



# Voyager™ III Rooftop Units

## Cooling-only

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

## Heat-pump

WKD/WKH 400-500-600

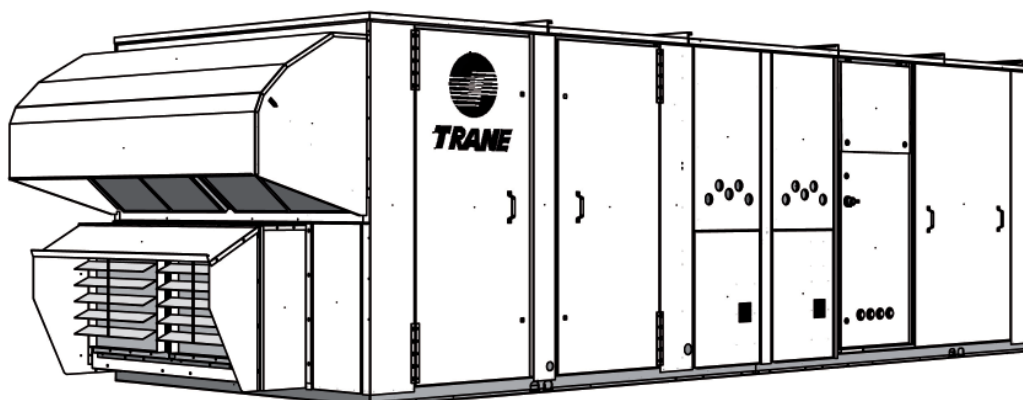
## Gas-fired

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

## Heat-pump with gas-fired heating

DKD/DKH 400-500-600

## R410A Refrigerant



RT-PRC022J-E4



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# Features and Benefits

## Standard Features

- Factory installed and tested microelectronic controls
- Scroll compressors
- Dedicated downflow or horizontal configuration
- FROSTAT™ coil frost protection on all units
- Supply airflow proving
- Emergency stop input
- Compressor lead-lag
- Occupied-unoccupied switching
- Timed override activation
- FC supply fans
- 50mm standard efficiency filters to start the system up
- Finish exceeds salt spray requirements of ASTM B117
- Sloped condensate drain pan

## Scroll Compressor

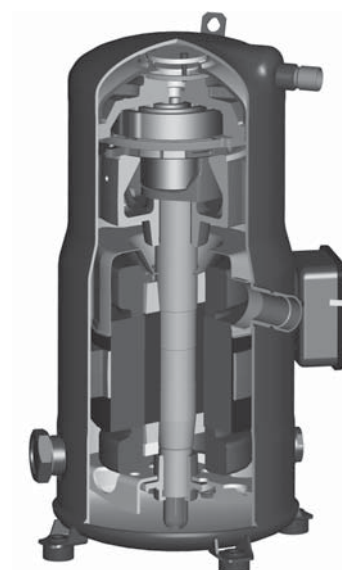
### Simple Design with 70% Fewer Parts

Fewer parts than an equal capacity reciprocating compressor means significant reliability and efficiency benefits. The single orbiting scroll eliminates the need for pistons, connecting rods, wrist pins and valves. Fewer parts lead to increased reliability. Fewer moving parts, less rotating mass and less internal friction means greater efficiency than reciprocating compressors. The Scroll provides important reliability and efficiency benefits. The Scroll allows the orbiting scrolls to be in contact in all three dimensions, forming a completely enclosed compression chamber which leads to increased efficiency. In addition, the orbiting scrolls only come in contact with the minimum required force to create a seal so there is no wear between the scroll plates. The fixed and orbiting scrolls are made of high strength cast iron which results in less thermal distortion, less leakage, and higher efficiencies. The most outstanding feature of the Scroll is that the slugging will not cause failure. In contrast, the liquid or dirt found in a reciprocating compressor may cause serious damage.

### Low Torque Variation

The Scroll compressor has a very smooth compression cycle with torque variations that are only 30 percent of that produced by a reciprocating compressor. This means the scroll compressor imposes very little stress on the motor for greater reliability. Low torque variation means reduced noise and vibration.

*Figure 1*



### Suction Gas Cooled Motor

Compressor motor efficiency and reliability is further optimized with this design. Cool suction gas keeps the motor cooler for longer life and better efficiency.

### Proven Design Through Testing and Research

With over twenty years of development and testing, Scroll compressors have undergone more than 400,000 hours of laboratory testing and field operation. This work combined with over 25 patents makes Trane the worldwide leader in air conditioning scroll compressor technology.

*Figure 2 - One of two matched scroll plates - the distinguishing feature of the scroll compressor*



## Features and Benefits

**Figure 3 - TD5 service and diagnostic user display**



The TD-5 display allows you to view data and make operational changes on Voyager rooftop equipped with Reliatel control v3.4 or above.

TD-5 is an 5" (127mm diagonal) high resolution color touch screen display

TD-5 provides in 26 languages:

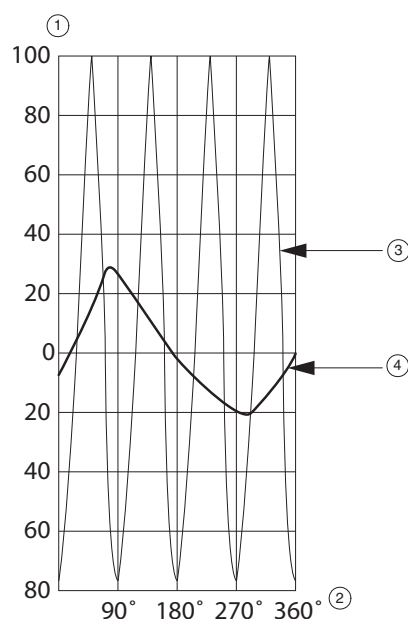
15 different reports (3 custom, 12 standard)

12 different graphs (4 custom, 8 standard)

View and reset Historic of last 100 detailed alarms.

Graph data can be exported to an excel file through USB memory stick.

**Figure 4 - Low torque variation of 3-D scroll compressors vs. reciprocating compressor**



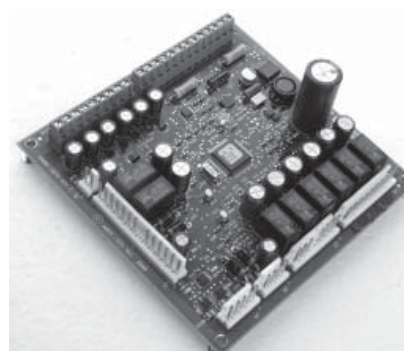
1 = Torque (%)  
2 = Crank angle  
3 = Scroll  
4 = 4 Cylinder reciprocating

## Quality and Reliability

### Reliatel Controls

- Reliatel requires no special tools to run the Voyager unit through its paces. Simply press the Test button located on the right side of the control panel and the unit will walk through its operational steps automatically.
- As long as the unit has power and the LED is lit, Reliatel is operational. The light indicates that Reliatel is functioning properly.
- Reliatel features expanded diagnostic capabilities when utilized with Trane's Integrated Comfort™ Systems.
- One Zone Sensor option has central control panel lights which indicate the mode the unit is in and possible diagnostic information (dirty filters for example).

**Figure 5 - RTRM (ReliaTel™ Refrigeration Module)**



- Reliatel improves quality and reliability through the use of time-tested microprocessor controls and logic. Reliatel:
  - prevents the unit from short cycling, considerably improving compressor life.
  - ensures that the compressor will run for a specific amount of time allowing oil to return for better lubrication, enhancing the reliability of the compressor.
- The Voyager with Reliatel reduces the number of components required to operate the unit, thereby reducing possibilities for component failure.

The unit is equipped in standard with phase reversing protection preventing reverse rotation operation on compressors and other unit motors.

## Features and Benefits

### Modulating Gas Burner

- Efficiency

The modulating gas burner operates as a condensing gas burner for the main part of its operating range. This result in a drastically improved efficiency (up to 105%) and optimum energy usage.

- Comfort

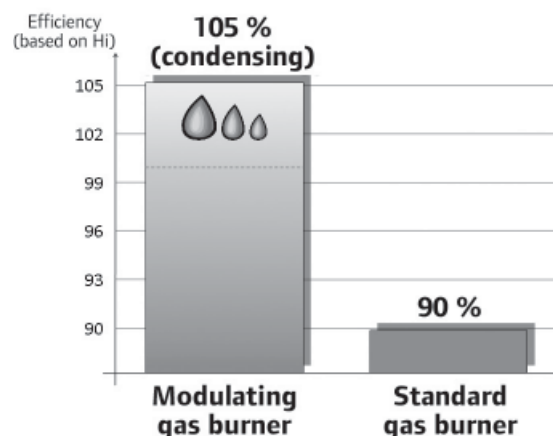
The modulating burner adapts the heating capacity to the building need. Modulation of heating capacity results in continuous operation of the burner at part load. Reduced ON-OFF cycling improves the gas consumption used during each start up of the burner as well as discharge air temperature variation.

Temperature uniformity: Control of the supply air temperature reduces air stratification effect caused by high temperature supply air. This result in a better mixing of the supply air with the air in the room.

- Reliability

Full stainless steel welded construction ensures reliable heat exchanger tightness.

Flame control: Ignition and combustion controller use a proven direct spark ignition with pre-mix burner technology. This result in a constant gas/air mix and optimized combustion quality over the complete operating map.



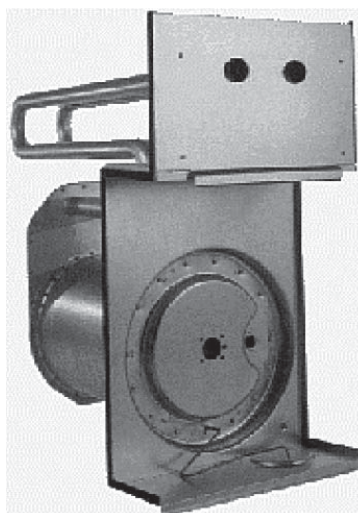
### Drum and Tube Gas Heat Exchanger

- The drum and tube heat exchanger is designed for increased efficiency and reliability and has utilized improved technology incorporated in the large rooftop commercial units for almost 20 years.
- The heat exchanger is manufactured using aluminized steel with stainless steel components for maximum durability. The drum and tube design has been tested and passed over 150,000 cycles.
- The negative pressure gas valve will not allow gas flow unless the combustion blower is operating. This is one of our unique safety features.
- The forced combustion blower supplies premixed fuel through a single stainless steel burner screen into a sealed drum where ignition takes place. It is more reliable to operate and maintain than a multiple burner system.
- The ignitor is a gas ignition device which doubles as a safety device utilizing a continuous test to prove the flame. The design is cycle tested at the factory for quality and reliability.
- **The Trane Voyager Rooftop has, by far, the best COP in its class. All performances are Eurovent certified which provides the assurance of accurate performance and common comparison criteria.**

