



Installation Operation Maintenance

Voyager™ III Rooftop units

Cooling-only

TKD-TKH 275-300-350-400-500-600

Heat pump

WKD-WKH 400-500-600

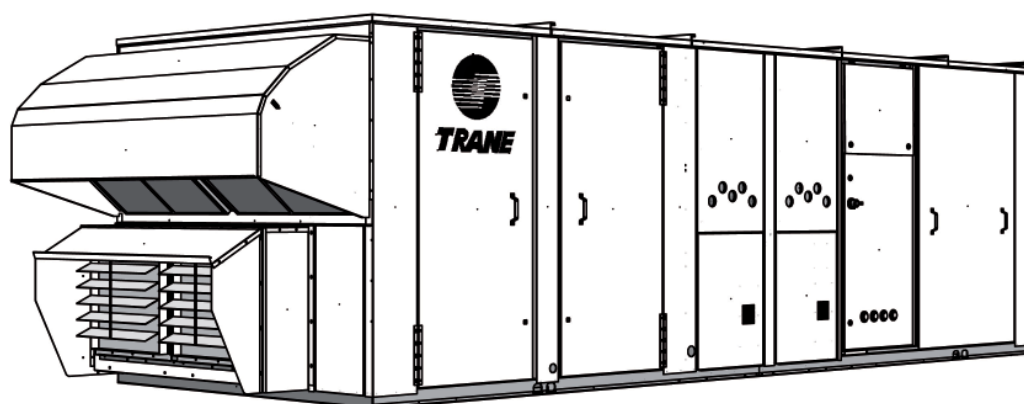
Gas-fired heating

YKD-YKH 275-300-350-400-500-600

Heat pump with gas-fired heating

DKD-DKH 400-500-600

R410A Refrigerant



RT-SVX16J-E4
Original instruction

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General information

Foreword

These instructions are given as a guide to good practice in the installation, start-up, operation, and maintenance by the user, of Trane TKD/TKH, WKD/WKH, YKD/YKH and DKD/DKH units. They do not contain full service procedures necessary for the continued successful operation of this equipment. The services of a qualified technician should be employed through the medium of a maintenance contract with a reputable service company. Read this manual thoroughly before unit start-up.

TKD/TKH, WKD/WKH, YKD/YKH and DKD/DKH units are assembled, pressure tested, dehydrated, charged and run tested before shipment.

Warnings and Cautions

Warnings and Cautions appear at appropriate sections throughout this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel.

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, may result in minor or moderate injury. It may also be used to alert against unsafe practices or for equipment or property-damage-only accidents.

Safety Recommendations

To avoid death, injury, equipment or property damage, the following recommendations should be observed during maintenance and service visits:

1. The maximum allowable pressures for system leak testing on low and high pressure side are given in the chapter "Installation". Always provide a pressure regulator.
2. Disconnect the main power supply before any servicing on the unit.
3. Service work on the refrigeration system and the electrical system should be carried out only by qualified and experienced personnel.

WARNING R-410A

Refrigerant under Higher Pressure than R-407C!

The unit described in this manual uses R-410A refrigerant which operates at higher pressures than R-407C refrigerant. Use ONLY R-410A rated service equipment or components with this unit. For specific handling concerns with R-410A, please contact your local Trane representative. Failure to use R-410A rated service equipment or components could cause equipment or components explosion under R-410A high pressures which could result in death, serious injury, or equipment damage.

Reception

On arrival, inspect the unit before signing the delivery note.

In case of visible damage: The consignee (or the site representative) must specify any damage on the delivery note, legibly sign and date the delivery note, and the truck driver must countersign it. The consignee (or the site representative) must notify Trane Epinal Operations - Claims team and send a copy of the delivery note. The customer (or the site representative) should send a registered letter to the last carrier within 3 days of delivery.

Reception in France only:

Concealed damage must be looked for at delivery and immediately treated as visible damage.

Reception in all countries except France:

In case of concealed damage: The consignee (or the site representative) must send a registered letter to the last carrier within 7 days of delivery, claiming for the described damage. A copy of this letter must be sent to Trane Epinal Operations - Claims team.

Warranty

Warranty is based on the general terms and conditions of the manufacturer. The warranty is void if the equipment is repaired or modified without the written approval of the manufacturer, if the operating limits are exceeded or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance or failure to comply with the manufacturer's instructions or recommendations is not covered by the warranty obligation. If the user does not conform to the rules of this manual, it may entail cancellation of warranty and liabilities by the manufacturer.

Refrigerant

The refrigerant provided by the manufacturer meets all the requirements of our units. When using recycled or reprocessed refrigerant, it is advisable to ensure its quality is equivalent to that of a new refrigerant. For this, it is necessary to have a precise analysis made by a specialized laboratory. If this condition is not respected, the manufacturer warranty could be cancelled.

Maintenance Contract

It is strongly recommended that you sign a maintenance contract with your local Service Agency. This contract provides regular maintenance of your installation by a specialist in our equipment. Regular maintenance ensures that any malfunction is detected and corrected in good time and minimizes the possibility that serious damage will occur. Finally, regular maintenance ensures the maximum operating life of your equipment. We would remind you that failure to respect these installation and maintenance instructions may result in immediate cancellation of the warranty.

General information

Storage

Take precautions to prevent condensate formation inside the unit's electrical components and motors when:

- a. The unit is stored before it is installed; or,
- b. The unit is set on the roof curb and temporary auxiliary heat is provided in the building.

Isolate all side panel service entrances and base pan openings (e.g., conduit holes, Supply Air and Return Air openings, and flue openings) to minimize ambient air from entering the unit until it is ready for start-up.

Do not use the unit's heater as temporary heat without completing the start-up procedures detailed under "Unit Start-Up".

The Trane Company will not assume responsibility for equipment damage resulting from accumulation of condensate on the unit electrical components.

Training

To assist you in obtaining the best use of it and maintaining it in perfect operating condition over a long period of time, the manufacturer has at your disposal a refrigeration and air conditioning service school. The principal aim of this is to give operators and technicians a better knowledge of the equipment they are using, or that is under their charge. Emphasis is particularly given to the importance of periodic checks on the unit operating parameters as well as on preventive maintenance, which reduces the cost of owning the unit by avoiding serious and costly breakdown.

Installation

General information: The installation must conform to all local standards and regulations.

Reception of Units

Unit Handling

The unit is supplied on wooden beams. It is recommended to check the machine's condition upon reception.

There are two ways to handle the unit:

- 1) Handle the machine using a forklift, in accordance with applicable safety regulations.
- 2) Use a lifting beam correctly adjusted to fit the unit (See Figure 1).

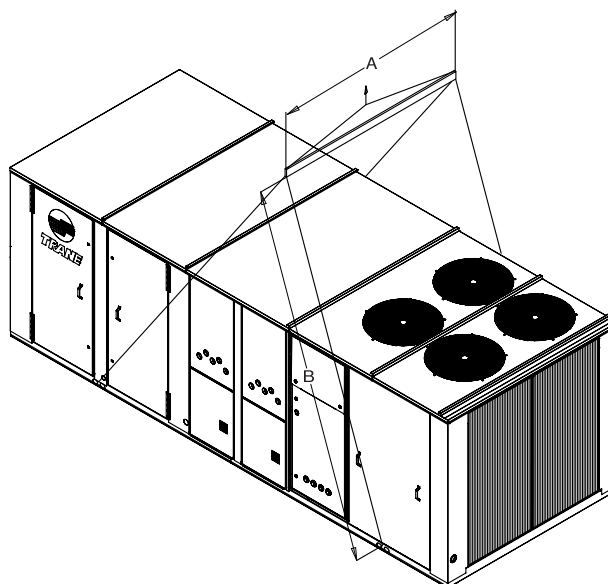
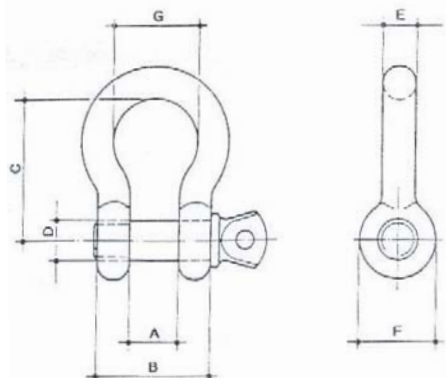
The units are supplied on the truck but are not unloaded. A lifting lug is provided on each corner of the unit's base to facilitate handling. 4 shackles and 4 slings are required.

Use a lifting beam to prevent the cables pressing too hard on top of the unit during lifting. (See Figure 1).

Important: For unit to fit on the roof curb the forklift pockets must be removed.

Figure 1 - Unit handling

Safe working load (kg)	OT800	1T100	1T100
Ø (mm)	16,0	18,0	20,0
F (mm)	64,0	72,0	72,0
A (mm)	30,0	35,0	35,0
C (mm)	31,0	41,0	41,0
B (mm)	64,0	78,0	78,0
E (mm)	18,0	19,5	19,5
G (mm)	48,0	59,0	59,0
Weight (kg)	0,480	0,960	0,960



Installation

Lifting and moving Instructions

Specific lifting method is recommended as follows:

- 1 - The units are supplied with four lifting points
- 2 - Slings and spreader bar to be provided by rigger and attached to the four lifting points.
- 3 - Minimum rated lifting capacity (vertical) of each sling and spreader bar shall be no less than the tabulated unit shipping weight. (See Table 1 and Table 4).
- 4 - Caution: The unit must be lifted with the utmost care. Avoid shock load by lifting slowly and evenly.
- 5 - Remove slings and spreader bars when installation is completed.

Roof Curb Installation (TKD-WKD-YKD-DKD accessories)

Roof curbs are available as an accessory for “downflow” units to support the unit and ensure the water tightness between the rooftop and the roof. Two types of roofcurbs are available: The standard version to allow the installation of the unit on a flat roof and the adjustable version for a sloped roof installation. (See Table 2 for the maximum sloped correction of adjustable roofcurb.)

The adjustable roof curbs are supplied pre-assembled on a skid.

Two types of self-adhesive seals are provided separately. (40mm wide for the perimeter, 20mm wide for the cross pieces). Make sure they are properly installed where indicated to assure an adequate curb-to-unit seal.

Instructions for the roofcurb assembly and installation with curb dimensions are provided with each roofcurb kit.

Table 1 - Slings lengths and max unit weight

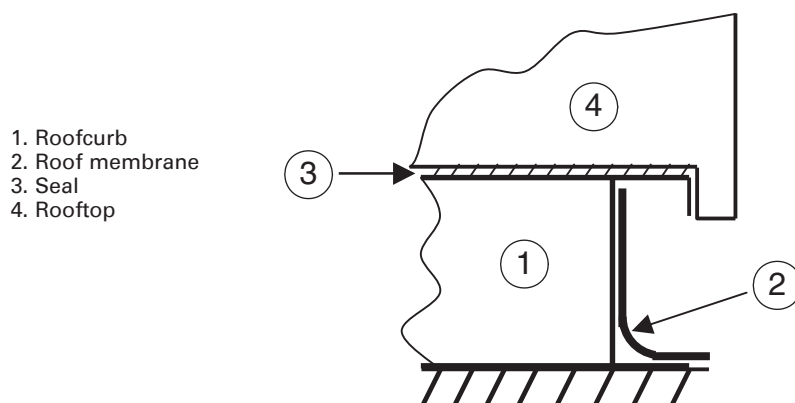
TK* / WK* YK* / DK*	A (mm)	B (mm)	MAXIMUM WEIGHT (Kg)
275	2680	3700	2327
300	2680	3700	2357
350	2680	3700	2395
400	2680	4000	2727
500	2680	4000	2805
600	2680	4000	2902

Table 2 - Maximum sloped correction of adjustable roofcurb

Unit Type	Long Side correction	Short side correction
TK* 275 - 300 - 350 YK* 275L - 300L - 350L	4%	5%
YK* 275H - 300H - 350H	3%	5%
TK* 400 - 500 - 600 WK*/DK* 400 - 500 - 600 YK 400L - 400H - 500L - 500H - 600L - 600H	3%	5%

Installation

Figure 2 - Waterproofing



Installing the Unit

The structure accommodating the unit(s) must be designed to support the equipment in operation, as a minimum. Refer to Table 3 for dimensions, weights and the space requirement plan.

Unit support

If the unit is to be roof mounted check the building codes for weight distribution requirements.

Location and clearances

Choose a location that will enable air to circulate freely in the condenser coil and allow air to be discharged above the fans. The clearance distances for air circulation and maintenance are indicated in the space requirement plans. (See table 3).

Placing and rigging

The rooftop units are designed to be installed outdoor and must be positioned horizontally (vertical air discharge off the condenser).

Rig the unit using either belt or cable slings. The sling eyelet must be placed through the lifting holes in the base rail of the unit. The point where the slings meet the lifting eyelet should be at least 2.2m above the unit. Use spreader bars to prevent excessive pressure on the top of the unit during lifting.

Slab mount

For ground level installation, the unit base should be adequately supported and hold the unit near level.

In areas where snowfall is common, the unit must be elevated enough to ensure that the bottom of the outdoor coil is above the height of the expected snow accumulation.

Where severely cold temperatures are a consideration, elevation of the unit is again recommended to ensure that defrost water does not create an ice build up that will interfere with unit operation. In addition, runoff water from roofs, etc... must not be allowed to fall on the outdoor coil; any blockage of airflow through the coil can be detrimental to unit operation and reliability.

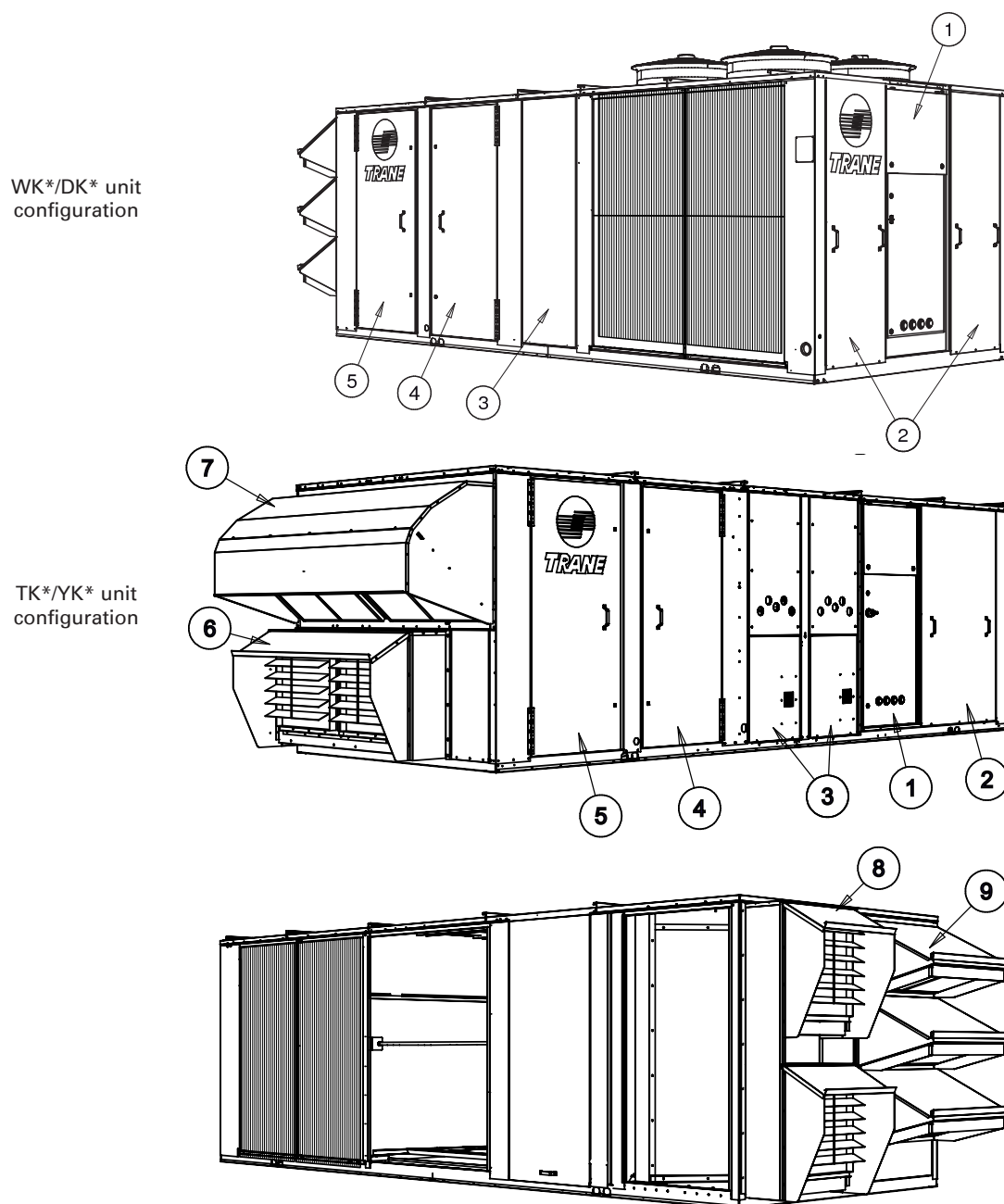
The manufacturer suggests that the bottom of the outdoor coil be raised 30cm above grade or roof to prevent possible ice build-up problems.

The unit frame structure is not designed to be supported by four points (mounting on spring isolators for instance).

The unit must therefore rest on its whole base.

