature optimization, and building freeze protection.

Tracer loop controller input/output capabilities

Analog inputs
- Loop supply temperature
- Loop return temperature
- Boiler supply temperature
- Outside air temperature
- Outside relative humidity
- Auxiliary temperature

Analog outputs
- Boiler mixing valve

Binary inputs
- System enable
- Flow status
- System timed override
- Pump request
- Load shed request

Binary outputs
- Pump 1 and 2
- Tower damper
- Tower circulating pump
- Tower stage 1, 2, 3
- Tower isolation valve
- Boiler enable
- Unit/compressor enable
- Fresh air unit enable
- Alarm

TLC features

- Up to 4 stages of cooling tower control
- System scheduling
- System-wide heat pump disable
- System-wide loop water pump request
- Fresh air/exhaust enable
- Loop trending
- Pre-cool and pre-heat sequences
- Password security

Communication

The Tracker (BMTK) controller is a Comms device. Comms is the fifth generation Trane communication architecture. It implements LonTalk, an open, industry-standard protocol. The RTUs, CCPs, unitary controllers, and I/O controllers that the Tracker controller communicates with reside on a LonTalk FTT-10A network. They provide data using LonMark® standard network variable types (SNVTs, pronounced Sniv-its) and configuration properties. The HVAC equipment controllers employ SCC profiles, as defined by LonMark® Interoperability Association. Ancillary sensors (such as temperature and humidity sensors) that are hard-wired to the terminals on the Tracker, CCP, and I/O module are standard resistive type sensors and do not communicate using LonTalk. They only provide analog or binary inputs and outputs.

LonTalk devices from other manufacturers will be tested for compatibility with the Tracker BAS. Devices that are compatible will be approved for inclusion in the Tracker system.

Necessary support documentation for approved devices will be released, when completed. The Tracker controller is designed for easy installation. Its 3-module assembly enables the termination module to be mounted on a wall, and the main module and display module to be stored for their protection until the site is ready for the controller to be fully assembled.

3-module definition

The termination module contains the termination board, which accepts all electrical connections for the controller. The main module contains the main logic board. The display module contains the touch screen, which enables the operator to interact with the controller.

Connect the PC workstation

If the site requires the optional PC software, the installer connects the RJ-11 (modem connection) or RJ-12 (direct connection) cable to the appropriate connector on the underside of the controller. To install the optional PC software, the installer inserts the Tracker CD into the PC CD-ROM drive and follows the self-prompting installation wizard.

An operator can set up and change HVAC operating parameters and collect and display building information at either the Tracker controller or the PC workstation. Each location provides access to an easy-to-use user interface. Tracker controller operation

LCD touch screen

The LCD touch screen, combined with an intuitive menu-driven user interface, provides access to the Tracker system from the controller.

The Tracker BAS goes well beyond accurate temperature control. It provides centralized scheduling and control for multiple RTUs and split systems. It provides multiple-zone control when paired with a Varitrac system. And it provides control for multiple Varitrac systems.

The Tracker BAS is capable of controlling multiple constant-volume Trane rooftop and split single-zone systems. The Trane unitary controller enables non-Trane HVAC systems to be easily integrated into the Tracker system.

The Tracker BAS communicates with the unit controllers on the Comms network and controls them to temperature setpoints and operating parameters determined by the operator. Once communicating, the Tracker BAS receives alarms automatically.

Connecting multiple unit controllers to the Tracker BAS enables the installer and operator to:

- Save installation time and materials costs by reducing the amount of wire used and by requiring only a thermostat in each area rather than a programmable zone sensor
- Schedule all devices from one location, rather than requiring that each device be scheduled independently
- Monitor alarms from one location

Rooftop VAV and Changeover bypass operation

The Tracker BAS is capable of supervising and scheduling a Varitrac VAV system. To do this, Trane Varitrac changeover bypass zoning systems or Varitrac VAV Rooftop system are introduced into the Tracker system. A Tracker controller is connected to one or more Varitrac CCPs. Each CCP is connected to one Trane Voyager RTU. The Tracker controller provides centralized scheduling and access to CCP alarms. Each CCP monitors its zone sensors and allows each zone to "vote" its needs, which are determined by the schedule and its setpoints. Based on that data, the CCP sets the operating mode (heat or cool) of the HVAC equipment. In addition, the CCP maintains a operator-defined static pressure in the ductwork by controlling a bypass damper or VAV (variable air volume) in the HVAC unit. If controlling a VAV HVAC unit the CCP will control either VFD (variable frequency drive) fans or inlet guide vanes.