### Rigorous Testing

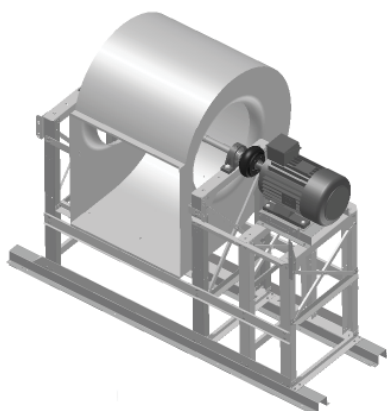
- All of Voyager's designs were rigorously rain tested at the factory to ensure water integrity.
- Rigging tests include lifting a unit into the air and letting it drop one foot, assuring that the lifting lugs and rails hold up under stress.
- We perform a 100% coil leak test at the factory. The evaporator and condenser coils are leak tested at 1.4 MPa and pressure tested to 3.1 MPa.
- All parts are inspected at the point of final assembly. Sub-standard parts are identified and rejected immediately.
- **Every unit receives a 100% unit run test before leaving the production line to make sure it lives up to rigorous Trane requirements.**

Figure 6



## Features and Benefits

*Figure 7 - Variable speed direct drive supply fan*



### Variable Speed Direct Drive Supply Fan

Efficient, flexible and low maintenance direct driven fan

#### High Efficiency Fan

Direct transmission, variable speed drives delivers energy saving through 3 aspects :

- Higher fan nominal efficiency: The pulley no longer penalizes the airflow stream at the an inlet, resulting in less turbulence and higher fan static efficiency.
- Direct coupling drive efficiency: The direct coupling concept avoids losses by belt friction. Classic belt drive is depletes part of the motor power caused by improper belt tension, pulley mis-alignment. The direct driven fan improves motor consumption by about 15% to 20% compared to belt driven fan.
- Reduction of power input with fan speed modulation at part load or in ventilation mode. Substantial energy savings can be achieved by reducing fan speed by only 20%, resulting in 20% less airflow and 50% less absorbed power. On a typical application, the result is an annual energy saving of 30% of the total rooftop consumption.
- Power factor of the fan motor is corrected and inrush current is very low thanks to progressive fan ramp up start (by default: 1 minute ramp up time).

Reduced maintenance costs with:

- Almost no maintenance direct coupling compared to belt drive.
- Easy commissioning with adjustment of nominal airflow and ramp up time for progressive textile duct inflation.

### Ease of Installation

Voyager units provide many time and money saving features.

#### Conversionless Units

The dedicated design units (either downflow or horizontal) require no panel removal or alteration time to convert in the field - a major cost saving during installation.

#### Improved Airflow

U-shaped airflow allows for improved static capabilities. The need for high static motor conversion is minimized and time is not spent changing to high static oversized motors.

#### Single Point Power

A single electrical connection powers the unit.

#### Single Side Access

Service technicians can access all major components from one side, opening the easy access panels.

#### Standardized Components

- Components are placed in the same location for all Voyager units.
- One single Unit controller (Reliatel™) can fit all Voyager models. This provides standardization of parts.

### Serviceability

Voyager was designed with input from service contractors. Their information helped us design a unit that would get the service technician off the job quicker and save the owner money.

#### Voyager's Simpler Design

The Voyager design uses fewer parts than previous units. Since it is simpler in design, it is easier to diagnose.

#### Micro

- The Micro requires no special tools to run the Voyager unit through its paces. Simply press the Test button located on the right side of the control panel and the unit will walk through its operational steps automatically.
- As long as the unit has power and the LED is lit, the Micro is operational. The light indicates that the Micro is functioning properly.
- The Micro features expanded diagnostic capabilities when utilized with Trane's Integrated Comfort™ Systems.
- One Zone Sensor option has central control panel lights which indicate the mode the unit is in and possible diagnostic information (dirty filters for example).





## Features and Benefits

### Easy Access Low Voltage Terminal Board

Voyager's Low Voltage Terminal Board is external to the electrical control cabinet. It is extremely easy to locate and attach the thermostat wire. This is another cost and time saving installation feature.

### Indoor Air Quality

- Filters. All rooftops are shipped with throw-away filters as a standard to be used during the first days of operation (usually the jobsite is not completely clean, and high efficiency filters would get dirty in a couple of hours, this would be a waste of money). We propose optional EU4 permanent filters for regular operation.
- Panels in the indoor air section have a fire-resistant (M0) aluminum foil-faced insulation. There is no more insulation particles carried over by the air. It can be cleaned which is particularly interesting for restaurant applications.
- All our drain pans are sloped. We thus avoid water stagnation that generates corrosion and micro-organism life such as mold and fungi.

### Reliabel Unit Controller Benefits

- Reliabel in the Voyager units has built-in anti-short-cycle timer, time delay relay and minimum "on" time controls. These controls are functions of Reliabel and are factory tested to assure proper operation.
- Reliabel softens electrical "spikes" by staging on fans, compressors and heaters.
- The Intelligent Fallback or Adaptive Control is a benefit to the building occupant. If a component goes astray, the unit will continue to operate at predetermined temperature set point.
- Intelligent Anticipation is a standard feature of Reliabel. It functions constantly as Reliabel and zone sensor work together in harmony to provide tighter comfort control than conventional electromechanical thermostats.

On dual fuel units (DKD/DKH), Reliabel automatically selects the best source of heat. In low ambient operation, when mechanical heating is not delivering enough performance, the compressor switches off and the gas burner delivers heat in optimized conditions. This results in an optimized energy consumption and higher compressor life cycle.



# Options and Accessories

In order to best suit customers requirements, Trane commercial Voyager can be fitted with a lot of options and accessories. The following table demonstrates these capabilities.

**Table 1 - Options and Accessories - Voyager III**

	TKD	TKH	WKD	WKH	YKD	YKH	DKD	DKH	Application	Description	Incompatible with
<b>FRESH AIR OPTIONS</b>											
0-25% manual fresh air hood	O	O	O	O	O	O	O	O	Fresh air needed in the building, up to 25% of the nominal airflow.	Manually sets a permanent amount of fresh air in the unit, between 0-25% of the nominal airflow.	Economizer, CO <sub>2</sub> sensor, remote potentiometer, barometric relief, power exhaust fans.
Economizer comparative enthalpy control	O	O	O	O	O	O	O	O	Fresh air needed in the building, up to 50% of nominal airflow, and intelligent energy saving.	The economizer is composed of 2 sets of temperature and humidity sensors that measure ambient and room enthalpy, and of a fresh air damper connected to a return air damper. The free-cooling function modulates between the permanent set value (between 0-50%) and 100% of the nominal airflow using the fresh air enthalpy to cool down the building. It also has a permanent fresh air function.	0-25% manual hood.
Energy Recovery Module	O	O	O	O	O	O	O	O	When unit has to operate with a fresh air rate higher than 15% in extreme outdoor temperature (winter and summer). It is important to recover heat from exhaust air and transfer it to the fresh air. Result is a reduction of the installed heating/cooling capacity.	A energy recovery module is installed on the fresh air side of the unit. 2 technologies for 2 levels of efficiency (Plate heat exchanger efficiency 50-60%, Heat recovery wheel efficiency 60-85%) Free cooling function is integrated (100% fresh air with by-passed exchanger). Heat recovery wheel has an hygroscopic treatment allowing partial transfer of moisture in parallel to sensible heat.	0-25% manual hood.
Remote potentiometer	A	A	A	A	A	A	A	A	To remotely set the permanent fresh air intake.	Connected to the potentiometer of the economizer, can modify remotely the permanent fresh air amount brought into the unit between 0-50% of the nominal airflow.	0-25% manual fresh air hood, not recommended with CO <sub>2</sub> sensor.
CO <sub>2</sub> sensor	O	O	O	O	O	O	O	O	Hygienic control of the air.	Works with the economizer and brings fresh air (modulating between the permanent fresh air setpoint and 50% of the nominal airflow) whenever the CO <sub>2</sub> concentration in the room meets or exceeds the adjustable threshold. The sensor itself has to be mounted in a relevant place in the room or in the ductwork.	0-25% manual hood, not recommended with remote potentiometer.
Barometric relief	O	O	O	O	O	O	O	O	To minimize overpressure in the building when fresh air intake is around 25% and pressure drop in the return duct is very low.	Damper placed in the return section opens with the overpressurization of the return air. 25% of this return air is blown outside.	0-25% manual hood, exhaust fans.
Exhaust fans	O	O	O	O	O	O	O	O	To minimize overpressure in the building caused by the introduction of fresh air, when the economizer fresh air damper set at 40-50% OA (permanent value), and/or when the pressure drop in the return duct is between the building overpressure accepted by the customer (12-25 Pa) and 200 Pa (maximum fan static pressure).	When the exhaust fans are off, the gravity dampers open with increased building pressure to relieve the air pressure. When the exhaust fans are on, around 50% of airflow can be exhausted, depending on the pressure drop of the return. They turn on whenever the position of the economizer fresh air dampers meet or exceed the power exhaust setpoint (when the supply fan is on).	0-25% manual fresh air hood, barometric relief option (because it is already included in the "exhaust fans" option).

**Legend**

A = Accessory (to be mounted on site).  
O = Option (factory mounted and tested).  
S = Standard feature mounted on all units.  
Other options or configurations are available. Please contact your local sales office for more information.

## Options and Accessories

**Table 1 - Options and Accessories - Voyager III (cont.)**

	TKD	TKH	WKD	WKH	YKD	YKH	DKD	DKH	Application	Description	Incompatible with
<b>HEATING DEVICES</b>											
Hot water coil	O	O	O	O	-	-	-	-	Need of heating or additional heating on cooling only units or heat pump units. Hot water loop available on site.	Avoids the power consumption of an electric heater by using the hot water loop available to heat the building.	Electric heaters, gas fired units.
Modulating Gas burner	-	-	O	O	-	-	O	O	Need more efficient gas burner (Condensing at part load) Low mixed air temperature (<5°C). Need discharge temperature control.	Modulating heat output adapted to the building need and discharge temperature. Condensation of flue gases allow efficiency to rise up to 105%.	Electric heaters, Hot water coil
Electric heaters	O	O	O	O	-	-	-	-	Need of heating or additional heating on cooling only units or heat pump units. Very useful with a heat pump unit to keep a good comfort level during the defrost cycle.	On a heat pump unit, in heating mode, turns on when the compressors job does not raise the temperature fast enough. On a heat pump, in heating mode, during the outdoor coil defrost cycle, the electric heater turns on to avoid blowing cold air in the building.	Hot water coil, gas fired units.
<b>VENTILATION</b>											
EU4 filters 50 mm & 100 mm	O	O	O	O	O	O	O	O	To filter the air (with less pressure drop for 100mm filters).	Washable media, treat the return and fresh air, 90% gravimetric efficiency.	
EU4+EU7 filters	O	O	O	O	O	O	O	O	To filter the air.	50mm+50mm Galvanized steel frame filters. Washable media for EU4 pre-filter, EU7 provides 85% opacimetric efficiency.	
Clogged filter detector	O	O	O	O	O	O	O	O	To facilitate maintenance of the filters.	When the pressure drop of the filter exceeds the selectable value, this differential pressostat report an alarm via a dry contact to the micro-control.	
"80%-100% inverter on indoor fan (Belt driven)"	O	O	O	O	O	O	O	O	Used to reduce fan speed and provide energy savings.	Speed inverter controls fan speed automatically down to 80% during part load, free-cooling and ventilation only mode.	
"80%-100% inverter on indoor fan (Direct driven)"	O	O	O	O	O	O	O	O	Combine energy savings of fan speed reduction and reduced transmission loss of the direct coupling.	Speed inverter controls fan speed automatically down to 80% during part load, free-cooling and ventilation only mode. Additional saving of direct coupling that improve motor absorbed power by 10 to 15% compared to belt driven fan.	
Soft starter	O	O	O	O	O	O	O	O	To achieve a progressive supply fan start.	Soft starter option achieved by the inverter. Starting time can be adjusted from 0 to 3800 seconds (factory-set at 60s).	
"80%-100% inverter on indoor fan + soft starter"	O	O	O	O	O	O	O	O	The soft fan start is included in the inverter 80-100% program.	Fan speed automatically drops to 80% during part load, free-cooling mode and in ventilation only. Soft starter option achieved by the inverter.	