Installation

Figure 3 - Location of components



1. Electric panel
2. Compressor section
3. Heating section (Gas heat, electric heat, Hot water heat)
4. Supply fan/Indoor coil section
5. Filter & Evaporator section
6. Exhaust air hood (Optional, Downflow unit)
7. Fresh air hood (Optional, Downflow unit)
8. Exhaust air hood (Optional, horizontal flow unit)
9. Fresh air hood (Optional, horizontal flow unit)

Installation

Dimensions/Weights/Clearances

Figure 4 - Dimensions and clearances

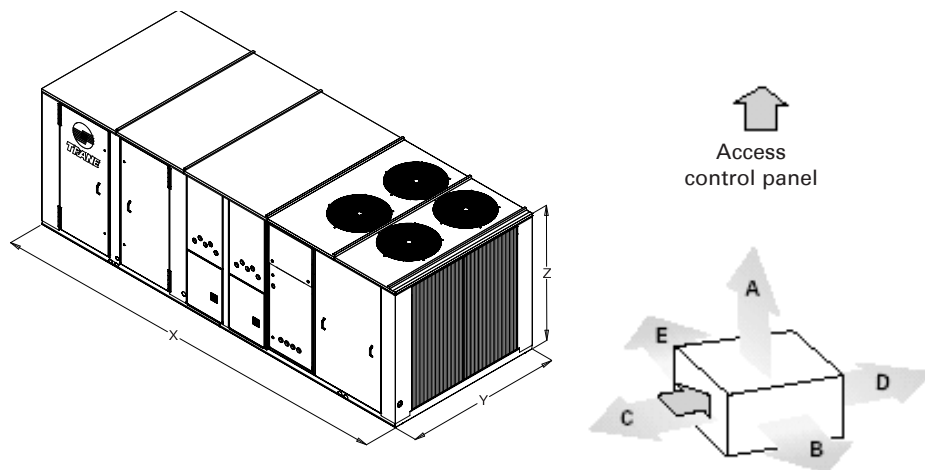


Table 3 - Dimensions, weights and clearances (1)

Unit	Size	Dimensions (mm)			Shipping Weight (kg)	Operating Weight (kg)	Minimum Clearances (mm)				
		X	Y	Z			A	B	C	D	E
YKD/YKH	275 L	4580	2302	2093	1768	1668		2440	1220	1220	1830
	300 L	4580	2302	2093	1784	1684	1900	2440	1220	1220	1830
	350 L	4580	2302	2093	1915	1715	1900	2440	1220	1220	1830
	400 L	5900	2302	2268	2309	2169	1900	2440	1220	1220	1830
	500 L	5900	2302	2268	2367	2227	1900	2440	1220	1220	1830
	600 L	5900	2302	2268	2634	2494	1900	2440	1220	1220	1830
	275 H	5285	2302	2093	1981	1861	1900	2440	1220	1220	1830
	300 H	5285	2302	2093	1991	1871	1900	2440	1220	1220	1830
	350 H	5285	2302	2093	2021	1901	1900	2440	1220	1220	1830
	400 H	5900	2302	2268	2365	2225	1900	2440	1220	1220	1830
TKD/TKH	500 H	5900	2302	2268	2424	2284	1900	2440	1220	1220	1830
	600 H	5900	2302	2268	2691	2551	1900	2440	1220	1220	1830
	275	4580	2302	2093	1725	1625	1900	2440	1220	1220	1830
	300	4580	2302	2093	1729	1629	1900	2440	1220	1220	1830
	350	4580	2302	2093	1756	1656	1900	2440	1220	1220	1830
	400	5200	2302	2268	2195	2055	1900	2440	1220	1220	1830
WKD/WKH	500	5200	2302	2268	2254	2114	1900	2440	1220	1220	1830
	600	5200	2302	2268	2381	2241	1900	2440	1220	1220	1830
	400	5200	2302	2268	2221	2081	1900	2440	1220	1220	1830
DKD/DKH	500	5200	2302	2268	2422	2282	1900	2440	1220	1220	1830
	600	5200	2302	2268	2437	2297	1900	2440	1220	1220	1830
	400 L	5900	2302	2268	2335	2195	1900	2440	1220	1220	1830
	500 L	5900	2302	2268	2535	2395	1900	2440	1220	1220	1830
	600 L	5900	2302	2268	2690	2550	1900	2440	1220	1220	1830
	400 H	5900	2302	2268	2391	2251	1900	2440	1220	1220	1830
	500 H	5900	2302	2268	2592	2452	1900	2440	1220	1220	1830
	600 H	5900	2302	2268	2747	2607	1900	2440	1220	1220	1830

(1) For standard unit, without accessories or options

Installation

Figure 5 - Top view of unit with loading points

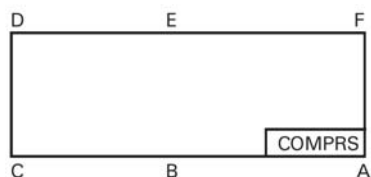


Table 4 - Point loading weights

Unit	Size	A (kg)	B (kg)	C (kg)	D (kg)	E (kg)	F (kg)
YKD/YKH	275 L	384	384	217	234	217	232
	300 L	387	387	219	236	219	236
	350 L	394	394	223	240	223	241
	400 L	499	499	282	304	282	303
	500 L	512	512	290	312	290	311
	600 L	574	574	324	349	324	349
	275 H	428	428	242	261	242	260
	300 H	430	430	243	262	243	263
	350 H	437	437	247	266	247	267
	400 H	512	512	289	312	289	311
	500 H	525	525	297	320	297	320
	600 H	587	587	332	357	332	356
TKD/TKH	275	374	374	211	228	211	227
	300	375	375	212	228	212	227
	350	381	381	215	232	215	231.5
	400	473	473	267	288	267	287
	500	486	486	275	296	275	296
	600	515	515	291	314	291	315
WKD/TKH	400	479	354	250	229	333	436
	500	525	388	274	251	365	479
	600	528	390	276	253	368	482
DKD/DKH	400 L	505	373	263	241	351	462
	500 L	551	407	287	263	383	504
	600 L	587	434	306	281	408	534
	400 H	518	383	270	248	360	472
	500 H	564	417	294	270	392	515
	600 H	600	443	313	287	417	547

Table 5 - Factory-installed Options Net Weights (kg)

UNIT	Size	Standard Roofcurb	Pitched Roofcurb	Barometric Relief	Power Exhaust	Oversized Supply Fan Motor	0-25% Man Damper	Economizer	Elec. Heat	Hot Water Coil	Direct driven fan (standard motor)
TKD/TKH	275	225	315	50/65	74/90	54	23	117/128	100	89	43
	300	225	315	50/65	74/90	54	23	117/128	100	89	43
	350	225	315	50/65	74/90	54	23	117/128	100	89	43
TKD/TKH/ WKD/WKH	400	260	360	50/65	74/90	56	23	131/135	140	100	55
	500	260	360	50/65	74/90	56	23	131/135	140	100	55
	600	260	360	50/65	74/90	56	23	131/135	140	100	55
YKD/YKH	275L	225	315	50/65	74/90	54	23	117/128	-	-	43
	275H	250	345	50/66	74/90	54	23	117/128	-	-	43
	300L	225	315	50/65	74/90	54	23	117/128	-	-	43
	300H	250	345	50/66	74/90	54	23	117/128	-	-	43
	350L	225	315	50/65	74/90	54	23	117/128	-	-	43
	350H	250	345	50/66	74/90	54	23	117/128	-	-	43
YKD/YKH/ DKD/DKH	400	270	380	50/65	74/90	56	23	131/135	-	-	55
	500	270	380	50/65	74/90	56	23	131/135	-	-	55
	600	270	380	50/65	74/90	56	23	131/135	-	-	55

Notes:

Net weight should be added to unit weight when ordering factory installed accessories.

Installation

Connection of Duct Network

Supply and return openings have curb flanges provided for easy duct installation. It is recommended to insulate the circumference of the curb after the unit is mounted to prevent condensation.

CAUTION! All ductwork must be run and attached to the curb flanges before the unit is set into place.

Guidelines for ductwork construction

- Connections to the unit should be made with 7.5cm canvas connectors to minimize noise and vibration transmission.
- Elbows with turning vanes or splitters recommended to minimize air noise and resistance.
- The first elbow in the ductwork leaving the unit should be no closer than 60cm from the unit, to minimize noise and resistance.

Attaching horizontal ductwork to unit

- All conditioned air ductwork should be insulated to minimize heating and cooling duct losses. Use minimum of 5cm of insulation with a vapor barrier. The outside ductwork must be weather proofed between the unit and the building.
- When attaching ductwork to a horizontal unit, provide a flexible watertight connection to prevent noise transmission from the unit to the ducts. The flexible connection must be indoors and made out of heavy canvas.

Note: Do not draw the canvas taut between the solid ducts.

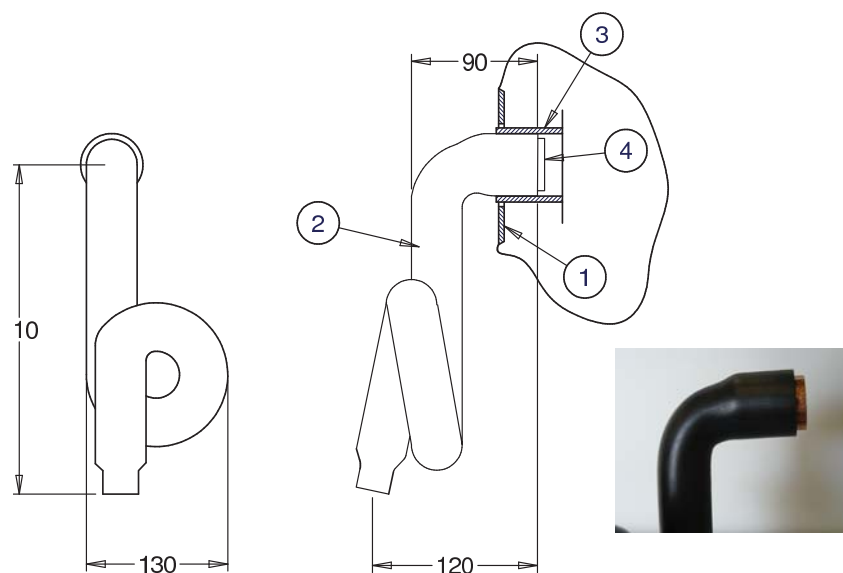
Condensate Drain Piping

Each Voyager III is equipped with a 1 1/4" female drainage connector. A P trap is supplied and must be connected to the drainage as shown in Figure 6.

Slope the drainage pipe down at least 1% to ensure an adequate condensate flow.

Check all the condensate drainage pipe fittings comply with the applicable construction regulations and waste disposal standards.

Figure 6 - Supplied trap



1. Panel enclosure
2. Atmosphere pressure
3. Static drain
4. Copper Stub insert

Gas Pipework Installation (YKD/YKH/DKD/DKH units)

Installation of gas piping (to be performed by the contractor)

The installation rules for public buildings shall be followed: refer to the brochure in the "Journal Officiel" number 1477-1 (France only).

The gas supply piping and the gas stop valve shall be dimensioned to guarantee the gas supply pressure at the unit's inlet when it is functioning at full capacity.

It is recommended to install one expansion valve as close as possible to each installed unit.

The piping must be self-supporting before the final branch connection to the burner. Allow for a dust trap (filter) upstream of the connection to the unit.

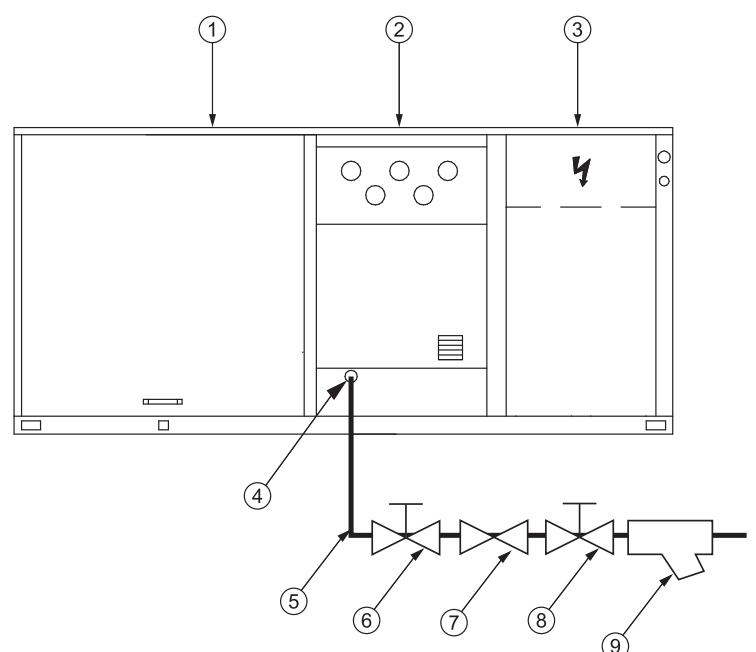
Search for gas pipe leaks using products such as "Typol" or "1000 bulles" or another equivalent method. Soapy water must not be used.

WARNING! Never use a flame to search for leaks. The required gas pressures at the unit's inlet connection are specified in table 24.

CAUTION! The piping must not exert any stress on the branch connection to the burner.

The heating system must be isolated by the gas stop valve on the gas supply piping during the pressure tests, as soon as the pressure exceeds 0.035 bar (35 mbar). If pressure greater than 0.035 bar is applied to the gas valve inlet the unit may be damaged.

Figure 7 - Typical gas supply pipework



- 1. Evaporator section
- 2. Gas burner section
- 3. Condenser section
- 4. Gas supply connection

- 5. Gas supply line
- 6, 8. Gas stop valve (Field supplied)
- 7. Expansion valve (Field supplied)
- 9. Filter (Field supplied)

Installation

Filter Installation

Access to the filter cells is done via the filter access door.

Each unit is shipped with either EU2/G2 or EU4/G4 filters.

EU4/G4 filters are available either in 50mm or 100mm depth.

The number and the size of the filter cells are determined by the size and the configuration of the unit. (See table 6).

CAUTION! Do not operate unit without filters in place.

The maximum pressure drops allowable on filters are the following:

EU2/G2: 120 Pa

EU4/G4: 150 Pa (50 & 100mm)

Table 6 - Filter arrangement

Unit size	STD		2" EU4 - AR500		4" EU4 - AR500	
	Quantity	Size	Quantity	Size	Quantity	Size
275	16	(395x497x45)	16	(395x495x45)	16	(395x495x90)
300	16	(395x497x45)	16	(395x495x45)	16	(395x495x90)
350	16	(395x497x45)	16	(395x495x45)	16	(395x495x90)
400	17	(395x497x45)	17	(395x495x45)	17	(395x495x90)
500	17	(395x497x45)	17	(395x495x45)	17	(395x495x90)
600	17	(395x497x45)	17	(395x495x45)	17	(395x495x90)

Installation

Supply Fan Adjustment

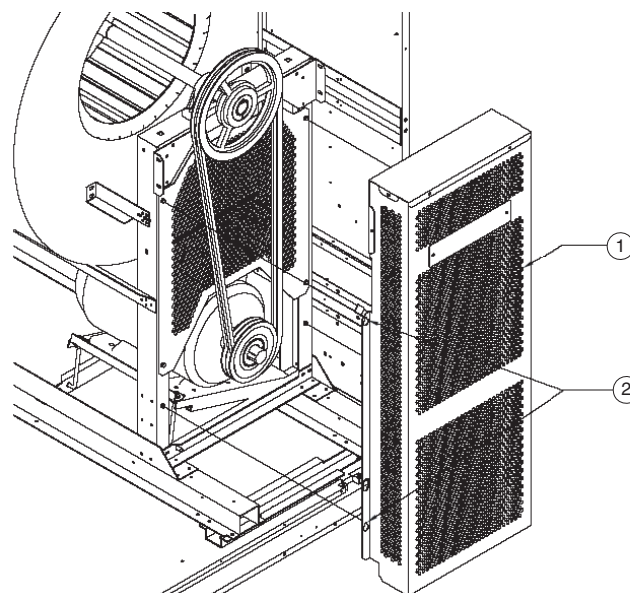
Use the following procedure to determine the proper adjustment of the evaporator fan for a specific application.

- 1) Determine total external static pressure about system and accessories.
 - a) Obtain the design airflow rate and the design external static pressure drop through the distribution system.
 - b) Add static pressure drop of the accessories installed on the unit. (Table 8).
 - c) Add the total accessory static pressure drop (from step 1b) to the design external static pressure (from step 1a). The sum of these two values is the total system external static pressure.
- 2) Using the table 9 to find the external static pressure that most closely approximates total system external static pressure. Then locate the appropriate airflow rate for your unit. The value obtained represents the brake horsepower for the evaporator fan motor and the fan RPM.
- 3) To increase belt tension: First, remove the fan belt guard (Figure 8). Then, Loosen the nut (next to the idler sheave) that secures the sheave in place. With a wrench, apply pressure clockwise on the outside nut (round headed one), until tension desired is reached (Table 11). While holding pressure with the tension nut, retighten the nut next to the idler sheave. (Table 11).

CAUTION! Excessive belt tension may reduce bearing life. Refer to Table 10 for ideal belt tension.

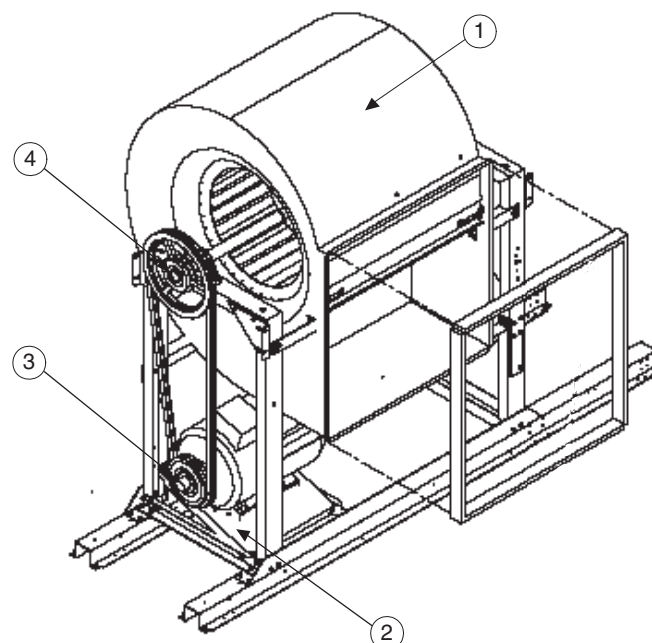
On direct driven fan, the fan speed is adjustable through parameter [205] on the speed inverter. Direct drive fan performances are in Table 7a.