Power requirements

24 Vac nominal (19-30 Vac)
50/60 Hz, 1 phase 40 VA minimum, Class 2 transformer required

Operating environment

Temperature: 32°F to 120°F (0-49°C)
Humidity: 10% to 90% relative humidity, non-condensing

Storage environment

Temperature: -40°F to 200°F (-40°C to 93°C)
Humidity: 5% to 95% relative humidity, non-condensing

Cabinet

NEMA 1 resin enclosure
Plenum rated
Mounting
Flat wall surface or with a conduit box that is either: Recessed, 2 in. x 4 in. (5 cm x 10 cm)
Recessed, 4 in. x 4 in. (10 cm x 10 cm)
Dimensions
Height: 8-3/4 in. (22.38 cm)
Width: 10-1/4 in. (26.04 cm)
Depth: 2-3/4 in. (6.99 cm)
Minimum clearances
Top: 12 in.
Bottom: 12 in.
Left: 12 in.
Right: 12 in.
Front: 36 in.
Weight
2.5 lb. (1.13 kg)

Analog input - Outside air temp.

Thermistor: 10K ohm at 77°F (25°C)
From -50°F to 200°F (-46°C to 93°C)

Binary inputs

Utility pulse meter: User-supplied dry contacts only
Tracker-supplied voltage: 12 Vdc nominal (10-14 Vdc), 12 mA nominal (10-14 mA)
Priority shutdown: User-supplied dry contacts only
Tracker-supplied voltage: 12 Vdc nominal (10-14 Vdc), 12 mA nominal (10-14 mA)

Binary output

Alarm relay: Tracker-supplied relay, Single-pole single-throw (SPST) dry contact rated at 24 Vac, 1 A maximum