**Legend**

A = Accessory (to be mounted on site).  
O = Option (factory mounted and tested).  
S = Standard feature mounted on all units.  
Other options or configurations are available. Please contact your local sales office for more information.

## Options and Accessories

**Table 1 - Options and Accessories - Voyager III (cont.)**

	TKD	TKH	WKD	WKH	YKD	YKH	DKD	DKH	Application	Description	Incompatible with
<b>SAFETY</b>											
Fire thermostat	A	A	A	A	A	A	A	A	To stop the unit when temperature of the air stream rises abnormally.	A kit of 2 manual reset thermostats are delivered. The first one, to be placed in the return duct, stops the unit and put the unit in general fault when the airstream rises above 57°C, the second, to be placed in the supply duct, reacts above 115°C. Temperature threshold cannot be changed.	
Smoke detector	O	O	O	O	O	O	O	O	To detect smoke in the building.	Closes the return air damper if an economizer is installed, stops the indoor fan, switches off the electric heater if installed and energized, and put the unit in general fault. This option provides a post ventilation period of 30 seconds in the case of high temperature cut out.	
High temperature safety thermostat	-	-	-	-	O	O	O	O	For the French ERP regulation only: additional security thermostat for gas-fired units.	This manual reset thermostat switches off the burner and the supply fan, and put the unit in general fault if the supply temperature rises above 120°C.	
Fan failure switch	O	O	O	O	O	O	O	O	To improve security and reliability of the unit (when the indoor fan belt breaks down for instance).	Detects the lack of fan static pressure. If the indoor fan fails, then the unit operation is shut down and the "Service" light LED on the Zone Sensor starts flashing. If no air flow going through the unit is detected within 40 seconds (by differential pressure), the control will shut off all mechanical operations, lock the system, send a diagnostic to the ICS, and the "Service" LED will flash. The system will remain locked until a reset is initiated either manually or through the ICS. The option board is required.	
Indoor fan belt guard	O	O	O	O	O	O	O	O	Used to improve safety when accessing the unit, during maintenance and to comply with some local regulations.	Two grids placed around the indoor fan belt drive prevent people from letting their hands or fingers get in contact with the moving parts and therefore reduce the risk of injury.	
Three-Phase Monitoring Relay Phase reversal + Phase loss	S	S	S	S	S	S	S	S	This device monitors three-phase power supply in order to protect unit motors. It prevent risk of starting unit in reverse rotation and phase loss that could cause motor burn out.	The relay disables the unit control when one of the following failures occurs on power supply: phase reversal, phase loss. No fault reporting is not delayed.	
Three-Phase Monitoring Relay Phase reversal + Phase loss + Phase imbalance	O	O	O	O	O	O	O	O	This device monitors three-phase power supply in order to protect unit motors. This option is recommended when there are risks of power supply imbalance 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.	
<b>ROOFCURBS</b>											
Standard roofcurb	A	-	A	-	A	-	A	-	Connection between a flat roof and the rooftop.	Supports the rooftop and ensures watertightness roof/roofcurb/rooftop, and easy connection of the ductwork.	Adjustable roofcurb.
Adjustable roofcurb	A	-	A	-	A	-	A	-	Connection between a sloped roof and the rooftop.	Supports the rooftop and ensures water tightness roof/roofcurb/rooftop, and easy connection of the ductwork, correcting slope up to 5%.	Standard roofcurb.

**Legend**

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## Options and Accessories

**Table 1 - Options and Accessories - Voyager III (cont.)**

	TKD	TKH	WKD	WKH	YKD	YKH	DKD	DKH	Application	Description	Incompatible with
<b>CONTROL</b>											
ReliaTel™ Options Module (RTOM)	S	S	S	S	S	S	S	S	Required for some optional ReliaTel™ devices (froststat, clogged filter switch, fan failure switch, discharge air sensor (DAS) used for supply air tempering and ICS input data, smoke detector, external on/off switch).	Communication interface between the ReliaTel™ Refrigeration Module (RTRM) and some options.	
TCI-R	O	O	O	O	O	O	O	O	To communicate with Trane Integrated Comfort Systems, such as the Tracer Summit™, the Tracker™ or a Varitrac™ system (CCP2).	Communication interface between a Trane ICS device and a Voyager™.	THS/P 03, and other communication interfaces
LCI-R	O	O	O	O	O	O	O	O	To communicate on a LonTalk® network at the unit level.	Communication interface between a LonTalk® management system and a Voyager™.	THS/P 03, and other communication interfaces
BCI-R	O	O	O	O	O	O	O	O	To communicate on a BACnet® MS/TP network at the unit level.	Communication interface between a BACnet management system and a Voyager™.	THS/P 03, and other communication interfaces
PIC	O	O	O	O	O	O	O	O	To communicate on a Modbus network at the unit level.	Communication interface between Modbus management system and a Voyager™.	THS/P 03, and other communication interfaces
THS03	A	A	A	A	A	A	A	A	Control of 1 cooling-only, heat pump or gas-fired rooftop.	Electronic thermostat, 2 stages cooling, 1 stage compressor heating, 2 stages auxiliary heating. No CTI card needed, communicates in the same language as the rooftop micro-control and uses 100% of its advanced control features	All communication interfaces
THP03	A	A	A	A	A	A	A	A	Control of 1 cooling-only, heat pump or gas-fired rooftop.	Electronic programmable thermostat, 2 stages cooling, 1 stage compressor heating, 2 stages auxiliary heating, LCD screen. Communicates in the same language as the rooftop micro-control and uses 100% of its advanced control features.	All communication interfaces
Remote sensor box for THS/THP03	A	A	A	A	A	A	A	A	Need of remote or additional sensors with THS/THP03	Senses the temperature and sends the information to the THS/P 03.	THS/P 01
Discharge air sensing ("Supply air tempering")	O	O	O	O	O	O	O	O	Supply air tempering maintains the supply air temperature above a lower limit during minimum ventilation periods in heating mode. Also used to monitor true discharge air temperature out of the unit.	A sensor is placed in the return air duct.	Hot water coil
Remote fault relay	O	O	O	O	O	O	O	O	To send alarms signals to a local BMS.	Report cool fail, Heat fail & system fail into one dry contact (Normally closed and normally open).	
TD-5	A	A	A	A	A	A	A	A	Plug and play diagnostic touch screen display. Read Only device connected to ReliaTel boards.	5 inch touch screen display. Monitor all unit parameters, input, output, graph and record parameter trend. Provide alarm historic reporting and possibility to reset alarms	

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## Options and Accessories

**Table 1 - Options and Accessories - Voyager III (cont.)**

	TKD	TKH	WKD	WKH	YKD	YKH	DKD	DKH	Application	Description	Incompatible with
<b>MISCELLANEOUS</b>											
Black epoxy coating on condenser	O	O	O	O	O	O	O	O	Sea side application.	The black epoxy coating slows down the corrosion process on the aluminum fins.	
Black epoxy coating on condenser and evaporator	O	O	O	O	O	O	O	O	Sea side application when a fresh air device is used.	The black epoxy coating slows down the corrosion process on the aluminum fins.	
<b>Phase out</b>											
THP01	A	A	-	-	A	A	A	A	Control of 1 cooling-only /gas-fired rooftop.	Electronic programmable thermostat, 2 stages cooling, 2 stages auxiliary heating, LCD screen.	TCI-R, LCI-R
THS01	A	A	-	-	A	A	A	A	Control of 1 cooling-only /gas-fired rooftop.	Electronic thermostat, 2 stages cooling, 2 stages auxiliary heating, LCD screen.	TCI-R, LCI-R
Remote sensor box for THS/THP01-02	-	-	A	A	-	-	-	-	Need for remote or additional sensors with THS/P 01-02.	Senses the temperature and sends the information to the THS/P 01-02.	THS/P 03, TCI-R, LCI-R
Ventilated roofcurb extension (French ERP regulations)	A	A	A	A	A	A	A	A	Connection between a roofcurb and a rooftop unit installed on a roof. Used to comply to the French ERP (Etablissement Recevant du Public: Buildings open to the public) regulations.	Avoids contact between the rooftop and the roof. Openings on the sides allow natural ventilation. Protection of the building in case of failure of the rooftop causing overheating/fire.	

**Legend**

A = Accessory (to be mounted on site).  
O = Option (factory mounted and tested).  
S = Standard feature mounted on all units.  
Other options or configurations are available. Please contact your local sales office for more information.

### Exhaust Air Options

When is it necessary to provide building exhaust?

Whenever an outdoor air economizer is used, a building generally requires an exhaust system. The purpose of the exhaust system is to exhaust the proper amount of air to prevent over or under-pressurization of the building.

A building may have all or part of its exhaust system in the rooftop unit. Often, a building provides exhaust external to the air conditioning equipment. This external exhaust must be considered when selecting the rooftop exhaust system.

Voyager™ Commercial rooftop units offer two types of exhaust systems:

**1 Power exhaust fan**

**2 Barometric relief dampers**

## Options and Accessories

### Application Recommendations

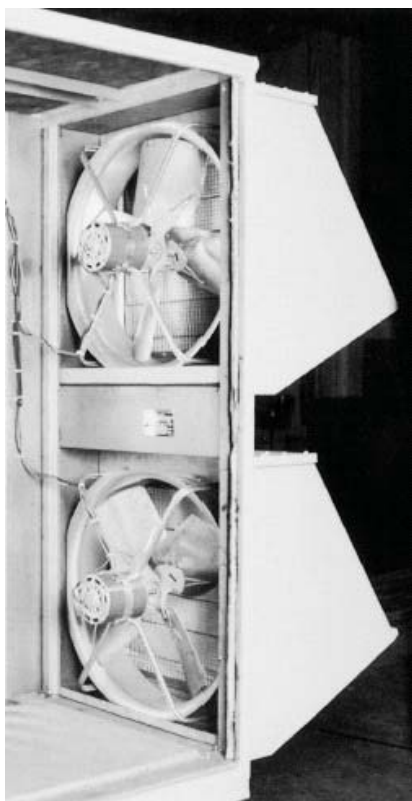
#### Power Exhaust Fan

The exhaust fan option is a dual, non-modulating exhaust fan with approximately half the air-moving capabilities of the supply fan system.