Figure 8 - Indoor Fan Belt guard (Option)



1. Belt Guard
2. Fitted with 4 screws.

Figure 9 - Typical fan, motor and sheave



1. Fan housing
2. Adjustable motor support for belt tensioning
3. Motor sheave
4. Fan sheave

Installation

Supply Fan Performances

Belt driven fan

Table 7 - Available static pressure

External Static Pressure (Pa)																				
	150		200		250		300		350		400		450		500		550		600	
m ³ /h	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)	RPM	Motor Shaft (kW)
275																				
10880	410	1.2	458	1.5	504	1.8	548	2.2	590	2.6	630	2.9	667	3.4	703	3.8	737	4.2	766	4.7
12240	423	1.5	469	1.8	512	2.1	554	2.4	594	2.8	633	3.2	669	3.6	703	4	736	4.5	767	5
13600	436	1.8	479	2.1	521	2.4	561	2.7	599	3.1	636	3.5	671	3.9	704	4.3	736	4.8	765	5.3
14960	449	2.1	490	2.4	530	2.7	568	3.1	605	3.5	640	3.9	673	4.3	706	4.7	736	5.2	765	5.6
16320	463	2.5	502	2.8	540	3.1	576	3.5	611	3.9	645	4.3	677	4.7	708	5.1	738	5.6	767	6.1
17680	478	2.9	515	3.3	551	3.6	586	4	619	4.4	652	4.8	683	5.2	713	5.7	742	6.1	770	6.6
300																				
12240	423	1.5	469	1.8	512	2.1	554	2.4	594	2.8	633	3.2	669	3.6	703	4	735	4.5	764	5
13770	437	1.8	480	2.1	521	2.4	561	2.8	599	3.1	636	3.5	671	3.9	704	4.4	735	4.8	765	5.3
15300	452	2.2	493	2.5	532	2.8	570	3.2	606	3.6	641	4	674	4.4	706	4.8	737	5.3	766	5.7
16830	469	2.6	507	3	544	3.3	580	3.7	614	4.1	647	4.5	679	4.9	710	5.3	740	5.8	768	6.3
18360	487	3.2	523	3.5	558	3.9	592	4.3	624	4.7	656	5.1	686	5.5	716	5.9	744	6.4	772	6.9
19890	505	3.8	539	4.1	572	4.5	604	4.9	635	5.3	665	5.7	694	6.2	723	6.6	750	7.1	777	7.6
350																				
13600	436	1.8	480	2.1	521	2.4	561	2.7	600	3.1	636	3.5	671	3.9	705	4.3	736	4.8	766	5.3
15300	454	2.2	495	2.5	534	2.8	571	3.2	608	3.6	642	4	676	4.4	707	4.8	738	5.3	767	5.8
17000	473	2.7	511	3	548	3.4	583	3.8	618	4.1	650	4.6	682	5	713	5.4	742	5.9	770	6.4
18700	493	3.3	528	3.7	563	4	596	4.4	628	4.8	660	5.2	690	5.7	719	6.1	747	6.6	774	7.1
20400	514	4	547	4.4	579	4.8	610	5.2	641	5.6	670	6	699	6.5	727	6.9	754	7.4	780	7.9
22100	536	4.8	567	5.2	597	5.6	627	6	655	6.5	683	6.9	711	7.4	737	7.9	763	8.4	789	8.9
400																				
16320	381	2	420	2.5	457	2.9	492	3.4	526	3.9	559	4.4	589	5	619	5.6	646	6.2	673	6.9
18360	395	2.4	431	2.9	466	3.3	500	3.8	532	4.3	563	4.9	593	5.4	621	6	648	6.7	673	7.3
20400	410	2.9	444	3.4	477	3.9	509	4.4	540	4.9	569	5.4	598	6	625	6.6	650	7.2	675	7.9
22440	425	3.5	457	4	489	4.5	519	5	548	5.5	576	6.1	603	6.6	629	7.2	654	7.9	678	8.5
24480	440	4.2	471	4.7	500	5.2	529	5.7	557	6.2	584	6.8	610	7.4	635	8	659	8.7	682	9.3
26520	456	5	485	5.5	513	6	541	6.5	567	7.1	593	7.7	618	8.3	642	8.9	665	9.6	688	10.2
500																				
19680	405	2.8	440	3.2	474	3.7	506	4.2	537	4.7	567	5.2	596	5.8	623	6.4	649	7	674	7.7
22140	423	3.4	455	3.9	487	4.4	518	4.9	547	5.4	575	6	603	6.5	629	7.1	654	7.8	678	8.4
24600	441	4.3	472	4.7	501	5.2	530	5.7	558	6.3	585	6.9	611	7.5	635	8.1	660	8.7	683	9.4
27060	460	5.2	489	5.7	516	6.2	543	6.8	570	7.3	595	7.9	620	8.5	644	9.2	667	9.8	689	10.5
29520	481	6.3	508	6.8	534	7.4	559	8	584	8.5	608	9.2	631	9.8	654	10.4	676	11.1	697	11.8
31980	502	7.6	527	8.1	551	8.7	575	9.3	598	9.9	621	10.6	644	11.2	665	11.9	687	12.6	707	13.3
600																				
23600	434	3.9	465	4.4	496	4.9	525	5.4	554	5.9	581	6.5	607	7.1	633	7.7	657	8.3	681	9
26550	457	5	486	5.5	514	6	541	6.6	568	7.1	593	7.7	618	8.3	642	8.9	666	9.6	688	10.3
29500	481	6.3	507	6.8	533	7.4	559	7.9	583	8.5	608	9.1	631	9.8	654	10.4	676	11.1	697	11.8
32450	506	7.8	531	8.4	555	9	578	9.6	601	10.2	624	10.8	646	11.5	667	12.2	689	12.9	709	13.6
35400	534	9.6	556	10.2	578	10.8	600	11.5	621	12.1	643	12.8	663	13.5	684	14.2	704	15	-	-
38350	563	11.6	583	12.3	604	12.9	624	13.6	644	14.3	-	-	-	-	-	-	-	-	-	-

Notes:

- Supply fan performance table includes internal resistance of rooftop + indoor coil. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (filters, optional economizer, optional heating system, optional roof curb).
- The pressure drops from the supply fan to the space should not exceed 550 Pa positive for sizes 275-300-350 and 600 Pa for sizes 400-500-600.
- Maximum motor kW for size 275-300 is 7.5 kW, size 350 is 11 kW, size 400 is 11 kW.
- For motor electrical power input, multiply motor shaft power by 1.16

 5.5kW motor

 7.5 kW motor

 11 kW motor

 15 kW motor

Installation

Table 8 - Direct drive Evaporator fan performances

Evaporator Airflow	150				200				250				300				350				400				450				500				550				600			
m3/h	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)	Fan RPM	VFD Hz	Motor Shaft (kW)				
275																																								
10880	410	21.3	1.10	458	23.8	1.37	504	26.1	1.66	548	28.4	1.96	590	30.6	2.29	630	32.7	2.64	667	34.6	3.01	703	36.5	3.40	737	38.2	3.81	766	39.8	4.25										
12240	423	21.9	1.32	469	24.3	1.59	512	26.6	1.88	554	28.7	2.19	594	30.8	2.52	633	32.8	2.87	669	34.7	3.24	703	36.5	3.62	736	38.2	4.03	767	39.6	4.46										
13600	436	22.6	1.57	479	24.8	1.85	521	27	2.14	561	29.1	2.45	599	31.1	2.79	636	33.0	3.14	671	34.8	3.51	704	36.5	3.90	736	38.0	4.31	765	39.5	5.07										
14960	449	23.3	1.87	490	25.4	2.15	530	27.5	2.46	568	29.5	2.77	605	31.4	3.11	640	33.2	3.47	673	34.9	3.84	706	36.4	4.23	736	38.0	4.64	765	39.5	5.07										
16320	463	24.0	2.22	502	26.0	2.51	540	28	2.82	576	29.9	3.15	611	31.7	3.49	645	33.3	3.85	677	34.9	3.84	708	36.6	4.62	738	38.1	6.05	767	39.6	5.47										
17680	478	24.8	2.62	515	26.7	2.93	551	28.4	3.25	586	30.2	3.58	619	32.0	3.93	652	33.6	4.3	683	35.2	4.69	713	36.8	5.09	742	38.3	5.51	-	-	-										
300																																								
12240	423	21.9	1.32	469	24.3	1.59	512	26.6	1.88	554	28.7	2.19	594	30.8	2.52	633	32.8	2.87	669	34.7	3.24	703	36.5	3.62	735	38.1	4.03	764	39.4	4.46										
13770	437	22.7	1.60	480	24.9	1.88	521	27	2.17	561	29.1	2.49	599	31.1	2.82	636	33.0	3.17	671	34.8	3.54	704	36.5	3.93	735	37.9	4.34	765	39.5	4.77										
15300	452	23.5	1.96	493	25.6	2.24	532	27.6	2.54	570	29.6	2.86	606	31.4	3.20	641	33.2	3.56	674	34.8	3.93	706	36.4	4.32	737	38.0	4.73	766	39.5	5.16										
16830	469	24.3	2.37	507	26.3	2.66	544	28.2	2.98	580	30.1	3.3	614	31.7	3.65	647	33.4	4.01	679	35.1	4.39	710	36.6	4.79	740	38.2	5.21	768	39.6	5.64										
18360	487	25.1	2.85	523	27.0	3.16	558	28.8	3.48	592	30.5	3.82	624	32.2	4.18	656	33.8	4.55	686	35.4	4.94	716	36.9	5.35	-	-	-	-	-	-										
19890	505	26.1	3.39	539	27.8	3.71	572	29.5	4.05	604	31.2	4.41	635	32.8	4.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
350																																								
13600	436	22.6	1.58	480	24.9	1.85	521	27.0	2.15	561	29.1	2.46	600	31.1	2.79	636	33.0	3.14	671	34.8	3.52	705	36.5	3.90	736	38.0	4.31	766	39.5	4.74										
15300	454	23.5	1.97	495	25.6	2.25	534	27.7	2.55	571	29.6	2.88	608	31.5	3.21	642	33.3	3.57	676	34.9	3.95	707	36.5	4.34	738	38.1	4.75	767	39.6	5.18										
17000	473	24.5	2.44	511	26.5	2.73	548	28.4	3.05	583	30.1	3.38	618	31.9	3.73	650	33.6	4.10	682	35.2	4.48	713	36.8	4.88	742	38.3	5.29	770	39.7	5.72										
18700	493	25.4	2.98	528	27.3	3.29	563	29.0	3.62	596	30.8	3.97	628	32.4	4.33	660	34.0	4.70	690	35.6	5.10	-	-	-	-	-	-	-	-	-	-									
20400	514	26.5	3.60	547	28.2	3.94	579	29.9	4.28	610	31.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
22100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
400																																								
16320	381	19.7	1.83	420	21.6	2.21	457	23.5	2.62	492	25.4	3.05	526	27.1	3.51	559	28.8	3.99	589	30.4	4.50	619	31.9	5.04	646	33.5	5.60	673	34.7	6.18										
18360	395	20.4	2.20	431	22.2	2.58	466	24.0	3.00	500	25.8	3.44	532	27.4	3.90	563	29.0	4.38	593	31.1	4.89	621	32.0	5.34	648	33.4	5.99	673	34.7	6.57										
20400	410	21.1	2.64	444	22.9	3.04	477	24.6	3.47	509	26.2	3.91	540	27.8	4.38	569	29.4	4.87	598	30.8	5.39	625	32.2	5.93	650	33.5	6.49	675	34.8	7.08										
22440	425	21.9	3.17	457	23.6	3.58	489	25.2	4.02	519	26.7	4.47	548	28.3	4.95	576	29.7	5.45	603	31.1	5.97	629	32.4	6.52	654	33.7	7.09	678	34.9	7.08										
24480	440	22.7	3.78	471	24.3	4.21	500	25.8	4.65	529	27.3	5.12	557	28.7	5.61	584	30.1	6.13	610	31.4	6.66	635	32.6	7.21	659	33.8	7.79	682	35.0	8.38										
26520	456	23.5	4.48	485	25.0	4.92	513	26.5	5.39	541	27.9	5.87	567	29.2	6.38	593	30.4	6.91	618	31.7	7.45	642	32.9	8.02	665	34.1	8.60	688	35.3	9.21										
500																																								
19680	405	20.9	2.48	440	22.7	2.87	474	24.4	3.29	506	26.1	3.74	537	27.7	4.20	567	29.2	4.69	596	30.7	5.21	623	32.1	5.74	648	33.5	6.30	674	34.8	6.89										
22140	423	21.8	3.09	455	23.5	3.5	487	25.1	3.93	518	26.7	4.39	547	28.2	4.86	575	29.7	5.36	603	31.1	5.89	629	32.4	6.43	654	33.7	7.00	678	34.9	7.59										
24600	441	22.7	3.82	472	24.3	4.25	501	25.8	4.70	530	27.3	5.17	558	28.8	5.66	585	30.1	6.17	611	31.5	6.71	635	32.6	7.26	660	33.9	7.84	683	35.0	8.43										
27060	460	23.7	4.67	489	25.2	5.12	516	26.6	5.59	543	28	6.08	570	29.2	6.59	595	30.5	7.12	620	31.8	7.67	644	33.0	8.24	667	34.2	8.83	689	35.4	9.43										
29520	481	24.7	5.67	508	26.1	6.15	534	27.4	6.64	559	28.7	7.16	584	30.0	7.69	608	31.2	8.24	631	32.4	8.80	654	33.6	9.39	676	34.7	9.99	697	35.8	10.62										
31980	502	25.8	6.8	527	27.1	7.31	551	28.3	7.83	575	29.5	8.37	598	30.7	8.93	621	31.9	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
600																																								
23600	434	22.4	3.51	465	24.0	3.93	496	25.6	4.38	525	27.1	4.84	554	28.5	5.33	581	29.9	5.83	607	31.3	6.36	633	32.6	6.91	657	33.7	7.48	681	34.9	8.08										
26550	457	23.6	4.50	486	25.0	4.94	514	26.5	5.41	541	27.9	5.90	568	29.3	6.4	593	30.5	6.93	618	31.7	7.47	642	33.0	8.04	666	34.2	8.62	688	35.3	9.23										
29500	481	24.7	5.66	507	26.1	6.14	533	27.4	6.63	559	28.7	7.15	583	30.0	7.68	608	31.2	8.23	631	32.4	8.80	654	33.6	9.38	676	34.2	9.99	697	35.8	10.61										
32450	506	26.0	7.03	531	27.2	7.54	555	28.5	8.07	578	29.7	8.62	601	30.9	9.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
35400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
38350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								

Notes:

- Supply fan performance table includes internal resistance of rooftop + indoor coil. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (filters, optional economizer, optional heating system, optional roof curb).
- The pressure drops from the supply fan to the space should not exceed 550 Pa positive for sizes 275-300-350 and 600 Pa for sizes 400-500-600.
- Maximum motor kW for size 275-300 is 7.5 kW, size 350 is 11 kW, size 400 is 11 kW.
- For motor electrical power input, multiply motor shaft power by 1.16

	Standard motor
	Oversized motor

Installation

Component Air Pressure Drops

Table 9 - Pressure drop through the components

	Airflow (m ³ /h)	Filter			Economizer	Gas heat		Electric heater	Hot water coil
		STD 50mm EU2	50mm EU4	100mm EU4		Low heat	High heat		
275	10880	14	35	33	8	16	13	12	63
	12240	16	39	37	9	19	15	14	76
	13600	19	43	40	11	23	19	17	91
	14960	22	48	44	13	28	22	20	106
	16320	24	52	47	14	32	26	24	122
	17680	27	56	51	16	37	29	27	140
300	12240	16	39	37	9	19	15	14	76
	13770	19	44	41	11	24	19	18	92
	15300	22	49	45	13	29	23	21	110
	16830	25	54	49	15	34	27	25	129
	18360	29	58	53	17	40	31	29	149
	19890	32	63	57	19	46	36	33	169
350	13600	19	43	40	11	23	19	17	91
	15300	22	49	45	13	29	23	21	110
	17000	26	54	49	15	35	27	25	131
	18700	30	60	53	18	41	32	30	153
	20400	33	65	58	20	48	38	35	177
	22100	37	70	62	22	56	43	40	202
400	16320	26	49	45	16	2	7	26	89
	18360	29	55	50	19	2	8	32	108
	20400	32	61	55	22	3	10	39	129
	22440	35	67	60	25	4	12	45	151
	24480	37	73	65	28	4	14	52	174
	26520	40	80	69	31	5	16	60	199
500	19680	31	59	53	21	3	9	36	122
	22140	34	66	59	24	4	11	44	148
	24600	38	74	65	28	4	14	53	176
	27060	41	81	71	31	5	16	62	205
	29520	44	89	76	35	6	19	72	237
	31980	47	96	82	39	8	22	82	270
600	23600	36	71	63	26	4	13	49	164
	26550	40	80	69	31	5	16	60	199
	29500	44	89	76	35	6	19	72	237
	32450	48	97	83	40	8	22	84	277
	35400	52	106	90	45	9	26	98	320
	38350	55	115	96	50	11	30	112	365

Notes:

1. Add only if greater than the R.A. ductwork Pressure drop.
2. Supply fan performance table includes internal resistance of rooftop wet coil pressure drop and 50mm EU2/G2 filters. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (optional filters, optional economizer, optional heating device).