Memory backup

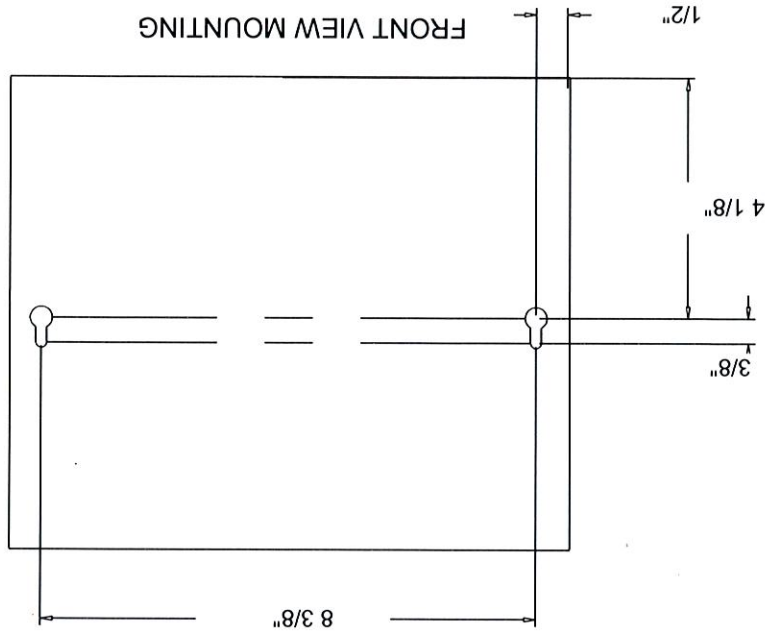
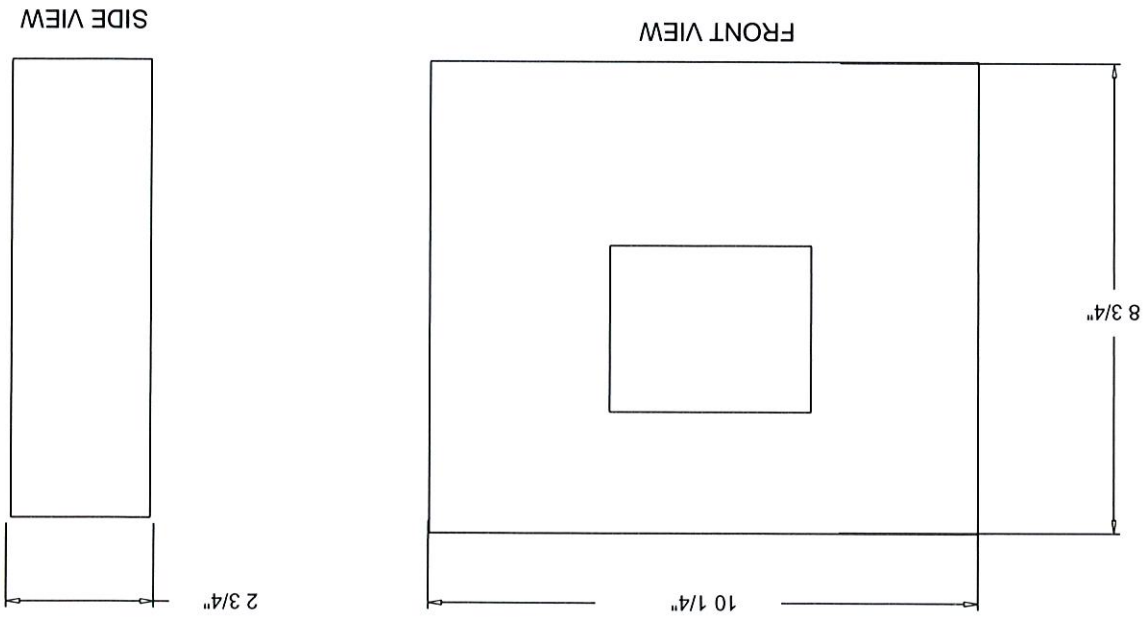
At power loss, the Tracker controller backs up memory and stores all data for seven days; after seven days, trends and alarms are not retained

Approvals

U.L.:Models 12, 24, WSH
FCC:Models 12, 24, WSH
C.E.:Model 12, 24, WSH

Notes:

- Note 1: All customer wiring must be in accordance with national, state, and local electrical codes.
- Note 2: Trane recommends a dedicated transformer for 24 Vac power.
- Note 3: Alarm relay circuit must not exceed 24 Vac, 1 A.
- Note 4: Do not apply voltage to the priority shutdown or meter inputs.
- Note 5: See product literature for Comm5 wire connection details.



Item	Tag(s)	Qty
H1	RTU-2, RTU-3, RTU-4, RTU-5	4

Product Data - Vibration Curbs
Item: H1 Qty: 4

Vibration Curb details to follow

Field Installed Options - Part/Order Number Summary

This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - Packaged Gas/Electric Rooftop Units

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-1	1	20 Ton Packaged Unitary Gas/Elec	YSH240F4RHA--0 001A10200000000 00000000000

Field Installed Option Description				
0-100% Economizer, dry bulb control				
Reference enthalpy kit				
Digital Display Wireless Zone Sensor				
Part/Ordering Number				
BAYECON092B				
BAYENTH007B				
BAYSENS050A				

Item	Tag(s)	Qty	Description	Model Number
A2	RTU-2, RTU-3	2	25 Ton Packaged Unitary Gas/Elec	YSD300F4RHA--F 001A10200000000 00000000000

Field Installed Option Description				
CO2 wall mounted, field sensor kit				
Digital Display Wireless Zone Sensor				
Part/Ordering Number				
BAYCO2K002C				
BAYSENS050A				

Product Family - Packaged Rooftop, Cooling / Heating Units

Item	Tag(s)	Qty	Description	Model Number
B1	RTU-4	1	50 Ton Packaged Commercial Roofto	YCD600B4L-1B4N D4-BC--F--J-0-00-- -----X---*

Field Installed Option Description				
Duct mounted CO2 sensor kit				
Part/Ordering Number				
BAYCO2K006A				