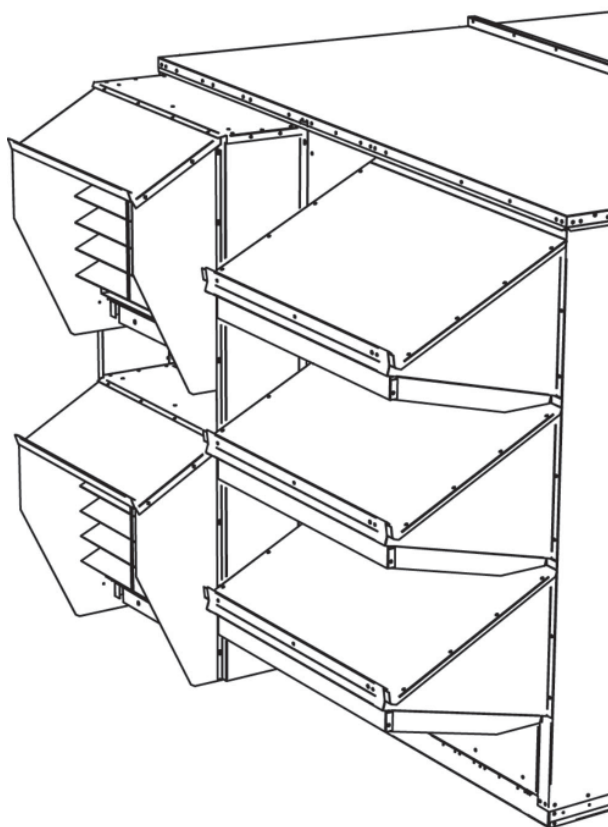
The experience of The Trane Company is that a non-modulating exhaust fan selected for 40 to 50 percent of nominal supply airflow can be applied successfully.

The power exhaust fan generally should not be selected for more than 40 to 50 percent of design supply airflow. Since it is an on/off non-modulating fan, it does not vary exhaust airflow with the amount of outside air entering the building. Therefore, if selected for more than 40 to 50 percent of supply airflow, the building may become under-pressurized when economizer operation is allowing lesser amounts of outdoor air into the building. If, however, building pressure is not of a critical nature, the non-modulating exhaust fan may be sized for more than 50 percent of design supply airflow.

**Figure 8**



**Figure 9**



#### Barometric Relief Dampers

Barometric relief dampers consist of gravity dampers which open with increased building pressure. As the building pressure increases, the pressure in the unit return section also increases, opening the dampers and relieving air. Barometric relief may be used to provide relief for single story buildings with no return ductwork and exhaust requirements less than 25 percent.

#### Acoustical Considerations

Proper placement of rooftops is critical to reduce transmitted sound levels to the building. The ideal time to make provisions to reduce sound transmissions is during the design phase. And the most economical means of avoiding an acoustical problem is to place the rooftop(s) away from acoustically critical areas. If possible, rooftops should not be located directly above areas such as: offices, conference rooms, executive office areas and classrooms. Instead, ideal locations might be over corridors, utility rooms, toilets or other areas where higher sound levels directly below the unit(s) are acceptable.

## Options and Accessories

Several basic guidelines for unit placement should be followed to minimize sound transmission through the building structure:

- 1) Never cantilever the compressor end of the unit. A structural cross member must support this end of the unit.
- 2) Locate the unit's center of gravity close to or over column or main support beam.
- 3) If the roof structure is very light, roof joists must be replaced by a structural shape in the critical areas described above.
- 4) If several units are to be placed on one span, they should be staggered to reduce deflection over that span.

It is impossible to totally quantify the effect of building structure on sound transmission because this depends on the response of the roof and building members to the sound and vibration of the unit components. However, the guidelines listed above are experience-proven guidelines which will help reduce sound transmissions.

### Energy Recovery Module (ERM)

In order to recover heat from exhasut air, it is recommended to use the energy recovery module. It is placed on the fresh air side of the unit.

In order to satisfy two levels of efficiency, two technologies are available:

- Plate heat exchanger version with an efficiency of 50 to 60%,
- Heat recovery wheel with an efficiency of 60-85%.

The option is available in the two airflow configurations: horizontal flow and downflow

The free cooling function is still valid with this option.

The heat recovery wheel version has an hygroscopic treatment allowing partial transfer of moisture in parralel to sensible heat.

### Clearance Requirements

The recommended clearances identified with unit dimensions should be maintained to assure adequate serviceability, maximum capacity and peak operating efficiency. Refer to the Minimum recommended clearances Table in this manual. A reduction in unit clearance could result in condenser coil starvation or warm condenser air recirculation. If the clearances shown are not possible on a particular job, consider the following:

- Do the clearances available allow for major service work such as changing compressors or coils?
- Do the clearances available allow for proper outside air intake, exhaust air removal and condenser airflow?
- If screening around the unit is being used, is there a possibility of air recirculation from the exhaust to the outside air intake or from condenser exhaust to condenser intake?

Actual clearances which appear inadequate should be reviewed with a local Trane sales engineer.

When two or more units are to be placed side by side, the distance between the units should be increased to 150 percent of the recommended single unit clearance. The units should also be staggered as shown for two reasons:

- 1) To reduce span deflection if more than one unit is placed on a single span. Reducing deflection discourages sound transmission.
- 2) To assure proper diffusion of exhaust air before contact with the outside air intake of adjacent unit.

### Duct Design

It is important to note that the rated capacities of the rooftop can be met only if the rooftop is properly installed in the field. A well designed duct system is essential in meeting these capacities.

The satisfactory distribution of air throughout the system requires that there be an unrestricted and uniform airflow from the rooftop discharge duct. This discharge section should be straight for at least several duct diameters to allow the conversion of fan energy from velocity pressure to static pressure.

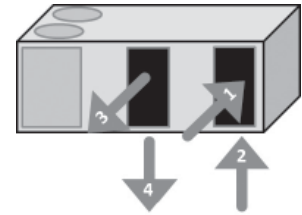
However, when job conditions dictate elbows be installed near the rooftop outlet, the loss of capacity and static pressure may be reduced through the use of guide vanes and proper direction of the bend in the elbow. The high velocity side of the rooftop outlet should be directed at the outside radius of the elbow rather than the inside.



# Selection Procedure

To obtain product selection, please contact your local Trane sales office with the following information:

## Mandatory informations to select a rooftop



System type	Cooling Only <input type="checkbox"/>	Heat pump <input type="checkbox"/>		
<b>Airflow information</b>				
Configuration of return duct	1 - Horizontal flow <input type="checkbox"/>	2 - Downflow <input type="checkbox"/>	Other	.....
Configuration of supply duct	3 - Horizontal flow <input type="checkbox"/>	4 - Downflow <input type="checkbox"/>	Other	.....
Unit airflow	..... m3/h			
Fresh air rate	..... m3/h	..... % of nominal airflow		
External static pressure on return duct	..... Pa			
External static pressure on supply duct	..... Pa			
<b>Cooling mode design conditions</b>				
Unit cooling capacity	..... kW			
Indoor air Dry Bulb	..... °C			
Indoor air wet Bulb/Relative Humidity	..... °C	..... %		
Outdoor air Dry Bulb	..... °C			
<b>Heating mode design conditions</b>				
Heating capacity	..... kW			
Auxiliary heat type	Electric Heat <input type="checkbox"/>	Gas Heat <input type="checkbox"/>	Hot Water coil <input type="checkbox"/>	
Gas type	Natural gas G20 <input type="checkbox"/>	Natural gas G25 <input type="checkbox"/>	Propane gas G31 <input type="checkbox"/>	
Auxiliary heating capacity	..... kW			
Indoor air Dry Bulb	..... °C			
Outdoor air Dry Bulb	..... °C			
Outdoor air wet Bulb/Relative Humidity	..... °C	..... %	(only for Heat pump)	
<b>Options</b>				
Air filter class	.....			
Variable speed drive	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Economizer type	Without <input type="checkbox"/>	Manual fresh air <input type="checkbox"/>	Comparative enthalpy economizer <input type="checkbox"/>	
Energy recovery on exhaust/fresh air	Without <input type="checkbox"/>	Rotary heat wheel <input type="checkbox"/>	Plate heat exchanger <input type="checkbox"/>	
Fresh air control	Constant <input type="checkbox"/>	Remote reference <input type="checkbox"/>	CO2 sensor controled <input type="checkbox"/>	
Unit control	Local control without scheduling <input type="checkbox"/>	Local control with scheduling <input type="checkbox"/>	Multi-unit centralized control <input type="checkbox"/>	Remote relay interface control <input type="checkbox"/>
Remote control communication interface	LON <input type="checkbox"/>	Modbus <input type="checkbox"/>	Bacnet <input type="checkbox"/>	Trane <input type="checkbox"/>
Smoke detector	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Fire detector	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Disconnect switch	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Dirty filter switch	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Fan fail switch	With <input type="checkbox"/>	Without <input type="checkbox"/>		
Outdoor coil corrosion protection	Without <input type="checkbox"/>	Epoxy coating <input type="checkbox"/>		
Indoor coil corrosion protection	Without <input type="checkbox"/>	Epoxy coating <input type="checkbox"/>		
Roofcurb	None <input type="checkbox"/>	Flat <input type="checkbox"/>	Adjustable pitch <input type="checkbox"/>	