Installation

Table 10 - Supply fan drive selection

5.5kW		7.5kW		11kW		15kW	
drive type	RPM	drive type	RPM	drive type	RPM	drive type	RPM
275-300	A = 460						
	C = 520						
	D = 580						
		E = 650					
		G = 725					
350	A = 460						
	C = 520						
	D = 580						
		E = 650					
		G = 725		G = 725			
400	H = 415						
		K = 465					
		L = 515					
				M = 610			
				N = 685			
500	H = 415						
		K = 465					
		L = 515					
				M = 610			
				N = 685		N = 685	
600		K = 465					
		L = 515					
				M = 610		M = 610	
				N = 685		N = 685	
						P = 737	

Table 11 - Belt drive tensioning

Drive Type	TK* / YK*	Motor kW	Fan pulley diam.	Motor pulley diam.	Belt type	Belt deflection mm	Deflection effort mini kg	Deflection effort maxi kg	Belt tension mini N	Belt tension maxi N
A	275-300-350	5.5	355	118	1-XPB 2500	8.6	2.3	2.9	650	680
C	275-300-350	5.5	400	140	1-XPB 2650	8.6	1.9	2.4	570	600
D	275-300-350	5.5	300	118	1-XPB 2410	8.7	2.2	2.9	650	690
E	275-300-350	7.5	400	180	1-XPB 2680	8.7	2.1	2.7	590	660
G	275-300-350	7.5	400	190	1-XPB 2680	8.6	2	2.5	580	610
G	275-300-350	11	400	190	1-XPB 2650	8.5	3	3.7	810	900
H	400-500	5.5	400	118	1-XPB 2650	9.0	2.3	2.9	660	700
K	400-500-600	7.5	355	112	2-XPB 2530	8.8	1.7	2.1	470	500
L	400-500-600	7.5	400	140	1-XPB 2650	8.8	2.7	3.4	750	800
M	400-500-600	11	300	118	2-XPB 2410	8.7	2.2	2.9	650	690
N	400-500-600	11	335	150	2-XPB 2530	8.7	2.4	3.1	700	740
N	500-600	15	335	150	2-XPB 2530	8.7	2.4	3.1	700	740
P	500-600	15	280	140	2-XPB 2410	8.7	2.7	3.3	730	770

Installation

Electrical Connections

The electric panel is located above the unit's compressor section. The unit is designed to run with 400V +/- 5%/50Hz/3pH.

WARNING! If a speed inverter is installed, it has to be configured according to mains source.

Please refer to page 22 for more information on inverter supply.

Over current protection

The branch circuit feeding the unit must be protected in accordance with national or local codes and max unit amps indicated in Table 12.

Power wiring

The unit's power supply must be provided by 4-wire cable with cross-sectional areas complying with legislation.

2 glands are available on each unit to be able to connect the unit to the main supply either from the side or from the bottom.

The power supply cables must be laid in leak-tight pipes and pass through the bottom of the electric panel. The cables must not be taut.

Appropriate connectors must be provided. Flexible pipe supports are required to prevent noise transmission in the building's structure. Ensure all the connections are tightened.

CAUTION! After completion of wiring, check all electrical connections, and ensure all connections are tight.

Replace and secure all electrical box covers and access doors before leaving unit or connecting power to circuit supplying unit.

Note:

- earthing must be executed in accordance with local legislation.
- the machines are designed for a short-circuit current of 10 kA. In the event of a higher application, contact your Trane sales office.

Table 12 - Electrical characteristics

Unit	Compressor 1 / 2			Indoor Fan				Indoor Fan				Exhaust fan		Outdoor Fan		Electric Heat
	Control			Belt Drive		Direct Drive		Standard drive		Oversized drive		Standard drive		Oversized drive		Max Amps
	Max Amps	Max Amps	Start Amps	Standard drive	Oversized drive	Standard drive	Oversized drive	Standard drive	Oversized drive	Standard drive	Oversized drive	Qty	Max Amps	Qty	Max Amps	
TK*/YK* 275	0.5	25.0/25.0	158/158	5.5	11.9	7.5	15.2	5.5	10.3	7.5	13.9	2.0	1.2	3	2.5	36
TK*/YK* 300	0.5	25.0/27.6	158/197	5.5	11.9	7.5	15.2	5.5	10.3	7.5	13.9	2.0	1.2	3	2.5	54
TK*/YK* 350	0.5	27.6/27.6	197/197	7.5	15.2	11.0	21.1	5.5	10.3	7.5	13.9	2.0	1.2	3	2.5	72
TK*/YK* 400	0.5	27.6/46.4	197/260	7.5	15.2	11.0	21.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	90
TK*/YK* 500	0.5	27.6/79.0	197/320	7.5	15.2	15.0	29.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	108
TK*/YK* 600	0.5	56.4/79.0	260/320	11.0	21.1	15.0	29.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	108
WK*/DK* 400	0.5	36.4/36.4	215/215	7.5	15.2	11.0	21.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	90
WK*/DK* 500	0.5	46.4/46.4	260/260	7.5	15.2	15.0	29.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	108
WK*/DK* 600	0.5	56.4/56.4	320/320	11.0	21.1	15.0	29.1	11.0	18.2	15.0	25.6	2.0	1.2	4	2.5	108

Data for nominal voltage 400V/3/50

Data are subject to change without notice. Please refer to unit nameplate data.

Installation

Scroll compressors

Proper phasing of the electrical power wiring is critical for proper operation and reliability of the scroll compressor and fans.

Proper rotation of the scroll compressor must be established before the unit is started. This is accomplished by confirming that the electrical phase sequence of the power supply is correct. The motor is internally connected for clockwise rotation with the inlet power supply phased A, B, C.

Voyager III units have an integrated phase monitoring device to prevent phase reversal. It is integrated inside the compressor terminal box on 20, 25 and 30 Ton compressors.

The direction of rotation may be reversed by interchanging any two of the line wires. It is this possible interchange of wiring that makes a phase sequence indicator necessary if the operator is to quickly determine the phase rotation of the compressor motor.

The "ABC" indicator on the face of the phase indicator will glow if phase is ABC for terminals L1, L2, and L3.

WARNING! Disconnect all power, including remote disconnects, and discharge all capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After power is removed, allow 14 minutes for capacitors to discharge. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and/or discharge capacitors before servicing could result in death or serious injury.

Options

80-100% Supply Fan Frequency Inverter

The 80-100% frequency inverter is a factory installed, programmed and tested option, used mainly to lower operation and maintenance costs.

It can be used also to adjust the air flow and for textile duct applications.

The inverters drive the supply fan motors at 80% or 100% of the nominal speed according to the cooling and the heating capacity steps of the rooftops. Inverters are electrically enslaved to the compressors and gas burner contactors.

The starting time is factory set at 60 seconds but can be adjusted on site with the VFD parameter n°207.

When both options "2 speed inverter" and "fan failure switch" are ordered at the same time, the starting time must not exceed 90 seconds. The nominal speed of the motor can be adjusted on site with the VFD parameter n°205. For direct driven fan, refer to Table 13 to adjust nominal speed (parameter [205]) and ramp up time (parameter [207])

CAUTION! Unit with speed inverter shall not operate in outdoor ambient temperature higher than 46°C.

High voltage WARNING!

The voltage of the frequency converter is dangerous whenever the converter is connected to mains. Consequently, it is essential to comply with the instructions in the Inverter manual.

These rules concern your safety:

1. The frequency converter must be disconnected from the mains if repair work is to be carried out. Check that the mains has been disconnected and that the prescribed time has passed before removing motor and mains plugs.
2. The [STOP/RESET] key on the control panel of the frequency converter does not disconnect the equipment from mains and is thus not to be used as a safety switch.
3. The earth leakage currents are higher than 3.5 mA.
4. Do not remove the plugs for the motor - and mains while the frequency converter is connected to mains. Check that the mains has been disconnected and that the prescribed time has passed before removing motor and mains plugs.
5. Note that the frequency converter has more voltage inputs than L1, L2 and L3 when the DC bus terminals are used. Check that all voltage inputs are disconnected and that the prescribed time has passed before repair work is commenced.

It can be extremely dangerous to touch the electrical parts even when the mains supply has been disconnected.

Also ensure that other voltage inputs are disconnected from load sharing through the DC bus.

Wait at least 14 minutes after the input power has been removed before servicing the drive.

WARNING! against unintended start

1. The motor can be brought to a stop by means of digital commands, bus commands, references or a local stop, while the frequency converter is connected to mains. If personal safety considerations make it necessary to ensure that no unintended start occurs, these stop functions are not sufficient.
2. While parameters are being changed, the motor may start. Consequently, the stop key [STOP/RESET] must always be activated, following which data can be modified.
3. A motor that has been stopped may start if faults occur in the electronics of the frequency converter, or if a temporary overload or a fault in the supply mains or the motor connection ceases.

In any case, the operator must be out of the unit when the unit is connected to mains.

Options

Table 13 - VFD Direct drive data

Unit	Size	Motor kW	Nb of poles	Motor RPM	VFD reference setting: parameter [205]						Factory setting
					Factory setting		Minimum speed Hz / RPM	Maximum speed Hz / RPM	Adjusted ramp-up time for effective 60 sec ramp parameter [207]		
					Nominal speed Hz / RPM						
TK*/YK*	275	5.5	6 Poles	963 RPM	29.9 Hz	576 RPM	20.0 Hz	385 RPM	39.8 Hz	767 RPM	75.4 s
TK*/YK*	300	5.5	6 Poles	963 RPM	29.5 Hz	569 RPM	20.0 Hz	385 RPM	39.0 Hz	752 RPM	76.8 s
TK*/YK*	350	5.5	6 Poles	963 RPM	28.7 Hz	553 RPM	20.0 Hz	385 RPM	37.4 Hz	721 RPM	80.1 s
TK*/YK*/WK*/DK*	400	11	6 Poles	970 RPM	27.4 Hz	532 RPM	20.0 Hz	388 RPM	34.8 Hz	675 RPM	86.2 s
TK*/YK*/WK*/DK*	500	11	6 Poles	970 RPM	27.5 Hz	533 RPM	20.0 Hz	388 RPM	34.9 Hz	678 RPM	85.8 s
TK*/YK*/WK*/DK*	600	11	6 Poles	970 RPM	26.6 Hz	517 RPM	20.0 Hz	388 RPM	33.2 Hz	645 RPM	90.2 s
TK*/YK*	275	7.5	6 Poles	970 RPM	33.2 Hz	645 RPM	20.0 Hz	388 RPM	39.8 Hz	772 RPM	75.4 s
TK*/YK*	300	7.5	6 Poles	970 RPM	33.5 Hz	650 RPM	20.0 Hz	388 RPM	39.6 Hz	768 RPM	75.8 s
TK*/YK*	350	7.5	6 Poles	970 RPM	33.7 Hz	653 RPM	20.0 Hz	388 RPM	39.6 Hz	768 RPM	75.8 s
TK*/YK*/WK*/DK*	400	15	6 Poles	973 RPM	32.4 Hz	630 RPM	20.0 Hz	389 RPM	35.4 Hz	689 RPM	84.7 s
TK*/YK*/WK*/DK*	500	15	6 Poles	973 RPM	32.6 Hz	635 RPM	20.0 Hz	389 RPM	35.8 Hz	697 RPM	83.8 s
TK*/YK*/WK*/DK*	600	15	6 Poles	973 RPM	32.9 Hz	640 RPM	20.0 Hz	389 RPM	35.8 Hz	697 RPM	83.8 s

To change ramp-up time, use the following formula:

$$\text{parameter [207]} = \text{desired ramp up time (s)} \times \frac{50}{\text{Maximum speed (Hz)}}$$

For example, to raise ramp up time to 75s on a YKD250 standard drive, set parameter [207] = 110

Options

RFI switch Mains supply isolated from earth:

If the frequency converter is supplied from an isolated mains source (IT mains), the RFI switch can be turned off (OFF). In OFF position, the internal RFI capacities (filter capacitors) between the chassis and the intermediate circuit are cut off to avoid damage to the intermediate circuit and to reduce the earth capacity currents (according to IEC 61800-3).

NB! The RFI switch is not to be operated with mains connected to the unit. Check that the mains supply has been disconnected before operating the RFI switch.

NB! The RFI switch disconnects the capacitors galvanically from ground.

The switch Mk9, placed next to terminal 96, should be removed to disconnect the RFI-filter.

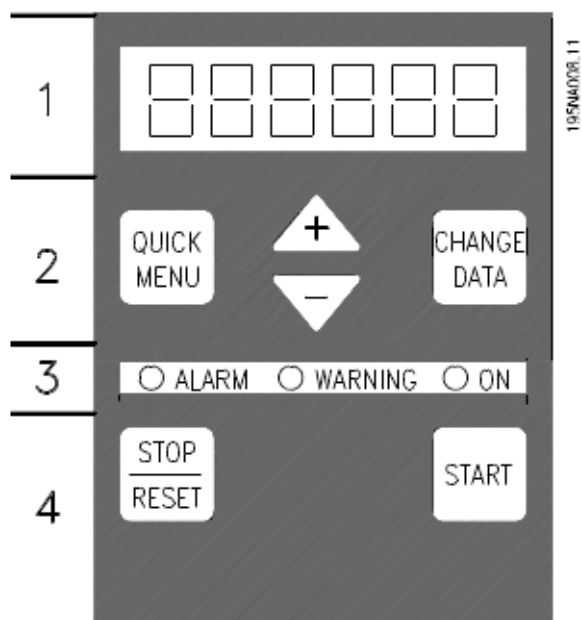
The RFI switch is only available on TR1 2880-2882 (11.00 and 15.00kW).

With IT mains, it is recommended to protect the rooftops with a 300mm differential switch.

• Control unit

On the front of the frequency converter there is a control panel.

Figure 10



The control panel is divided into four function groups:

1. Six-digit LED display.
2. Keys for changing parameters and shifting display function.
3. Indicator lamps.
4. Keys for local operation.

All displays of data are in the form of a six-digit LED display capable of showing one item of operating data continuously during normal operation. As a supplement to the display, there are three indicator lamps for indication of mains connection (ON), warning (WARNING) and alarm (ALARM). Most of the frequency converter's parameter Setups can be changed immediately via the control panel, unless this function has been programmed as Locked [1] via parameter 018 *Lock for data changes*.

• Control keys

[QUICK MENU] allows access to the parameters used for the Quick menu.

The **[QUICK MENU]** key is also used if a change to a parameter value is not to be implemented. See also **[QUICK MENU] + [+]**.

[CHANGE DATA] is used for changing a setting. The **[CHANGE DATA]** key is also used for confirming a change of parameter settings.

[+]/[-] are used for selecting parameters and for changing parameter values.

These keys are also used in Display mode for selecting the display of an operating value.

The **[QUICK MENU] + [+]** keys must be pressed at the same time to give access to all parameters. See *Menu mode*.

[STOP/RESET] is used for stopping the connected motor or for resetting the frequency converter after a trip.

Can be selected as Active [1] or Not active [0] via parameter 014 Local stop/reset. In Display mode, the display will flash if the stop function is activated.

NB!

If the **[STOP/RESET]** key is set at Not active [0] in parameter 014 Local stop/reset, and there is no stop command via the digital inputs or serial communication, the motor can only be stopped by disconnecting the mains voltage to the frequency converter.

[START] is used for starting the frequency converter. It is always active, but the **[START]** key cannot override a stop command.

Options

Soft Starter

A variable speed drive is used as a soft starter to achieve a progressive supply fan starting and a reduced starting current as well as the motor starting torque. This option is well adapted for textile duct applications. It is factory installed in the main control panel.

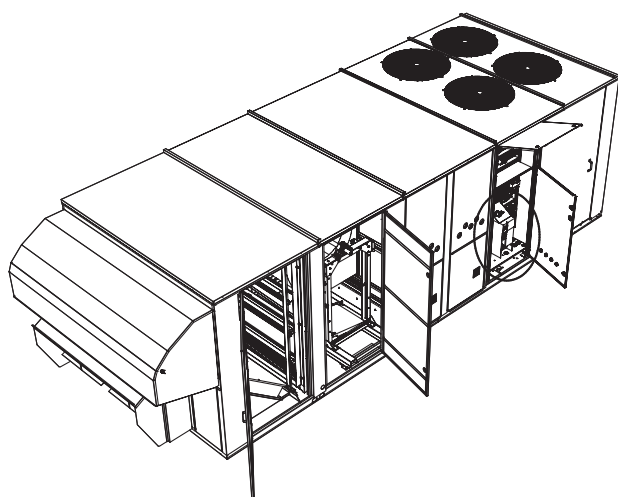
The ramp-up time is factory set at 60 seconds but can be adjusted on site with the VFD parameter n°207. For direct driven fan, refer to Table 13 to adjust nominal speed (parameter [205]) and ramp up time (parameter [207])

When both options "Soft starter" and "fan failure switch" are ordered at the same time, the starting time must not exceed 90 seconds.

The nominal speed of the motor can be adjusted on site with the VFD parameter n°205.

For more information about changing parameters and programming, see the VFD manual ref TR1-SVX15A.

Figure 11 - VFD (Soft starter & 80-100% speed control) location



0-25% Fresh Air Hood

The 0-25% fresh air hood allows to introduce fresh air into the unit. This is a manual device fitted on the back of the unit, sized for a maximum of 25% of the nominal rooftop air flow.

This option includes for the hood itself, a wire mesh and a slidable damper.

The slidable damper has to be adjusted manually by removing the screws and sliding it off up or down (Figure 11).

The amount of fresh air introduced is then permanently fixed.

Barometric Relief

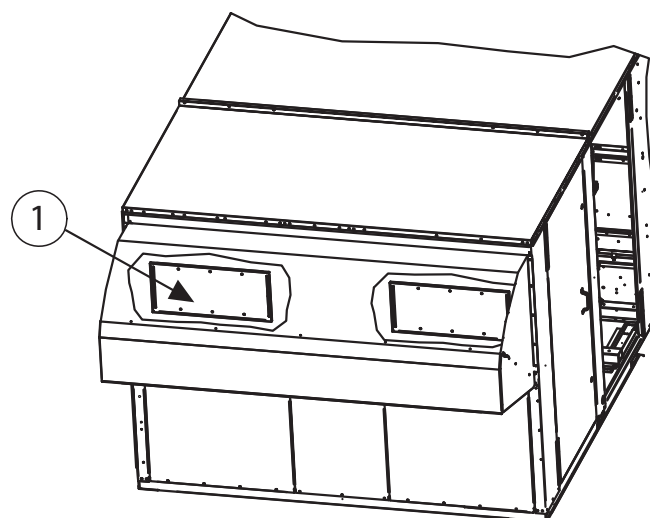
The barometric relief allows to minimize overpressure in the building caused by the introduction of fresh air. This option is typically installed when fresh air intake is below 25% of the nominal air flow and when the return air pressure drop is below 25Pa.