# General Data

Table 2 - General Data

Cooling only/Gas fired unit		TKD/TKH YKD/YKH	TKD/TKH YKD/YKH	TKD/TKH YKD/YKH	TKD/TKH YKD/YKH	TKD/TKH YKD/YKH	TKD/TKH YKD/YKH
		275	300	350	400	500	600
<b>Eurovent Performances (1)</b>		R410A	R410A	R410A	R410A	R410A	R410A
Net Cooling Capacity	(kW)	82.8	88.2	93.1	120.3	131.9	153.5
Total Power input in cooling	(kW)	24.9	27.3	29.6	39.8	46.9	58.6
EER		3.33	3.23	3.14	3.02	2.81	2.62
Eurovent Efficiency class Cooling		A	A	A	A	B	C
Main Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Outdoor sound power level env.	(dBA)	88	88	89	90	90	91
Indoor sound power level in duct	(dBA)	84	84	85	87	87	88
Outdoor sound pressure level env. (6)	(dBA)	56	56	57	57	58	58
<b>Unit amps</b>							
Unit max amps (3)	(A)	76	78	87	108	149	177
Unit start up amps (3)	(A)	209	209	209	209	209	209
Unit power factor (1)		0.78	0.79	0.78	0.77	0.81	0.79
Short circuit current	(kA)	10	10	10	10	10	10
<b>Electric Heater</b>							
Heating Capacity	(kW)	25	37.5	50	62.5	75	75
Capacity steps	(kW)	12.5/12.5	25/12.5	25/25	25/37.5	37.5/37.5	37.5/37.5
Rated Amps	(A)	36.1	54.1	72.2	90.2	108.3	108.3
<b>Gas burner (YKD/YKH)</b>							
<b>Staged Low heat version</b>							
Heating Input (G20)	(kW)	77	77	77	85	85	85
Heating Output (G20)	(kW)	69.3	69.3	69.3	77.4	77.4	77.4
Steady State Efficiency	(%)	90	90	90	91	91	91
No. Burners	#	1	1	1	1	1	1
No. Stages	#	2	2	2	2	2	2
Gas Connection Pipe Size		3/4" NPT	3/4" NPT	3/4" NPT	3/4" NPT	3/4" NPT	3/4" NPT
<b>Staged High heat version</b>							
Heating Input (G20)	(kW)	130	130	130	170	170	170
Heating Output (G20)	(kW)	117.5	117.5	117.5	154.8	154.8	154.8
Steady State Efficiency	(%)	90	90	90	91	91	91
No. Burners	#	2	2	2	2	2	2
No. Stages	#	2	2	2	2	2	2
Gas Connection Pipe Size		1" NPT	1" NPT	1" NPT	1" NPT	1" NPT	1" NPT
<b>Modulating gas heat version</b>							
Heating Input Min Max (G20)	(kW)	44/155	44/155	44/155	44/155	44/155	44/155
Heating Output Min/Max (G20)	(kW)	46.3/145	46.3/145	46.3/145	46.3/145	46.3/145	46.3/145
Steady State Efficiency	(%)	105% - 93.5%	105% - 93.5%	105% - 93.5%	105% - 93.5%	105% - 93.5%	105% - 93.5%
No. Burners	#	1	1	1	1	1	1
Modulation	%	32%-100%	32%-100%	32%-100%	32%-100%	32%-100%	32%-100%
Gas Connection Pipe Size		1" ISO R7	1" ISO R7	1" ISO R7	1" ISO R7	1" ISO R7	1" ISO R7
Condensate outlet Pipe Size	mm	18	18	18	18	18	18
<b>Compressor</b>							
Number	#	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		13T/13T	13T/15T	15T/15T	15T/25T	15T/30T	25T/30T
Rated Amps (2)	(A)	25.1/25.1	25.1/30.5	30.5/30.5	30.5/51.2	30.5/58.0	51.2/58.0
Locked rotor Amps (2)	(A)	158/158	158/197	197/197	197/260	197/320	260/320
<b>Outdoor Coil</b>							
Type		Wavy	Wavy	Wavy	Wavy	Wavy	Wavy
Tube Size OD	(mm)	9.52	9.52	9.52	9.52	9.52	9.52
Face Area	(m²)	4.8	4.8	4.8	6.1	6.1	6.1
Rows/Fin series	#/FPF	2/192	2/192	2/192	2/192	2/192	3/192
<b>Indoor Coil</b>							
Type		Wavy	Wavy	Wavy	Wavy	Wavy	Wavy
Tube Size OD	(mm)	9.52	9.52	9.52	9.52	9.52	9.52
Face Area	(m²)	2.9	2.9	2.9	3.4	3.4	3.4
Rows/Fin series	#/FPF	3/180	3/180	3/180	4/180	4/180	4/180
Refrigerant Control		TXV	TXV	TXV	TXV	TXV	TXV
Drain Connection No./Size	(mm)	1/32mm	1/32mm	1/32mm	1/32mm	1/32mm	1/32mm
<b>Outdoor Fan</b>							
Nominal Airflow	(m³/h)	41100	41100	41100	48700	48700	43600
Type		Axial	Axial	Axial	Axial	Axial	Axial
Diameter	(mm)	710	710	710	710	710	710
Drive type		Direct	Direct	Direct	Direct	Direct	Direct
Number/Voltage	#/V	3/400V	3/400V	3/400V	4/400V	4/400V	4/400V
Motor HP	(kW)	1.1	1.1	1.1	1.1	1.1	1.1
Motor Rated Amps (2)	(A)	2.5	2.5	2.5	2.5	2.5	2.5
Motor RPM	(rpm)	915	915	915	915	915	915

## General Data

**Table 2 - General Data (Cont.)**

<b>Indoor Fan</b>							
Minimum Airflow	(m <sup>3</sup> /h)	10880	12240	13600	16320	19680	23600
Nominal Airflow	(m <sup>3</sup> /h)	13600	15300	17000	20400	24600	29500
Maximum Airflow	(m <sup>3</sup> /h)	16320	18360	20400	24480	29520	35400
Maximum static pressure available (4)	(Pa)	525	520	465	590	600	600
Type		FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
Number	#	1	1	1	1	1	1
Diameter/Width	(in/in)	22.4"/22"	22.4"/22"	22.4"/22"	25"/25"	25"/25"	25"/25"
<b>Belt driven fan version</b>							
Motor HP (Standard/Oversized)	(kW)	5.5/7.5	5.5/7.5	7.5/11	7.5/11	7.5/15	11/15
Motor Rated Amps (Standard/Oversized)	(A)	11.9/15.2	11.9/15.2	15.2/21.1	15.2/21.1	15.2/29.1	21.1/29.1
Motor Locked rotor Amps (Standard/Oversized)	(A)	70/106	70/106	106/162	106/162	106/216	162/216
Motor RPM (Standard/Oversized)	(rpm)	1450/1450	1450/1450	1450/1450	1450/1450	1450/1450	1450/1450
<b>Direct driven fan version</b>							
Motor HP (Standard/Oversized)	(kW)	5.5/7.5	5.5/7.5	5.5/7.5	11/15	11/15	11/15
Motor Max Amps (Standard/Oversized)	(A)	10.3/13.9	10.3/13.9	10.3/13.9	18.2/25.6	18.2/25.6	18.2/25.6
Motor RPM (Standard/Oversized)	(rpm)	963/970	963/970	963/970	970/973	970/973	970/973
<b>Energy Recovery Module (5)</b>							
<b>Plate Heat exchanger version</b>							
Heat recovery efficiency at 10%/50% fresh air	(%)	62%/59%	61%/58%	61%/58%	61%/58%	61%/58%	61%/57%
Air pressure drop at 10%/50% fresh air	(Pa)	3Pa/56Pa	4Pa/69Pa	5Pa/83Pa	2Pa/38Pa	3Pa/54Pa	4Pa/75Pa
Exhaust fan kW at 10%/50% fresh air	(kW)	0.3kW/0.4kW	0.3kW/0.6kW	0.3kW/0.6kW	0.5kW/0.7kW	0.5kW/1kW	0.5kW/1.4kW
Length (Downflow/Horizontal flow)	(mm)	2288/2440	2288/2440	2288/2440	3050/3335	3050/3335	3050/3335
Width (Downflow/Horizontal flow)	(mm)	2295/2143	2295/2143	2295/2143	2295/2295	2295/2295	2295/2295
Height (Downflow/Horizontal flow)	(mm)	1858/1808	1858/1808	1858/1808	2010/1960	2010/1960	2010/1960
Weight (Downflow/Horizontal flow)	(kg)	799/807	799/807	799/807	1155/1240	1155/1240	1155/1240
<b>Rotary Wheel Heat exchanger version</b>							
Heat recovery efficiency at 10%/50% fresh air	(%)	84%/69%	83%/66%	83%/64%	85%/71%	84%/68%	83%/64%
Air pressure drop at 10%/50% fresh air	(Pa)	10Pa/72Pa	12Pa/83Pa	13Pa/95Pa	13Pa/91Pa	16Pa/114Pa	20Pa/143Pa
Exhaust fan kW at 10%/50% fresh air	(kW)	0.4kW/0.5kW	0.4kW/0.7kW	0.4kW/0.7kW	0.5kW/0.8kW	0.5kW/1kW	0.5kW/1.4kW
Length (Downflow/Horizontal flow)	(mm)	2440/2440	2440/2440	2440/2440	2745/2745	2745/2745	2745/2745
Width (Downflow/Horizontal flow)	(mm)	1990/2143	1990/2143	1990/2143	2295/2295	2295/2295	2295/2295
Height (Downflow/Horizontal flow)	(mm)	2010/1960	2010/1960	2010/1960	2335/2265	2335/2265	2335/2265
Weight (Downflow/Horizontal flow)	(kg)	877/981	877/981	877/981	1288/1363	1288/1363	1288/1363
<b>Power Exhaust Fan (Option)</b>							
Type		Axial	Axial	Axial	Axial	Axial	Axial
Diameter	(mm)	630	630	630	630	630	630
Drive type		Direct	Direct	Direct	Direct	Direct	Direct
Number/Voltage	#	2/400V	2/400V	2/400V	2/400V	2/400V	2/400V
Motor HP	(kW)	0.6	0.6	0.6	0.6	0.6	0.6
Motor Rated Amps (2)	(A)	1.2	1.2	1.2	1.2	1.2	1.2
<b>Filters</b>							
Type Furnished		2" Throwaway	2" Throwaway	2" Throwaway	2" Throwaway	2" Throwaway	2" Throwaway
(No.) Size Recommended		16x (398x498x45)	16x (398x498x45)	16x (398x498x45)	17x (398x498x45)	17x (398x498x45)	17x (398x498x45)
<b>Operating limits</b>							
Minimum operating outdoor air temp. (Cooling)	°C	-18	-18	-18	-18	-18	-18
Maximum operating outdoor air temp. (Cooling)	°C	52	52	52	49	49	52
Minimum intake air temp. on the indoor coil (Cooling)	°C	16	16	16	16	16	16
Minimum intake air temp. on the indoor coil (Heating)	°C	5	5	5	5	5	5
<b>Dimensions (3)</b>							
Length TKD/TKH	(mm)	4580	4580	4580	5200	5200	5200
YKD/YKH (Low heat)	(mm)	4580	4580	4580	5900	5900	5900
YKD/YKH (High heat)	(mm)	5285	5285	5285	5900	5900	5900
Width	(mm)	2302	2302	2302	2302	2302	2302
Height	(mm)	2093	2093	2093	2268	2268	2268
Operating weight TKD/TKH	(kg)	1625	1629	1655.5	2055	2114	2241
YKD/YKH (Low heat)	(kg)	1668	1684	1714.5	2169	2227	2494
YKD/YKH (High heat)	(kg)	1861	1871	1900.5	2225	2284	2551
Shipping weight TKD/TKH	(kg)	1725	1729	1755.5	2195	2254	2381
YKD/YKH (Low heat)	(kg)	1768	1784	1914.5	2309	2367	2634
YKD/YKH (High heat)	(kg)	1981	1991	2020.5	2365	2424	2691
<b>Unit construction</b>							
Sheet metal/Thickness	Type/ mm	GalvaSteel/1.2	GalvaSteel/1.2	GalvaSteel/1.2	GalvaSteel/1.2	GalvaSteel/1.2	GalvaSteel/1.2
Paint	Type/ RAL	Polyester/9002	Polyester/9002	Polyester/9002	Polyester/9002	Polyester/9002	Polyester/9002
Insulation/Thickness	Type/ mm	M0/25	M0/25	M0/25	M0/25	M0/25	M0/25
<b>System Data</b>							
Refrigerant circuit	#	1	1	1	2	2	2
Capacity steps	%	0/50/100	0/46/100	0/50/100	0/37/63/100	0/33/66/100	0/45/55/100
<b>Refrigerant Charge</b>							
Circuit A	(kg)	20.7	20.7	21.0	7.0	7.0	18.5
Circuit B	(kg)	-	-	-	21.6	21.6	18.5

(1) At Eurovent rating conditions: Indoor return Air (27°C DB/19°C WB) - Ambient 35°C according to EN14511:2013.

(2) per motor under 400V.

(3) Max load amp for unit with oversized belt driven fan, with exhaust fan options, without electric heater.

(4) At the nominal airflow with oversized drive.

(5) Performance of Energy recovery module given for Indoor 19°C/50%/Outdoor Ambient -5°C.

(6) At 10m from the unit in a free field.

Electrical & refrigerant charge Data are subject to change without notice. Please refer to unit nameplate data.