This option includes exhaust hoods and gravity dampers located in the return air section. When the pressure of the building increase, the gravity dampers open and relieve air to the outside.

If the return air duct pressure drop is higher than the building overpressure, the gravity dampers will not open.

If the return air duct pressure drop is lower than the building overpressure, the gravity dampers will open and relieve air outside of the building.

Figure 12 - 0-25% manual fresh air damper



1. Slidable dampers

Options

Exhaust Fans

The exhaust axial fans are used to minimize the overpressure in the building caused by the introduction of fresh air.

This option is typically used when the fresh air intake needed is between 40 to 50% of the nominal air flow or when the return air duct pressure drop is higher than 25Pa.

This option includes hoods, gravity dampers and two axial fans. (Figure 12)

Both fans work always synchronized with one stage.

A potentiometer installed in the Air inlet section allows to adjust the exhaust fan set point, corresponding to the fresh air damper position.

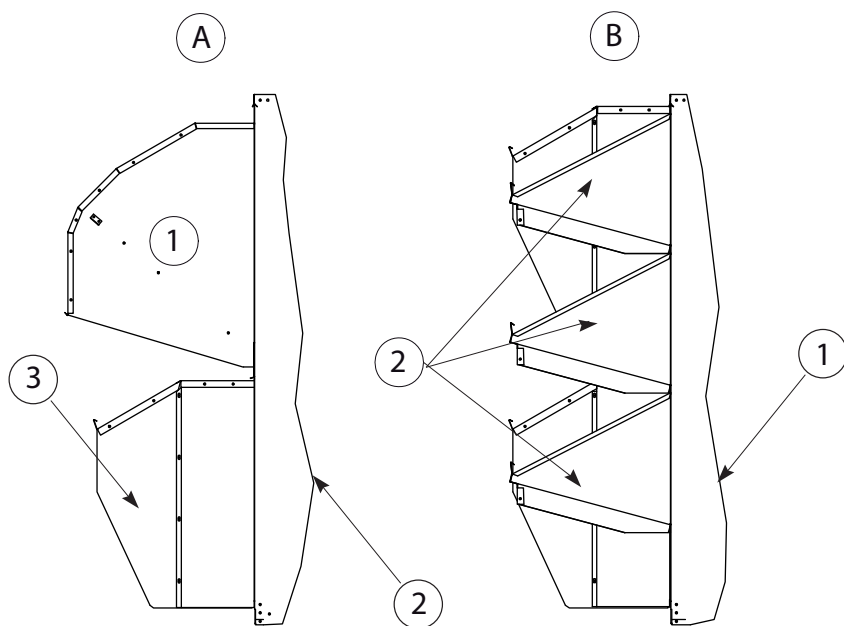
When the supply air fan is ON, the exhaust fans turn on whenever the position of the fresh air dampers meet or exceed the exhaust fan set point. (If the potentiometer is set at 40%, the exhaust fans will start when the fresh air dampers will meet or exceed 40% opening).

Table 14 - Exhaust fan performances

External Static Pressure (Pa)		
Exhaust Airflow	Step 1 ESP	Step 2 ESP
m³/h	Pa	Pa
1690	186,8	199
2560	169,4	194
3380	162	187
4250	130	179
5110	105	169
5940	77	162
6800	62	152
7630	37	140
8500	0	130
9360		115
10190		105
11050		90
11880		77
12740		62
13610		50
14440		37
15300		25
16130		10
16990		0

Notes:

- Step 1 = 1 exhaust fan motor operating.
Step 2 = 2 exhaust fan motor operating.
- Power Exhaust option is not to be applied on systems that have more return air static pressure drop than the maximum shown in the table for each motor speed tap.



A. Side view showing fresh air and power exhaust hoods for downflow configuration

- Fresh air hood
- End of unit
- Power exhaust hood

B. Side view showing power exhaust hoods for horizontal configuration

- End of unit
- Power exhaust hood

Options

Hot Water Coil

Low pressure hot water coils are fitted in the fan discharge plenum.

The hot water coil is provided with a fully modulating 3-way valve, a stop valve, a draining trap and an anti freeze protection.

When the temperature around the coil approaches the freezing point (2°C), the anti frost thermostat open the 3-way valve to 100%. No signal output available.

Max operating pressure: 4 bars

Max water temperature: 90°C

Installation and connection

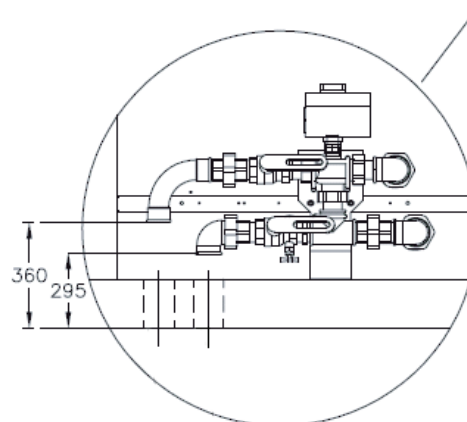
In order to prevent water from freezing up in the coil during unoccupied period or shutdown limited period, it is recommended to use ethylene glycol. The services of a water treatment specialist are recommended if water used can cause scaling deposits or erosion. Insulate all the water piping likely to be exposed to freezing temperatures in order to avoid freeze up of the coil and heat losses. The water distribution network must be fitted with vents in places where air is likely to be trapped.

Table 15 - Ethylene glycol percentage

Ethylene glycol percentage	Freezing point
(%)	(°C)
10	-4
20	-10

Water inlet connection: 1"1/4 ISO R7
Water outlet connection: 1"1/4 ISO R7

Figure 13 - Hot water coil connections



The hot water coil is factory mounted and placed in the discharge section. Two holes are provided to connect the hot water coil. They are located in the base of the unit. Remove the central panel or the EVP panel to access the coil, using an 8-mm wrench (The bolts are located on the bottom part of the panel). The tubes for entering and leaving water are equipped with a threaded female connection.

Electric Heater

Electric heaters are fitted on the supply fan discharge.

Heaters have two heating stages and provided with two types of overheat thermostats:

- Automatic reset thermostats which stop the electric heater when the air temperature rises to 76°C. Automatic reset at 60°C. No alarm output available.
- The manual reset thermostat which stops the unit when the air temperature rises to 120°C. No alarm output available.

Heat Recovery Module

For heat recovery option installation/Operation and maintenance, please refer to document RT-SVX42.

Controls

Control Wiring

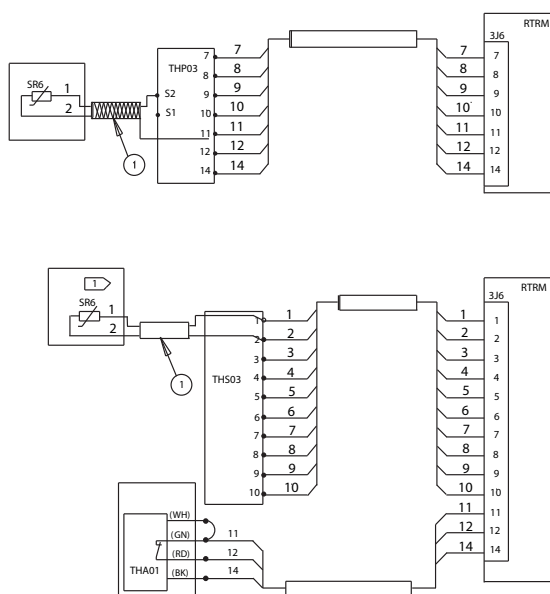
The control circuit is 24V AC. Unit includes a 400/24V transformer.

WARNING! The unit disconnect switch must be opened and locked open. Risk of injury and electrocution.

CAUTION! The unit 24V transformer must not be used to power accessories mounted on site, other than those proposed by Trane.

Unit controlled by thermostat

Figure 14 - Thermostat wiring



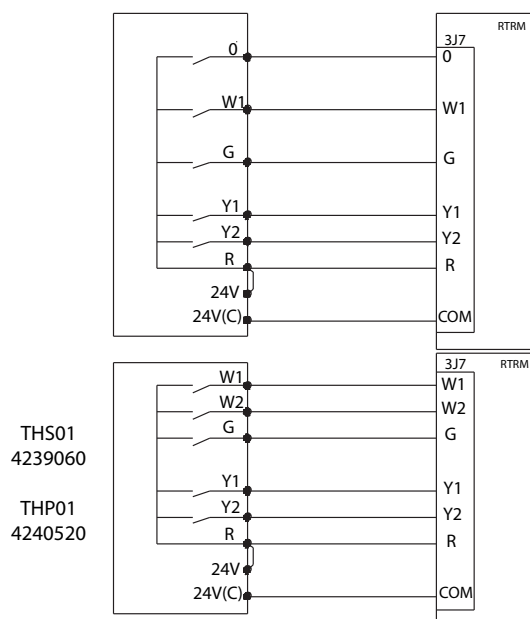
Conventional Thermostats are directly connected to RTRM board (J7 connector). TRANE THP03 thermostat is directly connected to RTRM board (J6 connector).

Install the electrical link between the thermostat (thermostat terminal strip) and the unit (J6 or J7 connector) in compliance with the interconnection diagram. The low voltage wiring must not be laid in the same pipes as the power cables.

The sizes and lengths of the thermostat connection wires are given in Table 16. The total resistance of these control cables must not exceed 5 ohms. If the resistance exceeds this value the thermostat may not operate with the same precision.

Table 16 - Zone sensor wire size and maximum length

	Wire size (mm ²)	Maximum wire length (m)
THS / THP 03	0.33	45
	0.5	76
	0.75	115
	1.3	185
	2	300
Conventional thermostat	0.33	10
	0.5	15
	0.75	23
	1.3	37
	2	60



Controls

Unit controlled by BAS

Each unit must be equipped with a TCI-R board. A communication bus (twisted shielded pair) must link each TCI-R to the Trane Roof Top Manager (RTM) or to the communication gateway (in the case of an external BAS). Connect one temperature sensor to each unit. LonTalk® communication interface LTCL-R board allows ICS communication between a ReliaTel™ unit and LonTalk® communication applications.

Modbus communication interface PIC board allows ICS communication between a ReliaTel™ unit and Modbus communication applications. It needs to be ordered with a TCI-R to operate. Refer to manual BAS-SVX09 for more detail on PIC board.

Unit controlled by Tracker™ supervisor

The units must also be equipped with the TCI-R communication board. One remote sensor is required on each unit for a constant flow volume. In the case of a variable flow installation (VariTrac™) these sensors must not be installed. A twisted shielded pair must be used for the communication link. The main functions of the Tracker™ supervisor are control of setpoints, timetable management (Programming) and display of faults. For more details refer to the supervisor documentation.

CO₂ Sensors

Table 17 - Specifications

	Wall-mounted	Duct-mounted
Measuring range CO ₂	0-2000 ppm	
Accuracy at 25°C	< +/- [40 ppm CO ₂ + 3% of reading] (included repeatability and calibration uncertainty)	< +/- [30 ppm CO ₂ + 2% of reading] (included repeatability and calibration uncertainty)
Non-linearity	<1.0% full scale	
Temperature dependence of output	0.3% full scale/°C	
Long-term stability	<5.0% full scale/5 years	
Recommended calibration interval	5 years	
Response time	1 minute (0-63%)	
Operating temperature	15-35°C	- 5-45°C
Storage temperature	-20-70°C	
Humidity range	0-85% relative humidity	
Airflow range	0-10 m/s)	
Output signals (jumper selectable)	0-10Vdc	
Resolution of analog outputs	10 ppm CO ₂	
Recommended external load	Ohms min. 1000	
Power supply	Nominal 24Vac	
Power consumption	<5 VA	
Warm-up time	<15 minutes	
Dimensions (mm)	108x80x36	80x80x200

Controls

Power supply requirements

CAUTION! Make sure that you connect the power wire only to the 24V terminal. Connecting the power wire to the output terminal may result in equipment damage.

The CO₂ sensor is designed to operate with a nominal 24 Vac supply. The power supply should maintain the voltage between 20 to 26 Vac.

Table 18 - CO₂ sensor wire size

Cross section (mm ²)	Maximum wire length (m)
0.25	50
0.5	100
1	200

Wiring the wall-mounted CO₂ sensor

DVC setpoint potentiometer on economizer module can be adjusted as follows:

0% - 500ppm, 50% - 1000 ppm, 100% - 1500ppm

The outside air damper will modulate from minimum position setting to up to 100% while attempting to maintain the CO₂ setpoint.

To connect the wall mounted CO₂ sensor, Refer to the wiring diagram provided in the unit.

Wiring the duct-mounted CO₂ sensor

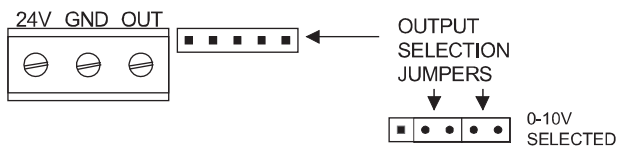
1. Connect the DCV signal wire to the connector DCV of the RTEM.
2. Connect the power according to the guidelines in Power supply requirements.

To connect the wall mounted CO₂ sensor, Refer to the wiring diagram provided in the unit.

Mounting the wall-mounted sensor

1. Select a proper location in the room to mount the CO₂ sensor. Look for an interior wall with good air circulation, approximately 1.4 m from the floor.
2. Remove the back plate from the sensor and thread the power wires and output signal wire through the hole in the back plate.
For surface wiring, make cut-outs with pliers to the thinner section of the upper or lower edge of the back plate and to thread the wires through.
3. Mount the back plate to the wall with screws. Note that the arrow on the back plate shows the mounting direction.

Figure 15 - Jumper settings



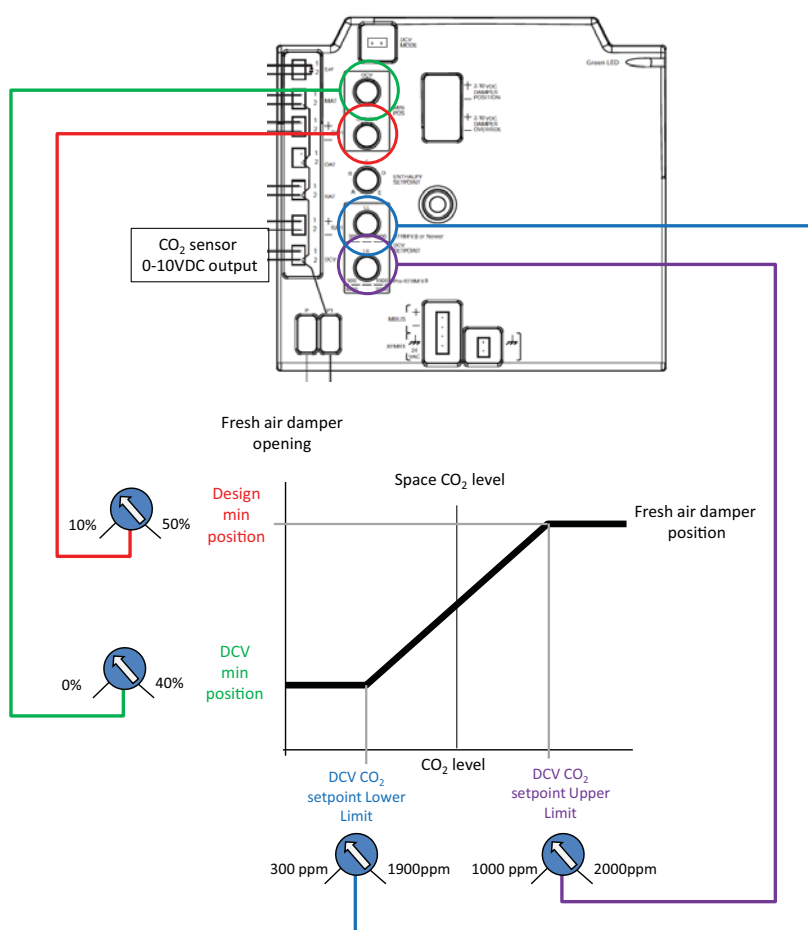
Controls

Mounting the duct-mounted CO₂ sensor

1. Select a proper location on the duct to mount the CO₂ sensor.
2. Drill a 22-25mm hole in the mounting surface for sensor insertion.
3. Attach the mounting plate to the duct wall with four screws.
4. Insert the sensor through the mounting plate, adjusting the depth for optimal air sensing.

CO₂ sensor maintenance

This CO₂ sensor has excellent stability and requires no maintenance. In most environments the recommended calibration interval is five years. A trained service technician can use a portable CO₂ meter to certify sensor calibration. If, when checking the sensor, the reading differs too much from the reference value, the sensor can be recalibrated in the field. A calibration kit, software, and calibration gases are required. If certified accuracy is required, the sensor must be calibrated against accurate and traceable calibration gases in a laboratory. Consult Trane BAS for further details.



Controls

Remote Potentiometer

To install the remote potentiometer, cut the jumper WL on the economizer RTEM board, and connect the wires to P and P1.

Note: This potentiometer allows to adjust the permanent fresh air intake from 0 to 50%.

0 Ω corresponds to closed fresh air damper.

270 Ω corresponds to 50% open fresh air damper.

Note: This potentiometer allows to adjust the permanent fresh air intake from 0 to 50%.

0 Ω corresponds to closed fresh air damper.

270 Ω corresponds to 50% open fresh air damper.

Figure 16 - Remote potentiometer dimensions

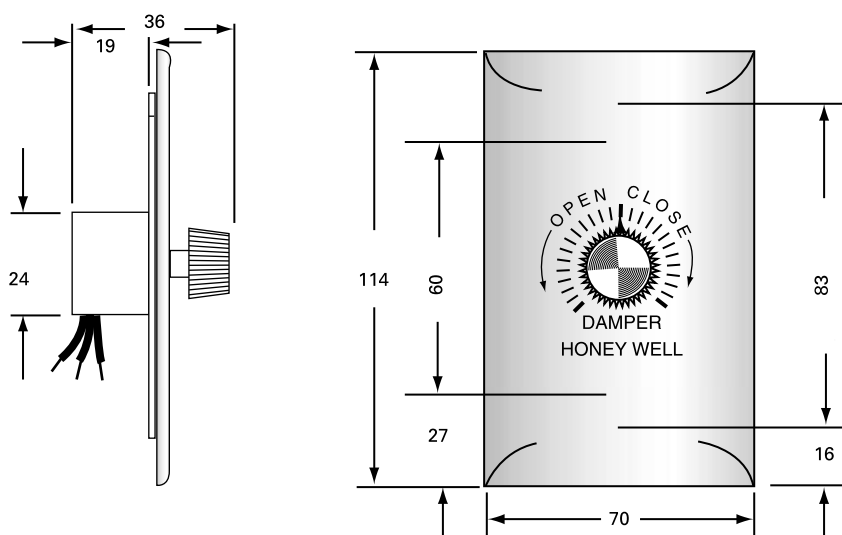
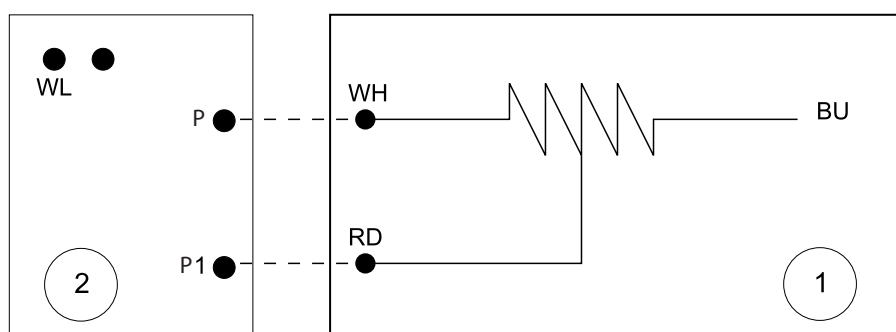


Figure 17 - Remote potentiometer wiring



1 = Remote potentiometer

2 = RTEM Board

WH = White wire

RD = Red Wire

BU = Blue wire

— Factory wiring

----- Field wiring

Fire Thermostat

There are two sensors in the fire thermostat Kit: Sensor X13100040-01 is factory-set to open at 57°C. Sensor X13100040-02 is set to open at 115°C.

Sensors are mounted directly in the ductwork. They should be installed where elements can respond quickly to air temperature changes. If not possible, the sensor may be installed on a suitable bracket so the air is drawn across the element. Sensor X13100040-01 has to be mounted in the return air duct. Sensor X13100040-02 has to be mounted in the supply air duct.

Note: Do not permit element guard to touch internal parts. Do not locate sensor where the air circulation is restricted by baffles.

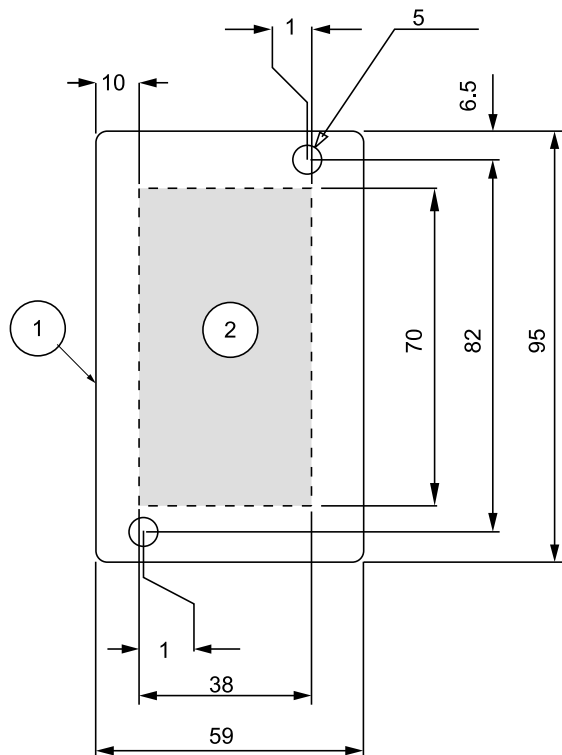
Connection of the fire thermostat with TCI board:
Refer to the wiring diagram provided in the unit.

Connection without TCI board

Connect according to the standard wiring diagram provided on the unit.

Remove sensor cover and fasten control securely with screws. Loads connected must not exceed 2 amps, 30V Ac.

Figure 18 - Duct mounting of fire thermostat



1 = Fire thermostat
2 = Hole in the duct

Clogged Filter Detector

This device is mounted in the filter section. The sensor measures the difference in pressure before and after the filter section. The information is sent to the THP03 thermostat, to a Tracker™ or to a BMS.

Smoke Detector

This device is used to detect smoke in the air stream. It includes a factory mounted detector connected to a central panel, both fitted in the fan section.

When smoke is detected, it shuts off the unit. A dry contact is available on the control panel for a remote default.

High Temperature Safety Thermostat

This additional safety device is a manual reset thermostat for gas fired units (YKD/YKH), required mainly by the French ERP regulation. It is located in the gas burner section. It stops the gas burner and the supply air fan when the supply air temperature rises to 120°C.

Remote Fault Relay

This is a factory mounted relay used to send alarm signals (dry contact) to a local BMS or a local control panel. With this relay, the compressor, heating, fan and power supply alarm output signals from the controller are reported to a single dry contact.

Thermostats

Two thermostats are available:

THS03 and THP03.

“THS” are non programmable thermostats,

“THP” are programmable.

03 series are dedicated to the controller.

Controls

Table 19 - Thermostats features

	THS03	THP03
Non-programmable	X	-
Programmable	-	X
Electronic	X	X
Control type design	Reliabel	Reliabel
For Cooling Only units	X	X
For Heat Pump units	X	X
For Gas Fired units	X	X
Number of Cooling stages	2-3	2-3
Auxiliary heating stages (electric heater, hot water coil)	2	2
Heating stages (heat pump mode)	2	2
Liquid crystal display	-	X

Other accessories available

TZS01: Remote room temperature sensor to be used with THS/THP 03, Tracker or Varitrac systems.

DTS: Duct temperature sensor to be used with THS/THP 03.

TZS02: Remote room temperature sensor with adjustable thumbwheel setpoint to be used with Tracker or Varitrac systems.

Refer to separate documentation for more information.

Three-Phase Monitoring Relay

This device monitors three-phase power supply in order to protect unit motors.

Standard functions include phase loss and phase reversal. An additional imbalance option is available. This option is recommended when there are risks of power supply imbalance, phase reversal or when power factor correction capacitors are used.

The relay disables the unit control when one of the following failures occurs on power supply: phase reversal, phase loss, phase imbalance (adjustable setting). The recommended setting is as follows: 5% imbalance on 3-phase voltage. Duration of imbalance should be set at 5 seconds.

Communication Interfaces

TRANE Communication Interface (TCI-R) board

This is an electronic board, factory-mounted in the main control panel, needed to allow communication between a TRANE Integrated Comfort system (Varitrac CCP3) and the unit. (COM3-COM4).

LON Communication Interface (LCI-R) board

This is an electronic board, factory-mounted in the main control panel, needed to allow communication on a LonTalk® Network at the unit level.

Network variables are based on the LonMark®. Space Comfort Controller Functional Profile Template. The LCI-V uses a Free Topology transceiver FTT-10A. The FTT-10A transceiver supports non-polarity sensitive, free topology wiring, allowing the system installer to use star, bus, and loop architecture. The LCI-V can also be connected to an optional High Temperature Limit Switch if installed with the rooftop unit. For more information, see attached manual LTCI-IN-1.

LCI-R is mandatory when the rooftop is controlled by a Tracker centralized controller.

Modbus interface - PIC Gateway

This is modbus gateway using Comm3 protocol of TCI-R board. The PIC uses the Modbus protocol by using a RS-232 or a RS-485 link. For more information, please refer to manual BAS-SVX09.

Operation

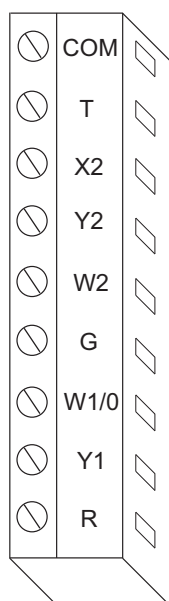
Operation with a Conventional Thermostat

The ReliaTel module has conventional thermostat connections as well as Zone Sensor Module connections. When a conventional thermostat is controlling the unit, operation differs as follows.

- Supply Air Tempering feature is not available. If outdoor air is being introduced through the equipment, discharge air temperature may be cold when not actively heating.
- Proportional Integral (PI) control is not available.
- Zone Sensor Diagnostics are only available on the RTRM module on the J6 terminals, instead of at the Zone Sensor in the space.
- Intelligent Fall-Back is not available. If a failure occurs in the device controlling the equipment, operation will cease.
- Heat Pump Smart Recovery and Smart Staging is not available. Heat Pump operation becomes more costly unless the generic control being applied can accomplish this.
- Remote Sensing Capabilities are not available on most mechanical thermostats.
- Space Temperature Averaging capabilities are not available on most mechanical thermostats.
- Built in Night Set Back and Unoccupied Functions function differently with a conventional mechanical thermostat.
- A built-in algorithm which allows for automatic reset of the discharge air temperature while economizing is not available.

The terminal strip for attaching the thermostat wires is located on the RTRM module in the control compartment.

The purpose of each terminal is discussed in the next section.



Customers occasionally require operation with a conventional thermostat rather than a zone sensor. In some cases there is a preference for a specific thermostat model, and in others there is reluctance to adopt newer technology that may not be as well understood as conventional thermostats. In addition, non-Trane Building Controllers typically provide an interface to HVAC equipment based on a conventional thermostat interface. Units applied with this type of controller need to accept conventional thermostat inputs.

Conventional thermostat signals represent direct calls for unit functions. In their simplest applications, thermostat contacts directly control contactors or other load switching devices. This function provides inputs for the thermostat signals and processing to enhance reliability and performance. Compressor protection and reliability enhancement functions (HPC, LPC, Minimum On/Off timers, etc.). All operate the same whether applied with zone sensors or a conventional thermostat.

Logic is also provided to cause appropriate unit functions when inappropriate thermostat signals are provided. Simultaneous calls for heating and cooling will be ignored, and the fan will be turned on with a call for heating or cooling even if the fan request is not detected.

If the thermostat is immediately changed from a heating to a cooling call, or vice versa, there will be a five minute delay before the new call will initiate.

Thermostat signals are as follows:

R 24VAC power to thermostat

Y1 Call for compressor 1 or first stage cooling

Y2 Call for compressor 2 or 2nd stage cooling

G Call for supply fan

W1 Call for heat 1

W2 Call for heat 2

Heat pump only:

X2 Call for emergency heat

O Switchover valve On = cooling, Off = heating

T Bias for heat anticipation for those mechanical thermostats that use this function.

Operation

Conventional thermostat – Gas/Electric, Electric Heat:

Input/connection	Function when energized
G (fan)	Fan runs continuously except during unoccupied mode (see next page)
Y1 (compressor 1 or economizer)	Compressor #1 runs or economizer operates
Y2 (compressor 2 or compressor 1 while economizing)	Compressor #2 also runs, or #1 compressor runs while economizing
W1 (gas/electric heat 1st stage)	1st stage heat
W2 (gas/electric heat 2nd stage)	2nd stage heat (if available)

Unoccupied mode:

If the thermostat being used is programmable, it will have its own strategy for unoccupied mode and will control the unit directly. If a mechanical thermostat is being used, a field applied time clock with relay contacts connected to J6-11 and J6-12 can initiate an unoccupied mode as follows:

- Contacts open: Normal occupied operation.
- Contacts closed: Unoccupied operation as follows - Fan in auto mode regardless of fan switch position. Economizer closes except while economizing regardless of minimum position setting.

Cooling/Economizer Operation:

If unit does not have an economizer, the Cool/Econ Stage 1 and Stage 2 will call directly for mechanical cooling (compressor) stages. If the unit has an economizer, the Cool/Econ stages will function as follows

Conventional thermostat – Heat Pump:

Input/connection	Function when energized
Cooling mode:	
G (fan)	Fan runs continuously except during unoccupied mode (see next page)
O (reversing valve during cooling)	Reversing valve in cool mode
Y1 + O (first stage cooling)	Compressor #1 runs or economizer operates
Y1 + Y2 + O (2nd stage cool)	Compressor #2 also runs, or #1 compressor runs while economizing.
Heating mode:	
G (fan)	Fan runs continuously except during unoccupied mode (see next page)
Y1 (Compressor 1st stage heat)	Compressor #1 runs
Y1+Y2 (Compressor 2nd stage heat)	Compressor #2 also runs
W1 (Aux. heat 1st stage)	1st stage (auxiliary heat)
W2 (Aux. heat 2nd stage)	2nd stage (auxiliary heat)
X2 (auxiliary heat only)	Auxiliary heat only - no compressors

Table 20 - Cooling/Economizer Operation with Thermostat 1, 2

OK to Economize?	Thermostat Y1	Thermostat Y2	Call for Economizer Cooling	Compressor Staging Request
No	On	Off	Inactive	Compressor Output 1
No	Off	On	Inactive	Compressor Output 2
No	On	On	Inactive	Compressor Outputs 1 & 2
Yes	On	Off	Active	Off
Yes	Off	On	Active	Compressor off
Yes	On	On	Active	Compressor

Operation

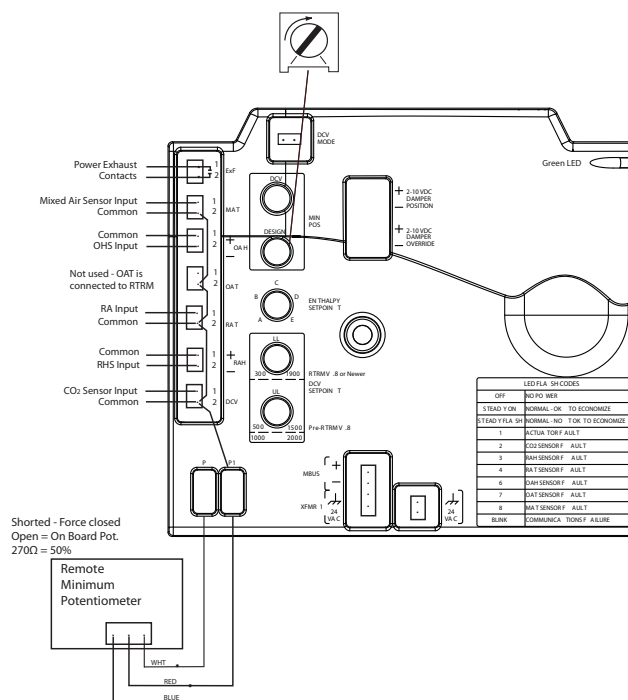
Setting the Economizer or 0-50% Motorized Hood (Option)

The RTEM board is mounted on the damper actuator. To access the RTEM board on economizers:

- Remove the access panel located on the economizer section.
- The electrical power must be disconnected to set the minimum position and check the economizer.
- Disconnect the power supply, put the thermostat fan selector to "ON" and the "HEAT/COOL" selector to "OFF". This puts the damper in the minimum ventilation position.
- To set the required minimum ventilation air position, turn the dial on the RTEM clockwise to increase ventilation, or anti-clockwise to decrease ventilation. The damper will open at this setting whenever the fan circuit is powered up.
- When the arrow on the dial adjustment screw is pointing to 8 o'clock, the minimum position is roughly 0%. When the dial is pointing to 12 o'clock it is roughly 25%, and when the dial is pointing to 4 o'clock it is roughly 50%

To check the damper is functioning correctly, the RTEM is equipped with an indicator light in the middle of the board. This light operates as in Table 21.

Figure 19 - Minimum fresh air adjustment



1 = RTEM board

Table 21 - RTEM board LED

OFF:	No Power or Failure
ON:	Normal, OK to Economize
Slow Flash:	Normal, Not OK to Economize
Fast Flash:	Communications Failure
Pulse Flash:	Error Code
1 Flash:	Actuator Fault
2 Flashes:	CO ₂ Sensor
3 Flashes:	RA Humidity Sensor
4 Flashes:	RA Temp Sensor
5 Flashes:	OA Quality Sensor
6 Flashes:	OA Humidity Sensor
7 Flashes:	OA Temp Sensor
8 Flashes:	MA Temp Sensor
9 Flashes:	RAM Fault
10 Flashes:	ROM Fault
11 Flashes:	EEPROM Fault

While setting the minimum position the damper may move toward the new setting in several small steps. Once the damper has remained in the same position for 10 to 15 seconds it can be assumed it is in the new position.



Operation

Test Procedures

Operating checklist before start-up

- Unit is level, with sufficient clearance all round
- Duct network is correctly sized according to the unit configuration, insulated, and water-tight
- Condensate drainage line is correctly sized, equipped with a trap, and sloped
- Filters are in position, of correct size and quantity and clean
- Wiring is correctly sized and connected in accordance with wiring diagrams
- Power supply lines are protected by recommended fuses and correctly earthed
- Thermostat is correctly wired and positioned
- Unit is checked for refrigerant charge and leaks
- Indoor and outdoor fans rotate freely and are fixed on shafts
- Supply fan rotation speed is set
- Access panels and doors are replaced to prevent air entering and risks of injury
- Checking of the gas heating section, in accordance with above procedure.

WARNING! If any operating checks must be performed with the unit operating, it is the technician's responsibility to recognize any possible hazards and proceed in a safe manner. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.

Power-up initialization

CAUTION! Before proceeding with any test procedure or operation, make sure that crankcase heaters have been energized for at least 8 hours.