## General Data

**Table 3 - General Data**

Reversible/Dual fuel unit		WKD/WKH DKD/DKH 400	WKD/WKH DKD/DKH 500	WKD/WKH DKD/DKH 600
<b>Eurovent Performances (1)</b>		<b>R410A</b>	<b>R410A</b>	<b>R410A</b>
Net Cooling Capacity	(kW)	115.5	136.2	156.1
Total Power input in cooling	(kW)	39.8	50.3	62.7
EER		2.90	2.71	2.49
Eurovent Efficiency class Cooling		B	C	D
Main Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50
Net Heating Capacity	(kW)	107.1	146.8	174.0
Total Power input in Heating	(kW)	32.3	44.1	52.4
COP		3.32	3.33	3.32
Eurovent Efficiency class Heating		B	B	B
Outdoor sound power level env.	(dBA)	90	90	91
Indoor sound power level in duct	(dBA)	87	87	88
Outdoor sound pressure level env. (6)	(dBA)	58	58	59
<b>Unit amps</b>				
Unit max amps (3)	(A)	117	148	162
Unit start up amps (3)	(A)	293	357	424
Unit power factor (1)		0.78	0.72	0.76
Short circuit current	(kA)	10	10	10
<b>Electric Heater (WKD/WKH)</b>				
Heating Capacity	(kW)	62.5	75	75
Capacity steps	(kW)	25/37.5	37.5/37.5	37.5/37.5
Rated Amps	(A)	90.2	108.3	108.3
<b>Gas burner (DKD/DKH)</b>				
<b>Staged Low heat version</b>				
Heating Input (G20)	(kW)	85	85	85
Heating Output (G20)	(kW)	77.4	77.4	77.4
Steady State Efficiency	(%)	91	91	91
No. Burners	#	1	1	1
No. Stages	#	2	2	2
Gas Connection Pipe Size		3/4" NPT	3/4" NPT	3/4" NPT
<b>Staged High heat version</b>				
Heating Input (G20)	(kW)	170	170	170
Heating Output (G20)	(kW)	154.8	154.8	154.8
Steady State Efficiency	(%)	91	91	91
No. Burners	#	2	2	2
No. Stages	#	2	2	2
Gas Connection Pipe Size		1" NPT	1" NPT	1" NPT
<b>Compressor</b>				
Number	#	2	2	2
Type		Scroll	Scroll	Scroll
Model		20T/20T	25T/25T	30T/30T
Rated Amps (1)	(A)	39.7/39.7	51.2/51.2	58.0/58.0
Locked rotor Amps (2)	(A)	215/215	260/260	320/320
<b>Outdoor Coil</b>				
Type		Wavy	Wavy	Wavy
Tube Size OD	(mm)	9.52	9.52	9.52
Face Area	(m <sup>2</sup> )	6.3	6.3	6.3
Rows/Fin series	#/FPF	3/168	3/168	3/168
Refrigerant Control		TXV	TXV	TXV
<b>Indoor Coil</b>				
Type		Wavy	Wavy	Wavy
Tube Size OD	(mm)	9.52	9.52	9.52
Face Area	(m <sup>2</sup> )	3.4	3.4	3.4
Rows/Fin series	#/FPF	4/180	4/180	4/180
Refrigerant Control		TXV	TXV	TXV
Drain Connection No./Size	(mm)	1/32mm	1/32mm	1/32mm
<b>Outdoor Fan</b>				
Nominal Airflow	(m <sup>3</sup> /h)	50600	48100	48100
Type		Axial	Axial	Axial
Diameter	(mm)	710	710	710
Drive type		Direct	Direct	Direct
Number/Voltage	#/V	4/400V	4/400V	4/400V
Motor HP	(kW)	1.1	1.1	1.1
Motor Rated Amps (1)	(A)	2.5	2.5	2.5
Motor RPM	(rpm)	915	915	915

## General Data

**Table 3 - General Data (Cont.)**

<b>Indoor Fan</b>					
Minimum Airflow	(m3/h)	16320	19680	23600	
Nominal Airflow	(m3/h)	20400	24600	29500	
Maximum Airflow	(m3/h)	24480	29520	35400	
Static pressure available (4)	(Pa)	590	600	600	
Type		FC Centrifugal	FC Centrifugal	FC Centrifugal	
Number	#	1	1	1	
Diameter/Width	(in/in)	25"/25"	25"/25"	25"/25"	
<b>Belt driven fan version</b>					
Motor HP (Standard/Oversized)	(kW)	5.5/11	5.5/15	5.5/15	
Motor Rated Amps (Standard/Oversized)	(A)	11.1/21.0	11.1/28.8	11.1/28.8	
Motor Locked rotor Amps (Standard/Oversized)	(A)	70/162	70/216	70/216	
Motor RPM (Standard/Oversized)	(rpm)	1450/1450	1450/1450	1450/1450	
<b>Direct driven fan version</b>					
Motor HP (Standard/Oversized)	(kW)	11/15	11/15	11/15	
Motor Max Amps (Standard/Oversized)	(A)	18.2/25.6	18.2/25.6	18.2/25.6	
Motor RPM (Standard/Oversized)	(rpm)	970/973	970/973	970/973	
<b>Energy Recovery Module (5)</b>					
<b>Plate Heat exchanger version</b>					
Thermal efficiency at 10%/50% fresh air	(%)	61%/58%	61%/58%	61%/57%	
Air pressure drop at 10%/50% fresh air	(Pa)	2Pa/38Pa	3Pa/54Pa	4Pa/75Pa	
Exhaust fan kW at 10%/50% fresh air	(kW)	0.5kW/0.7kW	0.5kW/1kW	0.5kW/1.4kW	
Length (Downflow/Horizontal flow)	(mm)	3050/3335	3050/3335	3050/3335	
Width (Downflow/Horizontal flow)	(mm)	2295/2295	2295/2295	2295/2295	
Height (Downflow/Horizontal flow)	(mm)	2010/1960	2010/1960	2010/1960	
Weight (Downflow/Horizontal flow)	(kg)	1155/1240	1155/1240	1155/1240	
<b>Rotary Wheel Heat exchanger version</b>					
Thermal efficiency at 10%/50% fresh air	(%)	85%/71%	84%/68%	83%/64%	
Air pressure drop at 10%/50% fresh air	(Pa)	13Pa/91Pa	16Pa/114Pa	20Pa/143Pa	
Exhaust fan kW at 10%/50% fresh air	(kW)	0.5kW/0.8kW	0.5kW/1kW	0.5kW/1.4kW	
Length (Downflow/Horizontal flow)	(mm)	2745/2745	2745/2745	2745/2745	
Width (Downflow/Horizontal flow)	(mm)	2295/2295	2295/2295	2295/2295	
Height (Downflow/Horizontal flow)	(mm)	2335/2265	2335/2265	2335/2265	
Weight (Downflow/Horizontal flow)	(kg)	1288/1363	1288/1363	1288/1363	
<b>Power Exhaust Fan (Option)</b>					
Type		Axial	Axial	Axial	
Diameter	(mm)	660	660	660	
Drive type		Direct	Direct	Direct	
Number/Voltage	#/V	2/400V	2/400V	2/400V	
Motor HP	(kW)	0.75	0.75	0.75	
Motor Rated Amps (2)	(A)	2.9	2.9	2.9	
<b>Filters</b>					
Type Furnished		2" Throwaway	2" Throwaway	2" Throwaway	
(No.) Size Recommended		17x(398x498x45)	17x(398x498x45)	17x(398x498x45)	
<b>Operating limits</b>					
Minimum operating outdoor air temp. (Cooling)	°C	-18	-18	-18	
Minimum operating outdoor air temp. (Heating)	°C	-15	-15	-15	
Maximum operating outdoor air temp. (Cooling)	°C	52	52	52	
Maximum operating outdoor air temp. (Heating)	°C	18	18	18	
Minimum intake air temp. on the indoor coil (Cooling)	°C	16	16	16	
Minimum intake air temp. on the indoor coil (Heating)	°C	10	10	10	
<b>Dimensions (3)</b>					
Length	WKD/WKH	(mm)	5200	5200	5200
	DKD/DKH	(mm)	5900	5900	5900
Width		(mm)	2302	2302	2302
Height		(mm)	2268	2268	2268
Operating Weight	WKD/WKH	(kg)	2081	2282	2297
	DKD/DKH (Low heat)	(kg)	2195	2395	2550
	DKD/DKH (High heat)	(kg)	2251	2452	2607
Shipping Weight	WKD/WKH	(kg)	2221	2422	2437
	DKD/DKH (Low heat)	(kg)	2335	2535	2690
	DKD/DKH (High heat)	(kg)	2391	2592	2747
<b>Unit construction</b>					
Sheet metal/Thickness	Type/mm	GalvaSteel/1.2	GalvaSteel/1.2	GalvaSteel/1.2	
Paint	Type/RAL	Polyester/9002	Polyester/9002	Polyester/9002	
Insulation/Thickness	Type/mm	M0/25	M0/25	M0/25	
<b>System Data</b>					
Refrigerant circuit	#	2	2	2	
Capacity steps (Cooling)	%	0/50/100	0/50/100	0/50/100	
Capacity steps (Heating)	%	0/50/100	0/50/100	0/50/100	
<b>Refrigerant Charge (3)</b>					
Circuit A (WKD/WKH)	(kg)	15.0	19.0	19.0	
Circuit B (WKD/WKH)	(kg)	15.0	19.0	19.0	

(1) At Eurovent rating conditions: Indoor return Air (27°C DB/19°C WB) - Ambient 35°C according to EN14511:2013.

(2) per motor under 400V.

(3) Max load amp for standard unit, with exhaust fan options, without electric heat.

(4) At the nominal airflow with oversized drive.

(5) Performance of Energy recovery module given for Indoor 19°C/50%/Outdoor Ambient -5°C.

(6) At 10m from the unit in a free field.

Electrical & refrigerant charge Data are subject to change without notice. Please refer to unit nameplate data.