Units equipped with Scroll compressors do not have crankcase heaters.

Note:

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The Liteport LED located on the RTRM module is turned "On" within 1 second of power-up if internal operation is okay.

Test mode procedure at the ReliaTel™ control board

Operating the unit from the roof using the test mode at the ReliaTel™ control board.

CAUTION! Before proceeding with the following test procedures, make sure that thermostat or zone sensor is off.

CAUTION! Use one of the following "Test" procedures to bypass some time delays and to start the unit at the control panel.

Each step of unit operation can be activated individually by temporarily shorting across the "Test" terminals for two to three seconds. The Liteport LED located on the RTRM module will blink when the test mode has been initiated. The unit can be left in any "Test" step for up to one hour before it will automatically terminate, or it can be terminated by opening the main power disconnect switch. Once the test mode has been terminated, the Liteport LED will glow continuously and the unit will revert to the "System" control.

Test Modes

There are 2 methods in which the "Test" mode can be cycled with the test button:

1. Step Test Mode

This method initiates the different components of the unit, one at a time, by temporarily pressing on the TEST button for two to three seconds. For the initial start-up of the unit, this method allows the technician to cycle a component "On" and have up to 1 hour to complete the check.

2. Auto Test Mode

This method is not recommended for start-up due to the short timing between individual component steps. This method initiates the different components of the unit, one at a time, when a jumper is installed across the test terminals. The unit will start the first test step and change to the next step every 30 seconds. At the end of the test mode, control of the unit will automatically revert to the applied "System" control method.

For unit test steps and test modes, values to cycle the various components, refer to Table 22.

Operation

Table 22 - Service Test Guide for Component Operation

Cooling Only and Gas fired unit (TK*/YK*)

Step	Mode	Indoor Fan	Economizer	Compressor 1	Compressor 2	Heat 1	Heat 2	Outdoor 1	Outdoor 2
1	Fan On	ON	Min	Off	Off	Off	Off	Off	Off
2*	Econ.	ON	Open	Off	Off	Off	Off	Off	Off
3	Cool1	ON	Min	ON	Off	Off	Off	ON	**
4	Cool2	ON	Min	ON	ON	Off	Off	ON	**
5	Heat1	ON	Min	Off	Off	ON	Off	Off	Off
6	Heat2	ON	Min	Off	Off	ON	ON	Off	Off

Reversible and dual fuel unit (WK*/DK*)

Step	Mode	Indoor Fan	Economizer	Compressor 1	Compressor 2	SOV	Heat 1	Heat 2	Outdoor 1	Outdoor 2
1	Fan On	ON	Min	Off	Off	Off	Off	Off	Off	Off
2*	Econ.	ON	Open	Off	Off	Off	Off	Off	Off	Off
3	Cool1	ON	Min	ON	Off	ON	Off	Off	ON	**
4	Cool2	ON	Min	ON	ON	ON	Off	Off	ON	**
5	Heat1	ON	Min	ON	Off	Off	ON	Off	ON	Off
6	Heat2	ON	Min	ON	ON	Off	ON	ON	ON	ON
7	Heat3	ON	Min	ON (WK*) Off (DK*)	ON (WK*) Off (DK*)	Off	ON	Off	ON	ON
8	Heat4	ON	Min	ON (WK*) Off (DK*)	ON (WK*) Off (DK*)	Off	ON	ON	ON	ON
9	Defrost	ON	Min	ON	ON	ON	ON	ON	Off	Off
10	Emergency Heat	ON	Min	Off	Off	Off	ON	ON	Off	Off

* With Optional Accessory

** "Off" If temperature falls below 16° (±1°)°C, "On" if temperature rises above 18°(±1°)°C.

Note: Steps for optional accessories and modes not present in unit will be skipped.

Operation

Unit Start-up

Verification of gas valve settings - (Reserved for the qualified gas technician)

WARNING! Improper gas valve setting may lead to burner destruction and people injury.

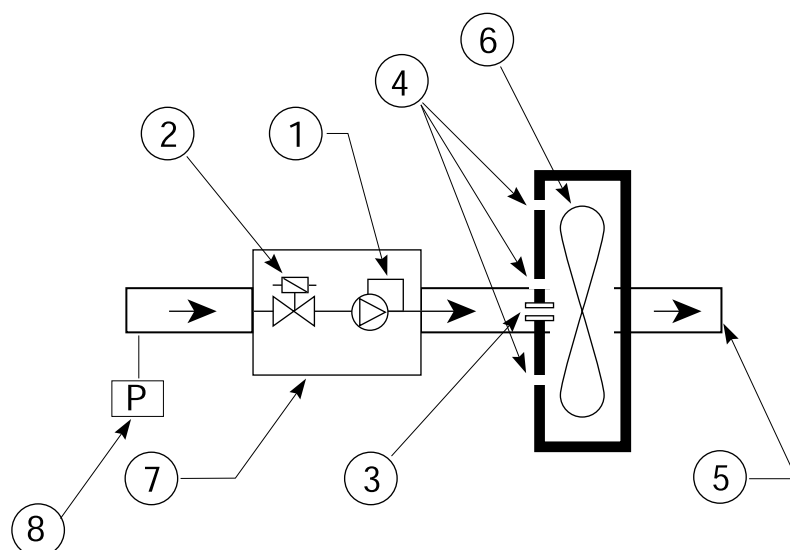
Note: Unit factory-set for G20.

Note: Unit to be installed outside only.

Note: Expansion valve must be adapted to the type of gas used:

- G 20: 20 mb
- G 25: 25 mb
- G 31 (Propane): 37 or 50 mb

Figure 20 - Gas valve



- 1 = Negative pressure controller
- 2 = Safety solenoid valve
- 3 = Gas injector
- 4 = Air inlets
- 5 = To the burner
- 6 = Fan
- 7 = Gas unit
- 8 = Minimum gas pressure cut-out

Operation

Table 23 - Hot water coil and gas burner data

Gas Burner			G250	G350	G400	PCH150
	YK* 275-300-350	Low Heat		1		
	YK* 275-300-350	High Heat	1	1		
	DK-YK* 400-500-600	Low Heat			1	
	DK-YK* 400-500-600	High Heat			2	
	YK* 275-300-350	Modulating				1
	YK* 400-500-600	Modulating				1
Burner			G250	G350	G400	PCH150
Natural Gas G20 (20 mbar) 34.02 MJ/m³ (15°C-1013)						
Gas Flow (15 C-1013 mbar)	(m ₃ /h)	Nominal rate	5.6	8.1	9	16.4
		Reduced rate	5.08	8.13	8.47	4.66
Heating Capacity	(kW)	Nominal rate	48.2	69.3	77.4	145
		Reduced rate	43.7	69.1	72.8	46.3
Heating Rate	(kW)	Nominal rate	53	77	85	155
		Reduced rate	48	76.8	80	44
Efficiency	%	Nominal rate	90.9	90.0	91.1	93.5
		Reduced rate	91	90	91	105.2
Smoke analysis	G20 - 20mbar @ 400V-3-50Hz	CO%	< 0.001%	< 0.001%	< 0.001%	< 0.001%
		NOx ppm	19 ppm	9 ppm	46 ppm	34 ppm
		Nox mg/kWh	33	16	81	60
		CO2%	8.5%	9.7%	9.6%	8.7%
Burner			G250	G350	G400	PCH150
Natural Gas G25 (20 or 25 mbar) 29.30 MJ/m³ (15°C-1013)						
Gas Flow (15 C-1013 mbar)	(m ₃ /h)	Nominal rate	5.3	8.2	8.8	19.07
		Reduced rate	5.15	8.02	8.21	5.41
Heating Capacity	(kW)	Nominal rate	38.3	60.3	62.9	145
		Reduced rate	37.5	58.5	59.5	46.3
Heating Rate	(kW)	Nominal rate	43	67	71.5	155
		Reduced rate	41.9	65.3	66.8	44
Efficiency	%	Nominal rate	89	90	88	93.5
		Reduced rate	89	90	89	105.2
Smoke analysis	G25 - 25mbar @ 400V-3-50Hz	CO%	< 0.050%	< 0.001%	< 0.001%	< 0.001%
		NOx ppm	-	-	-	34 ppm
		Nox mg/kWh	-	-	-	61
		CO ₂ %	7.1%	7.0%	7.4%	8.7%
Burner			G250	G350	G400	PCH150
Natural Gas G31 (30, 37 ou 50 mbar) 88.00 MJ/m³ (15°C-1013)						
Gas Flow (15 C-1013 mbar)	(m ₃ /h)	Nominal rate	2.2	2.7	3.5	6.32
		Reduced rate	2.17	2.56	3.19	1.79
Gas Flow (15 C-1013 mbar)	(kg/h)	Nominal rate	4.2	5.1	6.6	9.83
		Reduced rate	7.1	4.9	6.1	2.79
Heating Capacity	(kW)	Nominal rate	48.6	57.5	78.2	145
		Reduced rate	47.7	55.3	71.8	46.3
Heating Rate	(kW)	Nominal rate	54	65.3	85	155
		Reduced rate	53	62.6	78	44
Efficiency	%	Nominal rate	90	88	92	93.5
		Reduced rate	90	88.3	92	105.2
Combustion Air Flow (Avec E=25%)	(m3/h)	Nominal rate	72	98	113	206
		Reduced rate	71	93	103	59
Smoke analysis	G25 - 25mbar @ 400V-3-50Hz	CO%	< 0.001%	< 0.001%	0.002%	< 0.001%
		NOx ppm	-	-	-	34 ppm
		Nox mg/kWh	-	-	-	59
		CO ₂ %	9.3%	8.9%	12.0%	9.4%
Hot Water Coil						
UNIT			Water connection inlet/outlet (inches)			
TKD/TKH/WKD/WKH, 275TKD/TKH/WKD/WKH 300, TKD/TKH/WKD/WKH 350, TKD/TKH/WKD/WKH 400, TKD/TKH/WKD/WKH 500, TKD/TKH/WKD/WKH 600			1 ¼ ISO R7			

Operation

Table 24 - Marking category of gas section in different countries

CAT	G20	G25	G31
I12E+3P	FR		
	mbar	20	25 37
I12H3P	CH - CZ - ES - GB - GR - IE - PT		
	mbar	20	- 37
I12H3+	IT		
	mbar	20	- 28-30/37
I12L3P	NL		
	mbar	-	25 30
I2E+	BE		
	mbar	20	25 -
I2E	DE - LU - PL		
	mbar	20	- -
I2H	AT - DK - EE - FI - LT - LV - NO - SE - SI - SK - TR		
	mbar	20	- -
	HU		
I3P	BE - CZ - PL - SI - SK - TR		
	mbar	-	- 37
	AT - DE - HU - LU - SK		
	mbar	-	- 50

AT	Austria	HU	Hungary
BE	Belgium	IE	Ireland
CH	Switzerland	IT	Italy
CZ	Czech Republic	LT	Lithuania
DE	Germany	LU	Luxembourg
DE	Germany	LV	Latvia
DK	Denmark	NL	Netherlands
EE	Estonia	NO	Norway
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
FI	Finland	SE	Sweden
FR	France	SI	Slovenia
GB	Great Britain (UK)	SK	Slovakia (Slovak Republic)
GR	Greece	TR	Turkey
HU	Hungary		

For units fitted with a PCH150 burner, refer to the Installation/Operation/Maintenance document attached with the unit.

Operation

Starting the unit in cooling mode

Before start-up, ensure that all power cables are tightened.

Verify that the unit airflow rate is adjusted according to the information provided in the "Supply fan adjustment" section of this manual.

To start the unit in cooling mode:

- Place the zone sensor system switch in the "COOL" position.
- Position the cooling setpoint approximately 10° below room temperature and place the fan switch in the "AUTO" or "ON" position.
- Turn on unit main power supply.

The condenser fan motor, compressor and supply fan motor should operate automatically.

There will be a delay of up to 5 minutes before the unit starts in cooling mode.

Operating pressures

After the unit has operated in cooling mode for a short period of time, install pressure gauges on the gauge ports of the discharge and suction line valves.

Note: To bypass time delays and verify the operation of this unit from the roof, use the "Test procedure" section in this manual. Check the suction and discharge pressures.

Note: Always route refrigerant hoses through the port hole provided and ensure that the compressor access panel is in place.

Cooling shutdown

To exit the test mode, disconnect unit power for 3-5 seconds and reapply. When running the unit using the zone sensor as the control, position the selector switch to "OFF".

There may be a delay of up to 3 minutes before compressors shut down and an additional one minute before the fan shuts down in this setting.

Do not de-energize main power disconnect except when unit is to be serviced. Power is required to keep the compressor crankcase warm and boil off refrigerant in the oil (except on units with Scroll compressors).

Final installation checklist

- Are all power cables tightened?
- **Check torque of power cables contact !**
- Is the condenser fan and indoor blower operating correctly, i.e. correct rotation and without undue noise?
- Are the compressors operating correctly and has the system been checked for leaks?
- Have the voltage and running currents been checked to determine if they are within limits?
- Have the air discharge grilles been adjusted to balance the system?

- Has the ductwork been checked for air leaks and any condensation?
- Has the air temperature rise been checked?
- Has the indoor airflow been checked and adjusted if necessary?
- Has the unit been checked for tubing and sheet metal rattles or any unusual noises?
- Are all covers and panels in place and properly fastened?

ReliaTel™ is a microelectronic control feature, which provides operating functions that are significantly different from conventional electro-mechanical units. The master module is the ReliaTel™ Refrigeration Module (RTRM).

The RTRM provides compressor antishort cycle timing functions through minimum "Off" and "On" timing to increase reliability, performance and to maximize unit efficiency.

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functioning. It checks the configuration parameters against the components connected to the system.

The LED located on the RTRM module is turned "On" within one second after power-up if all internal operations are okay.

Cooling without an Economizer

When the system switch is set to the "Cool" position and the zone temperature rises above the cooling setpoint controlband, the RTRM energizes the (K9) relay coil located on the RTRM. When the K9 relay contacts close, the compressor contactor (CC1) coil is energized provided the low pressure control (LPC1) and high pressure control (HPC1) are closed. When the CC1 contacts close, compressor (CPR1) and the outdoor fan motor (ODM) start to maintain the zone temperature to within ± 2 F of the sensor setpoint at the sensed location.

If the first stage of cooling can not satisfy the cooling requirement, the RTRM energizes the (K10) relay coil located on the RTRM. When the (K10) relay contacts close, the compressor contactor (CC2) coil is energized provided the low pressure control (LPC2) and high pressure control (HPC2) are closed. When the CC2 contacts close, compressor (CPR2) starts to maintain the zone temperature to within ± 2 F of the sensor setpoint at the sensed location.

Evaporator Fan Operation

When the fan selection switch is set to the "Auto" position, the RTRM energizes the (K6) relay coil approximately one second after energizing the compressor contactor coil (CC1) in the cooling mode. In heating mode, the RTRM energizes the (K6) relay coil approximately 45 seconds after gas ignition. Closing the K6 contacts on the RTRM energizes the supply fan relay (F) coil to start the supply fan motor (IDM).

Operation

The RTRM de-energizes the fan relay (F) approximately 60 seconds after the cooling requirement has been satisfied to enhance unit efficiency.

When the heating cycle is terminated, the supply fan relay (F) coil is de-energized approximately 90 seconds after the heating requirement.

When the fan selection switch is set to the "On" position, the RTRM keeps the supply fan relay coil (F) energized for continuous fan motor operation.

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3 and J7-4 on the ReliaTel™ Options Module (RTOM), the RTRM produces an analog output if the clogged filter switch (CFS) closes for two minutes after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will be turned on when this failure occurs.

Low Ambient Operation

The condenser fans are cycled according to the outdoor air temperature and the number of cooling steps in operation.

Cooling with an Economizer

The economizer is utilized to control the zone temperature providing the outside air conditions are suitable.

Outside air is drawn into the unit through modulating dampers. When cooling is required and economizing is possible, the RTRM sends the cooling request to the unit economizer actuator (ECA) to open the economizer damper. The RTRM tries to cool the zone utilizing the economizer to slightly below the zone temperature setpoint. If the mixed air sensor (MAS) senses that the mixed air temperature is below 53°F, the damper modulates toward the closed position. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is full open, the RTRM energizes the compressor contactor (CC1). If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is fully open, the RTRM energizes the compressor contactor (CC2).

The ECA continues to modulate the economizer damper open/closed to keep the mixed air temperature that is calculated by the RTRM.

If economizing is not possible, the ECA drives the damper to the minimum position setpoint when the supply fan relay (F) is energized and allows mechanical cooling operation. When the unit is equipped with the optional fan failure switch, wired between terminals J7-5 and J7-6 on the RTOM, the RTRM will stop all cooling functions and produce an analog output if the fan failure switch (FFS) does not open within 40 seconds after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will flash when this failure occurs.

Economizer Set-Up

Adjusting the minimum position potentiometer located on the unit economizer Actuator (ECA) sets the required amount of ventilation air.

Two of the three methods for determining the suitability of the outside air can be selected utilizing the enthalpy potentiometer on the RTEM, as described below:

1. Ambient Temperature - controlling the economizing cycle by sensing the outside air dry bulb temperature. The Table below lists the selectable dry bulb values by potentiometer setting.
2. Reference Enthalpy - controlling the economizer cycle by sensing the outdoor air humidity. The Table below lists the selectable enthalpy values by potentiometer setting.
If the outside air enthalpy value is less than the selected value, the economizer is allowed to operate.
3. Comparative Enthalpy - By utilizing a humidity sensor and a temperature sensor in both the return air stream and the outdoor air stream, the unit control processor (RTRM) will be able to establish which conditions are best suited for maintaining the zone temperature, i.e. indoor conditions or outdoor conditions. The potentiometer located on the RTEM is non-functional when both the temperature and humidity sensors are installed.

Table 25 - Potentiometer Setting

Potentiometer Setting	Dry Bulb (°C)	Enthalpy (KJ/kg)
A	23*	63
B	21	58
C	19	53
D	17	51

*Factory Setting

ReliaTel™ Control Heating Operation

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint controlband, a heat cycle is initiated when the RTRM communicates ignition information to the Ignition module (IGN).