# Performance Data

## Gas Burner Performance

Table 4 - Gas burner performance

		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 (15C-1013 mbar)	(m3/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
		CO <sub>2</sub> %	8.5%	9.7%	9.6%	8.7%

Burner		G250	G350	G400	PCH150	
Natural Gas G25 (20 ou 25 mbar) 29.30 MJ/m3 (15°C-1013)						
Gas Flow (15C-1013 mbar)	(m3/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 <sub>2</sub> %	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)	(m3/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	G20-20mbar @ 400V-3-50Hz	CO%	<0.001%	<0.001%	0.002%	<0.001%
		NOx ppm	-	-	-	34 ppm
		Nox mg/kWh	-	-	-	59
		CO <sub>2</sub> %	9.3%	8.9%	12.0%	9.4%

## Performance Data

### Supply fan performances

Table 5 - Supply fan drive selections

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



## Performance Data

### Sound levels

Data given at 300Pa and 35°C ambient  
Sound Power Reference = 10E--12 Watt

**Table 6 - Overall Outdoor Sound Power Level (Env.)**

		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
TKD/H - YKD/H	275	74.7 dBA	73.9 dBA	78.5 dBA	82.2 dBA	83.1 dBA	79.3 dBA	71.9 dBA	56.7 dBA	88 dBA
TKD/H - YKD/H	300	74.9 dBA	74.1 dBA	78.7 dBA	83.0 dBA	83.6 dBA	80.5 dBA	73.7 dBA	56.9 dBA	88 dBA
TKD/H - YKD/H	350	74.9 dBA	74.1 dBA	78.8 dBA	83.5 dBA	83.8 dBA	81.3 dBA	74.9 dBA	56.9 dBA	89 dBA
TKD/H - YKD/H	400	75.8 dBA	75.1 dBA	79.8 dBA	84.6 dBA	84.9 dBA	82.2 dBA	75.5 dBA	57.7 dBA	90 dBA
TKD/H - YKD/H	500	75.9 dBA	75.3 dBA	80.0 dBA	85.3 dBA	85.9 dBA	82.2 dBA	75.4 dBA	57.9 dBA	90 dBA
TKD/H - YKD/H	600	76.0 dBA	75.3 dBA	80.0 dBA	85.6 dBA	86.1 dBA	82.6 dBA	75.5 dBA	57.9 dBA	91 dBA
WKD/H - DKD/H	400	75.8 dBA	75.1 dBA	79.8 dBA	84.0 dBA	84.7 dBA	84.9 dBA	77.3 dBA	57.7 dBA	90 dBA
WKD/H - DKD/H	500	76.0 dBA	75.3 dBA	80.0 dBA	85.1 dBA	85.4 dBA	82.8 dBA	75.8 dBA	57.9 dBA	90 dBA
WKD/H - DKD/H	600	75.9 dBA	75.3 dBA	80.0 dBA	86.0 dBA	86.8 dBA	82.4 dBA	75.2 dBA	57.9 dBA	91 dBA

**Table 7 - SUPPLY Indoor Sound Power level (In duct)**

		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
TKD/H - YKD/H	275	56.5 dBA	63.9 dBA	67.9 dBA	78.6 dBA	71.9 dBA	70.1 dBA	65.9 dBA	59.8 dBA	80 dBA
TKD/H - YKD/H	300	57.0 dBA	64.4 dBA	68.4 dBA	79.1 dBA	72.4 dBA	70.6 dBA	66.4 dBA	60.3 dBA	81 dBA
TKD/H - YKD/H	350	58.0 dBA	65.4 dBA	69.4 dBA	80.1 dBA	73.4 dBA	71.6 dBA	67.4 dBA	61.3 dBA	82 dBA
TKD/H - YKD/H	400	58.9 dBA	68.3 dBA	72.4 dBA	82.1 dBA	75.4 dBA	73.6 dBA	67.4 dBA	60.2 dBA	84 dBA
TKD/H - YKD/H	500	58.5 dBA	68.9 dBA	72.9 dBA	81.6 dBA	75.9 dBA	74.1 dBA	69.9 dBA	62.8 dBA	84 dBA
TKD/H - YKD/H	600	58.1 dBA	69.5 dBA	73.4 dBA	81.1 dBA	76.4 dBA	74.6 dBA	72.4 dBA	65.4 dBA	84 dBA
WKD/H - DKD/H	400	58.9 dBA	68.3 dBA	72.4 dBA	82.1 dBA	75.4 dBA	73.6 dBA	67.4 dBA	60.2 dBA	84 dBA
WKD/H - DKD/H	500	58.5 dBA	68.9 dBA	72.9 dBA	81.6 dBA	75.9 dBA	74.1 dBA	69.9 dBA	62.8 dBA	84 dBA
WKD/H - DKD/H	600	58.1 dBA	69.5 dBA	73.4 dBA	81.1 dBA	76.4 dBA	74.6 dBA	72.4 dBA	65.4 dBA	84 dBA

**Table 8 - RETURN Indoor Sound Power level (In duct)**

		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
TKD/H - YKD/H	275	56.5 dBA	63.9 dBA	67.9 dBA	78.6 dBA	71.9 dBA	70.1 dBA	65.9 dBA	59.8 dBA	80 dBA
TKD/H - YKD/H	300	57.0 dBA	64.4 dBA	68.4 dBA	79.1 dBA	72.4 dBA	70.6 dBA	66.4 dBA	60.3 dBA	81 dBA
TKD/H - YKD/H	350	58.0 dBA	65.4 dBA	69.4 dBA	80.1 dBA	73.4 dBA	71.6 dBA	67.4 dBA	61.3 dBA	82 dBA
TKD/H - YKD/H	400	58.9 dBA	68.3 dBA	72.4 dBA	82.1 dBA	75.4 dBA	73.6 dBA	67.4 dBA	60.2 dBA	84 dBA
TKD/H - YKD/H	500	58.5 dBA	68.9 dBA	72.9 dBA	81.6 dBA	75.9 dBA	74.1 dBA	69.9 dBA	62.8 dBA	84 dBA
TKD/H - YKD/H	600	58.1 dBA	69.5 dBA	73.4 dBA	81.1 dBA	76.4 dBA	74.6 dBA	72.4 dBA	65.4 dBA	84 dBA
WKD/H - DKD/H	400	58.9 dBA	68.3 dBA	72.4 dBA	82.1 dBA	75.4 dBA	73.6 dBA	67.4 dBA	60.2 dBA	84 dBA
WKD/H - DKD/H	500	58.5 dBA	68.9 dBA	72.9 dBA	81.6 dBA	75.9 dBA	74.1 dBA	69.9 dBA	62.8 dBA	84 dBA
WKD/H - DKD/H	600	58.1 dBA	69.5 dBA	73.4 dBA	81.1 dBA	76.4 dBA	74.6 dBA	72.4 dBA	65.4 dBA	84 dBA

# Electrical Data

**Table 9 - Maximum length**

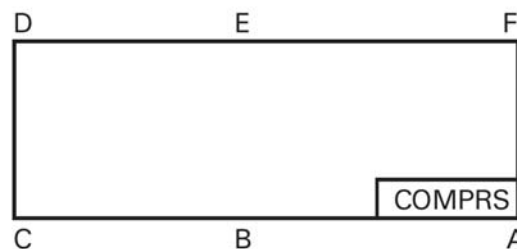
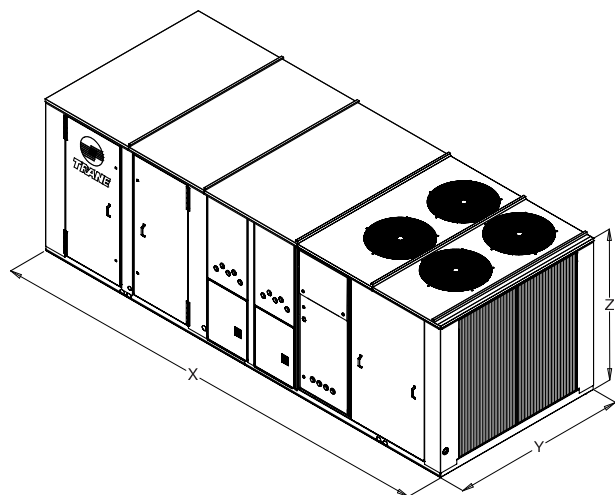
*Zone sensor wire size*

	Wire size (mm <sup>2</sup> )	Maximum wire length (m)
<b>THS/THP 03</b>	0.33	45
	0.5	76
	0.75	115
	1.3	185
	2	300
<b>Conventional thermostat</b>	0.33	10
	0.5	15
	0.75	23
	1.3	37
	2	60
<b>CO2 sensor wire size</b>		
	Wire size (mm <sup>2</sup> )	Maximum wire length (m)
	0.25	50
	0.5	100
	1	200

## Dimensions and Weights

Overall unit dimensions, shipping weights and operating weights are given in the General Data tables.

**Table 10 - Dimensions, Weights and Clearances**



Unit size	Dimensions (mm)			Shipping weight (kg)	Operating weight (kg)	Minimum clearances (mm)					Point loading weight					
	X	Y	Z			A	B	C	D	E	A	B	C	D	E	F
											(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
YKD/YKH 275 L	4580	2302	2093	1768	1668	1900	2440	1220	1220	1830	384	384	217	234	217	232
YKD/YKH 300 L	4580	2302	2093	1784	1684	1900	2440	1220	1220	1830	387	387	219	236	219	236
YKD/YKH 350 L	4580	2302	2093	1915	1715	1900	2440	1220	1220	1830	394	394	223	240	223	241
YKD/YKH 400 L	5900	2302	2268	2309	2169	1900	2440	1220	1220	1830	499	499	282	304	282	303
YKD/YKH 500 L	5900	2302	2268	2367	2227	1900	2440	1220	1220	1830	512	512	290	312	290	311
YKD/YKH 600 L	5900	2302	2268	2634	2494	1900	2440	1220	1220	1830	574	574	324	349	324	349
YKD/YKH 275 H	5285	2302	2093	1981	1861	1900	2440	1220	1220	1830	428	428	242	261	242	260
YKD/YKH 300 H	5285	2302	2093	1991	1871	1900	2440	1220	1220	1830	430	430	243	262	243	263
YKD/YKH 350 H	5285	2302	2093	2021	1901	1900	2440	1220	1220	1830	437	437	247	266	247	267
YKD/YKH 400 H	5900	2302	2268	2365	2225	1900	2440	1220	1220	1830	512	512	289	312	289	311
YKD/YKH 500 H	5900	2302	2268	2424	2284	1900	2440	1220	1220	1830	525	525	297	320	297	320
YKD/YKH 600 H	5900	2302	2268	2691	2551	1900	2440	1220	1220	1830	587	587	332	357	332	356
TKD/TKH 275	4580	2302	2093	1725	1625	1900	2440	1220	1220	1830	374	374	211	228	211	227
TKD/TKH 300	4580	2302	2093	1729	1629	1900	2440	1220	1220	1830	375	375	212	228	212	227
TKD/TKH 350	4580	2302	2093	1756	1656	1900	2440	1220	1220	1830	381	381	215	232	215	231.5
TKD/TKH 400	5200	2302	2268	2195	2055	1900	2440	1220	1220	1830	473	473	267	288	267	287
TKD/TKH 500	5200	2302	2268	2254	2114	1900	2440	1220	1220	1830	486	486	275	296	275	296
TKD/TKH 600	5200	2302	2268	2381	2241	1900	2440	1220	1220	1830	515	515	291	314	291	315
WKD/WKH 400	5200	2302	2268	2221	2081	1900	2440	1220	1220	1830	479	354	250	229	333	436
WKD/WKH 500	5200	2302	2268	2422	2282	1900	2440	1220	1220	1830	525	388	274	251	365	479
WKD/WKH 600	5200	2302	2268	2437	2297	1900	2440	1220	1220	1830	528	390	276	253	368	482
DKD/DKH 400 L	5900	2302	2268	2335	2195	1900	2440	1220	1220	1830	505	373	263	241	351	462
DKD/DKH 500 L	5900	2302	2268	2535	2395	1900	2440	1220	1220	1830	551	407	287	263	383	504
DKD/DKH 600 L	5900	2302	2268	2690	2550	1900	2440	1220	1220	1830	587	434	306	281	408	534
DKD/DKH 400 H	5900	2302	2268	2391	2251	1900	2440	1220	1220	1830	518	383	270	248	360	472
DKD/DKH 500 H	5900	2302	2268	2592	2452	1900	2440	1220	1220	1830	564	417	294	270	392	515
DKD/DKH 600 H	5900	2302	2268	2747	2607	1900	2440	1220	1220	1830	600	443	313	287	417	547

## Dimensions and Weights

### Weights of factory-installed accessories

Net weights should be added to unit weight when ordering factory-installed accessories. To estimate shipping weight, add 2.3kg to net weight.