Modulating gas heat

For units equipped with modulating gas burners, please refer to the specific user guide given with the unit documentation.

Units with modulating heat are enabled/disabled by the ReliaTel™ depending on the heating demand. Modulating signal is sent by the ReliaTel™ to the modulating heat air control. This signal is proportional to the discharged air temperature. The discharged air temperature setpoint is adjustable from the potentiometer R42 of the RTOM board.

Operation

Ignition Module

Two Stage (IGN) runs self-check (including verification that the gas valve is de-energized). (IGN) checks the high-limit switches (TC01 & TC02) for normally closed contacts. With 115 VAC power supplied to the ignition module (IGN), the hot surface ignition probe (IP) is preheated for approximately 45 seconds. The gas valve (GV) is energized for approximately 7 seconds for trial for ignition, to ignite the burner.

Once the burner is ignited, the hot surface ignition probe (IP) is de-energized by the ignition module (IGN) and functions as the flame sensing device.

If the burner fails to ignite, the ignition module will make two more attempts before locking out. The green LED will indicate a lock out by two fast flashes. An ignition lockout can be reset by:

1. Opening for 3 seconds and closing the main power disconnect switch
2. By switching the "Mode" switch on the zone sensor to "OFF" and then to the desired position
3. Allowing the ignition control module to reset automatically after one hour.

Refer to the ignition control module diagnostics section for the LED diagnostic definitions.

When the fan selection switch is set to the "Auto" position, the RTRM energizes the supply fan relay (F) coil approximately 30 second after initiating the heating cycle to start the supply fan motor (IDM).

The automatic reset high limit (TC01), located in the bottom right corner of the burner compartment, protects against abnormally high leaving air temperatures.

The automatic reset fan fail limit (TC02), located in the upper middle section of the supply fan board, protects against abnormally high heat buildup which could occur because of extended cycling of the high limit (TC01) or if the supply fan motor (IDM) fails to operate. Should TC02 open, the RTRM will energize the supply fan relay (F) in an attempt to start the fan motor. The RTRM signals that a heat failure has occurred by flashing the "Heat" LED on the zone sensor.

There is a Green LED located in the Ignition Control Module. The table below lists the diagnostics and the status of the LED during the various operating states.

Final Installation Checklist

- Is the condenser fan and indoor blower operating correctly, i.e.: correct rotation and without undue noise?
- Are the compressors operating correctly and has the system charge been checked?
- Has the gas module been installed as per the procedure in this manual?
- Have the voltage and running currents been checked to determine if they are within limits?
- Have the air discharge grilles been adjusted to balance the system?
- Has the ductwork been checked for air leaks and any condensation?
- Has the heating air temperature rise been checked?
- Has the indoor airflow been checked and adjusted if necessary?
- Has the unit been checked for tubing and sheet metal rattles or any unusual noises?
- Are all covers and panels in place and properly fastened?

To keep the unit operating safely and efficiently, the manufacturer recommends that a qualified service technician check the entire system at least once each year, or more frequently if conditions warrant.

Table 26 - LED status

Diagnostics	Green LED	Red LED
1. Powered but no heat demand	Off	Off
2. Heat demand without fault	Flash ing	Off
3. No flame detection on ignition - or signal detected and then lost	Off	Flashing
4. Gas unit incorrectly wired or flame signal detected on a heat demand	Steady	Flashing
5. Internal fault	Off	Steady

Maintenance

To keep the unit operating safely and efficiently, the manufacturer recommends that a qualified service technician check the entire system at least once each year, or more frequently if conditions warrant it.

End user Routine Maintenance

Some of the periodic maintenance functions for the unit can be undertaken by the end user. This includes replacing (disposable) or cleaning (permanent) air filters, cleaning unit cabinet, cleaning the condenser coil, and carrying out a general unit inspection on a regular basis.

WARNING! Disconnect the power supply before removing access panels to service the unit. Failure to disconnect power before attempting any servicing can result in severe injury or death.

Air filters

It is very important for the central duct system air filters to be kept clean.

These should be inspected at least once a month when the system is in constant operation (in new buildings, the filters should be checked every week for the first four weeks). If disposable-type filters are used, they should only be replaced with ones of the same type and size.

The economizer fresh air filter should be inspected (washed if needed) at least once a month.

Supply Fan Drive

Belt drive sheaves alignment has to be checked on each maintenance inspection.

Check belt tension. Refer to table 9

Direct drive fan

Direct drive fan/motor assembly is mounted in factory with an perfect adjustment of the motor position. If for any reason, the motor or the fan has been moved, an new alignment of the motor and fan shaft must be done. Please contact your local Trane representative for alignment procedure.

Refer to Figure 21 for Motor/fan shaft alignment tolerances

Note: Do not attempt to clean disposable filters. Permanent filters can be cleaned by washing with a mild detergent and water. Ensure that the filters are thoroughly dry before reinstalling them in the unit (or duct system).

Note: Replace permanent filters annually if washing fails to clean them, or they show signs of deterioration. Be sure to use the same type and size as were originally installed.

Condenser coil

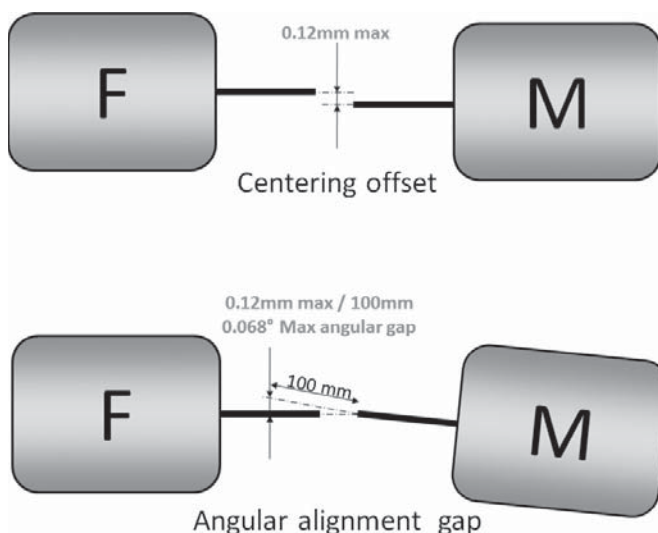
Unfiltered air circulates through the unit's condenser coil and can cause the coil's surface to become clogged with dust, dirt, etc. To clean the coil, brush the coil surface in the direction of the fins with a soft bristled brush.

Keep all vegetation away from the condenser coil area.

Hot water coil (option)

Stop the unit. Do not disconnect the main supply to the unit. This will permit the anti-frost protection to continue to operate, and avoid water to freeze-up in the coil.

Figure 21



Maintenance

Service Technician Maintenance

Before the cooling season, your service technician may examine the following areas of your unit:

- Filters, for cleaning or replacement
- Motors and drives system components
- Economizer gaskets, for replacement if necessary
- Condenser coils, for cleaning
- Safety controls, for mechanical cleaning
- Electrical components and wiring, for replacement and tightening of connections as necessary
- Condensate drain, for cleaning
- Unit duct connections, to ensure they are physically sound and sealed to the unit casing
- Unit mounting support, to ensure that it is sound
- The unit, to ensure there is no obvious deterioration

Before the heating season, your service technician may examine the following areas of your unit:

- The unit, to ensure that the condenser coil can receive the required airflow (that the condenser fan grille is not obstructed)
- The control panel wiring, to verify that all electrical connections are tight, and that wire insulation is intact
- Clean burner area, verify the gas heat system operates properly.

Troubleshooting

The RTRM has the ability to provide the service personnel with some unit diagnostics and system status information. Before turning the main power disconnect switch "Off", follow the steps below to check the ReliaTel™

Refrigeration Module (RTRM). All diagnostics & system status information stored in the RTRM will be lost when the main power is turned "Off".

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 VAC is present between J1-1 and J1-2. If 24 VAC is present, proceed to Step 3. If 24 VAC is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing "Method 1" or "Method 2" in the system status diagnostic section, check the following: System status, Heating status, Cooling status. If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Steps 1 and 2. If the LED is not lit in Step 1, and 24 VAC is present in Step 2, the RTRM has failed. Replace the RTRM.

5. If no failures are indicated, use one of the TEST mode procedures described in the unit "Start-Up" section to start the unit. This procedure will allow you to check all of the RTRM outputs, and all of the external controls (relays, contactors, etc.) that the RTRM outputs energize, for each respective mode. Proceed to Step 6.
6. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Steps 7 and 8.
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

System Status Checkout Procedure

"System Status" is checked by using one of the following two methods:

Method 1

If the Zone Sensor Module (ZSM) is equipped with a remote panel with LED status indication, you can check the unit within the space. If the ZSM does not have LED's, use Method 2.

THS/P03 have the remote panel indication feature. The LED descriptions are listed below:

LED 1 (System) "On" during normal operation. "Off" if a system failure occurs or the LED fails. "Flashing" indicates test mode.

LED 2 (Heat) "On" when the heat cycle is operating. "Off" when the heat cycle terminates or the LED fails. "Flashing" indicates a heating failure.

LED 3 (Cool) "On" when the cooling cycle is operating. "Off" when the cooling cycle terminates or the LED fails. "Flashing" indicates a cooling failure.

LED 4 (Service) "On" indicates a clogged filter. "Off" during normal operation. "Flashing" indicates an supply fan failure.



Maintenance

Below is the complete listing of failure indication causes:

System failure

Check the voltage between terminals 6 and 9 on J6, it should read approximately 32 VDC. If no voltage is present, a system failure has occurred. Refer to Step 4 in the previous section for the recommended troubleshooting procedure.

Heating Failure

Verify Heat Failure by Ignition Module (IGN) LED indicator:

OFF: No Power or Failure

ON: Normal

Slow Flash: Normal, Heat Call

Fast Flash: Error Code:

- 1 Flash: Communication Failure
- 2 Flashes: System Lockout
- 3 Flashes: Pressure Switch Fail
- 4 Flashes TC01 or TC02 Open
- 5 Flashes: Flame w/o Gas Valve
- 6 Flashes: Flame Rollout Open

Cooling Failure

1. Cooling and heating set point (slide pot) on the zone sensor has failed. Refer to the "Zone Sensor Test Procedure" section.
2. Zone temperature thermistor ZTEMP on ZTS failed. Refer to the "Zone Sensor Test Procedure" section.
3. CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2).
4. LPC1 has opened during the 3 minute minimum "on time" during 4 consecutive compressor starts, check LPC1 or LPC2 by testing voltage between the J1-8 & J3-2 terminals on the RTRM and ground. If 24 VAC is present, the LPC's has not tripped. If no voltage is present, LPC's has tripped.

Service Failure

1. If the supply fan proving switch has closed, the unit will not operate (when connected to RTOM), check the fan motor, belts, and proving switch.
2. Clogged filter switch has closed, check the filters.

Simultaneous Heat and Cool Failure

1. Emergency Stop is activated

Method 2

The second method for determining system status is done by checking voltage readings at the RTRM (J6).

The system indication descriptions and the approximate voltages are listed below.

System Failure

Measure the voltage between terminals J6-9 & J6-6.

Normal Operation = approximately 32 VDC.

System Failure = less than 1 VDC, approximately 0.75 VDC.

Test Mode = voltage alternates between 32 VDC & 0.75 VDC.

Heat Failure

Measure the voltage between terminals J6-7 & J6-6.

Heat Operating = approximately 32 VDC.

Heat Off = less than 1 VDC, approximately 0.75 VDC.

Heating Failure = voltage alternates between 32 VDC & 0.75 VDC.

Cool Failure

Measure the voltage between terminals J6-8 & J6-6.

Cool Operating = approximately 32 VDC.

Cool Off = less than 1 VDC, approximately 0.75 VDC.

Cooling Failure = voltage alternates between 32 VDC & 0.75 VDC.

Service Failure

Measure the voltage between terminals J6-10 & J6-6.

Clogged Filter = Approximately 32 VDC.

Normal = Less than 1 VDC, approximately 0.75 VDC.

Fan Failure = voltage alternates between 32 VDC & 0.75 VDC.

To use LED's for quick status information at the unit, purchase a ZSM and connect wires with alligator clamps to terminals 6 through 10.

Connect each respective terminal wire (6 through 10) from the Zone Sensor to the unit J6 terminals 6 through 10.

Note: If the system is equipped with a programmable zone sensor THS03, the LED indicators will not function while the ZSM is connected.

Maintenance

Resetting Cooling and Ignition Lockouts

Cooling Failures and Ignition

Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space, Method 2 explains resetting the system at the unit.

Note: Before resetting Cooling Failures and Ignition Lockouts, check the Failure Status Diagnostics by the methods previously explained.

Diagnostics will be lost when the power to the unit is disconnected.

Method 1

To reset the system from the zone, turn the "Mode" selection switch at the zone sensor to the "Off" position.

After approximately 30 seconds, turn the "Mode" selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch "Off" and then "On".

Lockouts can be cleared through the building management system. Refer to the building management system instructions for more information.

Zone Temperature Sensor (ZTS) Service Indicator

The ZSM SERVICE LED is a generic indicator that will signal the closing of a Normally Open switch at any time, providing the Indoor Motor (IDM) is operating. This indicator is usually used to indicate a clogged filter, or an air side fan failure.

The RTRM will ignore the closing of this Normally Open switch for 2 ($\pm$ 1) minutes. This helps prevent nuisance SERVICE LED indications. The exception is the LED will flash 40 seconds after the fan is turned "On" if the Fan Proving Switch is not made.

Clogged Filter Switch

This LED will remain lit the entire time that the Normally Open switch is closed. The LED will be turned off immediately after resetting the switch (to the Normally Open position), or any time that the IDM is turned "Off".

If the switch remains closed, and the IDM is turned "On", the SERVICE LED will be turned "On" again after the 2 ($\pm$ 1) minute ignore delay.

This LED being turned "On", will have no other affect on unit operation. It is an indicator only.

Fan Failure Switch

When the "Fan Failure" switch is wired to the RTOM, the LED will remain flashing the entire time the fan proving switch is closed, indicating a fan failure, and it will shut the unit operations down.

Zone Temperature Sensor (ZTS) Test

Note: These procedures are not for programmable or digital models and are conducted with the Zone Sensor Module electrically removed from the system.

Test 1

Zone Temperature Thermistor (ZTEMP)

This component is tested by measuring the resistance between terminals 1 and 2 on the Zone Temperature Sensor.

Table 27 - Thermistor Resistance/Temperature Chart

Temperature/resistance coefficient is negative.

Temperature (°C)	Resistance (kOhms)
-21	103
-15	74.65
-9	54.66
-7	46.94
-4	40.4
-1	34.85
2	30.18
4	26.22
7	22.85
10	19.96
13	17.47
16	15.33
18	13.49
21	11.89
24	10.5
27	9.297
29	8.247
32	7.33
35	6.528
38	5.824

Maintenance

Table 28 - Refrigerant saturated temperature/Pressure

Refrigerant T° sat	R410A P sat relative	Refrigerant T° sat	R410A P sat relative
-20.0°C	3.0 bar	25.0°C	15.6 bar
-19.0°C	3.2 bar	26.0°C	16.0 bar
-18.0°C	3.3 bar	27.0°C	16.5 bar
-17.0°C	3.5 bar	28.0°C	16.9 bar
-16.0°C	3.6 bar	29.0°C	17.4 bar
-15.0°C	3.8 bar	30.0°C	17.9 bar
-14.0°C	4.0 bar	31.0°C	18.4 bar
-13.0°C	4.2 bar	32.0°C	18.9 bar
-12.0°C	4.4 bar	33.0°C	19.4 bar
-11.0°C	4.6 bar	34.0°C	19.9 bar
-10.0°C	4.7 bar	35.0°C	20.5 bar
-9.0°C	4.9 bar	36.0°C	21.0 bar
-8.0°C	5.2 bar	37.0°C	21.5 bar
-7.0°C	5.4 bar	38.0°C	22.1 bar
-6.0°C	5.6 bar	39.0°C	22.7 bar
-5.0°C	5.8 bar	40.0°C	23.3 bar
-4.0°C	6.0 bar	41.0°C	23.9 bar
-3.0°C	6.3 bar	42.0°C	24.5 bar
-2.0°C	6.5 bar	43.0°C	25.1 bar
-1.0°C	6.8 bar	44.0°C	25.7 bar
0.0°C	7.0 bar	45.0°C	26.3 bar
1.0°C	7.3 bar	46.0°C	27.0 bar
2.0°C	7.5 bar	47.0°C	27.7 bar
3.0°C	7.8 bar	48.0°C	28.3 bar
4.0°C	8.1 bar	49.0°C	29.0 bar
5.0°C	8.4 bar	50.0°C	29.7 bar
6.0°C	8.7 bar	51.0°C	30.4 bar
7.0°C	9.0 bar	52.0°C	31.1 bar
8.0°C	9.3 bar	53.0°C	31.9 bar
9.0°C	9.6 bar	54.0°C	32.6 bar
10.0°C	9.9 bar	55.0°C	33.4 bar
11.0°C	10.2 bar	56.0°C	34.2 bar
12.0°C	10.5 bar	57.0°C	35.0 bar
13.0°C	10.9 bar	58.0°C	35.8 bar
14.0°C	11.2 bar	59.0°C	36.6 bar
15.0°C	11.6 bar	60.0°C	37.4 bar
16.0°C	11.9 bar	61.0°C	38.3 bar
17.0°C	12.3 bar	62.0°C	39.1 bar
18.0°C	12.7 bar	63.0°C	40.0 bar
19.0°C	13.1 bar	64.0°C	40.9 bar
20.0°C	13.5 bar	65.0°C	41.8 bar
21.0°C	13.9 bar	66.0°C	42.8 bar
22.0°C	14.3 bar	67.0°C	43.7 bar
23.0°C	14.7 bar	68.0°C	44.7 bar
24.0°C	15.1 bar	69.0°C	45.7 bar
		70.0°C	46.7 bar



Notes



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