**Table 11 - Factory -installed accessories 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	78/94	54	23	117/128	100	89	43
TKD/TKH	300	225	315	50/65	78/94	54	23	117/128	100	89	43
TKD/TKH	350	225	315	50/65	78/94	54	23	117/128	100	89	43
TKD/TKH/WKD/WKH	400	260	360	50/65	78/94	56	23	131/135	140	100	55
TKD/TKH/WKD/WKH	500	260	360	50/65	78/94	56	23	131/135	140	100	55
TKD/TKH/WKD/WKH	600	260	360	50/65	78/94	56	23	131/135	140	100	55
YKD/YKH	275L	225	315	50/65	78/94	54	23	117/128	-	-	43
YKD/YKH	275H	250	345	50/66	78/94	54	23	117/128	-	-	43
YKD/YKH	300L	225	315	50/65	78/94	54	23	117/128	-	-	43
YKD/YKH	300H	250	345	50/66	78/94	54	23	117/128	-	-	43
YKD/YKH	350L	225	315	50/65	78/94	54	23	117/128	-	-	43
YKD/YKH	350H	250	345	50/66	78/94	54	23	117/128	-	-	43
YKD/YKH/DKD/DKH	400	270	380	50/65	78/94	56	23	131/135	-	-	55
YKD/YKH/DKD/DKH	500	270	380	50/65	78/94	56	23	131/135	-	-	55
YKD/YKH/DKD/DKH	600	270	380	50/65	78/94	56	23	131/135	-	-	55

Notes:

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

**Table 12 - Filter arrangement**

UNIT	Standard			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)

# Controls

## Equipment protection/operation

### Timings and Features

#### Increased Reliability

Fewer components (moving electromechanical parts); less likelihood of equipment down time or failure. Standard.

#### Proportional Integral (PI) Control

Proportional - sets corrective action proportional to deviation from setpoint. Integral - fine-tunes the rate of corrective action proportional to the error (results in superior temperature control). Standard.

#### Built In "TEST" Mode

Aids in quick verification of system and control operation; exercises both hardware and software (no special tools required). Standard.

#### On Board Diagnostics

Assists with equipment troubleshooting if a problem should occur. Standard.

#### Low Ambient Start Timer (LAST) Function

Bypasses low pressure control when a compressor starts, eliminating nuisance compressor lockouts. Standard.

#### Anti Short Cycle Timer (ASCT) Function

Provides a three minute minimum "ON" time and a three minute minimum "OFF" time for compressors; enhances compressor reliability by ensuring proper oil return. Standard.

#### Time Delay Relay (TDR) Function

Provides an incremental staging delay between compressors; minimizes equipment current inrush and consumption by keeping compressors from starting simultaneously. Standard.

#### Built In Fan Delay Relay (FDR) Function

Provides custom indoor fan timing sequences for the different types of equipment, enhancing efficiency and reliability. Standard.

#### Built in Evaporator Defrost Control Function

Provides low ambient cooling down to -18°C. Standard.

#### Intelligent Fallback

Built-in Default Control provides adaptive operation, which allows the equipment to continue to operate, and provide comfort in the event of certain input failures. Also, allows temporary operation without a thermostat. Standard.

### Emergency Stop Terminals on Low Voltage Terminal Board

Provides a convenient point to disable the equipment completely and immediately. Standard.

#### Lower Installation Cost

When using a Trane THS03 or THP03, control voltage wiring may be run up to five times further than any electromechanical system with no increase in wire section. Example: Electromechanical System - 22m using 0.5mm<sup>2</sup> wire. Microcontrol System (THS/P 03) 110m 0.5mm<sup>2</sup> wire. Standard.

#### Alternating Lead/Lag

During periods of part load operation, each compressor cycles alternately as circuit number one, equalizing compressor wear and run time. Enable by cutting the wire at RTRM junction number J3-8.

#### Demand defrost - Heat Pump

Defrost only if needed; not based on time like most other systems. Adapts to changing weather conditions and lowers operating costs. Standard.

#### Heat Pump Soft Start

Provides a smooth transition into heating after defrost, minimizing noise and compressor stress associated with switch over. Standard.

#### Heat Pump Smart Recovery and Smart Staging

Inhibits auxiliary heat operation if the space is recovering adequately (0.1°C/minute) with the heat pump alone, providing considerable savings in operating costs. Standard.

#### Economizer Preferred Cooling

Provides fully integrated operation. Will not turn on a compressor with the economizer, if the space is recovering adequately with the economizer alone (0.1°C./minute). Allows the equipment to be utilized in more varied applications. Standard with economizer.

#### Features lost when using a conventional thermostat

- When a Conventional Thermostat is applied, equipment operation differs significantly. The basic equipment protection features remain intact, and the following features end benefits are lost.
- Proportional Integral (PI) control is lost, equipment is controlled by a thermostat or generic building automation system device.
- Intelligent Fall Back is lost, 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 applied can accomplish this.

## Controls

### Three-Phase Monitoring Relay

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

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.

**Figure 10**



### TD5 Service and Diagnostic User Display

The TD-5 display allows you to view data and make operational changes on Voyager rooftop equipped with Reliatel control v3.4 or above.

TD-5 is an 5" (127mm diagonal) high resolution color touch screen display

TD-5 provides in 26 languages:

- 15 different reports (3 custom, 12 standard)
- 12 different graphs (4 custom, 8 standard)
- View and reset Historic of last 100 detailed alarms.

Graph data can be exported to an excel file through USB memory stick.

## Field-installed Control Options

### Zone sensors

Zone sensors are the building occupants' comfort control devices. They replace the conventional electromechanical thermostats. Zones sensors are to be used with the Voyager™ II units with the Micro control. These sensors are available in the following options:

- THP03: Sensor, programmable setpoint and operation mode according to a schedule
- TZS01: Sensor only, used when connected with CCP2 or Tracker™
- TZS02: Sensor and setpoint adjustable thumbwheel
- THS03: Sensor, setpoint and operation mode, unit Led indication (mode and alarms)



*From left to right TZS01, TZS02, THS03 THP03*

## Room thermostats

### Trane Communication Interface (TCI)

This microprocessor interface allows the unit to communicate to Trane's Integrated Comfort™ system (CCP2, Tracker™).



*THS03 room thermostat*

**Table 13 - Characteristics of programmable and conventional thermostats**

	Conv. Thermostat	THS03	THP03
Programmable	•	-	•
Control type design	•	-	•
Electronic	Electro-mechanical	Reliatel	
For cooling-only units (TS*/TK*)	•	•	•
For heat pump units (WS*/WK*)	•	•	•
For gas-fired units (YS*/YK*)	•	•	•
Number of cooling stages	2	3	3
Auxiliary heating stages (electric heater, hot water coil)	2	2/1 Modulating	
Liquid crystal display	•	-	•

## LonMark® Communication Interface LCI-R

This microprocessor interface allows the unit to communicate to Trane's Integrated Comfort™ system (Tracer SC, Tracker™) or other open building automation systems

### Tracker™ multi rooftops centralized control

- Intuitive, menu-driven user interface
- 2 wires cable communication with units (LonMark®)
- 365-day scheduling and 10 schedules
- Capability of including all equipment and devices in one schedule
- Temporary schedule override
- Easy-to-administer security system with two levels of access
- Automatic daylight savings time changeover
- Error and alarm messaging
- Setpoint viewing and editing
- Trend data collection
- Report generation
- Optimal start

Features exclusive to the PC software (optional)

- RJ45 - Ethernet connection
- Backup and restore capability
- Standard graphics and HTML graphical interface
- Binary output programming capability
- Operator-defined custom alarms capability
- Printer support

Connection to controllers over shared Ethernet/IP connection

- E-mail forwarding of alarms and messages
- Standard timed override (after hours) usage report
- Standard daily, monthly, and yearly energy reports

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





# Mechanical Specifications

## General

Units shall be dedicated downflow or horizontal airflow. Operating range shall be between 50°C and -18°C cooling as standard for all units. All units shall be factory assembled, internally wired, fully charged with refrigerant, and 100 percent run-tested before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification.

Unit shall be available with a main refrigeration circuit in cooling only and reversible version. Auxiliary heat type shall be selectable: Hot water heat, Gas heater and electrical heater in both refrigeration circuit versions.

## Performance

The unit with a capacity above 100kW shall be certified and registered on the Eurovent certification under RT program (<http://www.eurovent-certification.com>).

## Casing

Unit casing shall be constructed of zinc coated, heavy-gauge, galvanized steel. All exterior components shall be mounted in a weather resistant steel cabinet and painted with a polyester white RAL 9002 powder paint. Where top cover seams exist, they shall be double hemmed and gasket sealed to prevent water leakage. Cabinet construction shall allow access for all maintenance on two sides of the unit. Service panels shall have handles and shall be removable while providing a water and air tight seal. The indoor air section shall be completely insulated with fire resistant, permanent, odorless glass fiber material, aluminum foil faced. The base of the unit shall have provisions for crane lifting.

## Hinged Service Access + ¼ locks: Standard

Filter access panel and supply fan access panel shall be hinged for ease of unit service + ¼ turn locks shall be standard.

Electrical Control box upper access door shall deliver a protection against rain or snow during commissioning and maintenance operations.

## Filters

Unit shall be provided on standard with 50 mm, throwaway EU3 filters. 50 mm EU4, 100 mm EU4 filters shall be optional.

## Compressors

All units shall have Trane CSHD/CSHN scroll type compressors. Compressor shall be direct-drive, hermetic with self-lubrication. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal temperature and current sensitive motor overloads shall be included for maximum protection. Each compressor shall be protected by external discharge temperature thermostat, winding temperature thermostat and reverse rotation/phase loss protection. Each compressor

shall have crankcase heaters installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. All scroll compressors shall be provided with phase monitoring protection.

## Refrigerant Circuits

The unit shall be operating with R410A HFC-based refrigerant. Each refrigerant circuit shall have independent thermostatic expansion devices, service pressure ports and refrigerant line filter driers factory-installed as standard. An area shall be provided for replacement suction line driers. Refrigeration circuit shall be protected against refrigerant leak by a low pressure switch. Service valves shall be provided as standard and located on low pressure and high pressure side of the refrigeration piping.

## Evaporator and Condenser Coils

Condenser coils shall have 3/8" (10 mm) copper tubes mechanically bonded to lanced aluminum plate fins. Evaporator coils shall be 3/8" (13 mm) internally finned copper tubes mechanically bonded to high performance aluminum plate fins. All coils shall be leak tested at the factory to ensure pressure integrity. All coils shall be leak tested to 2.1 MPa and pressure tested to 4.5 MPa. All evaporator coils shall be of intermingled configuration. Sloped condensate drain pans are standard. Indoor coil shall be protected as standard on all units by an ant frost thermostat.

## Outdoor Fans

The outdoor fans shall be direct drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motors shall be permanently lubricated and shall have built-in thermal overload protection.

## Indoor Fan

Units shall have belt driven, forward curved centrifugal fans with fixed motor sheaves. All motors shall be circuit breaker protected.

## Controls

Unit shall be completely factory wired with necessary controls and terminal block for power wiring. Units shall provide an external location for mounting fused disconnect device. Unit controller shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperature. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. Unit controller shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection. Heat pump unit shall manage defrost cycles based on demand defrost logic on the 2 independent circuits.

## Mechanical Specifications

Electrical components and wiring shall be compliant with EN 60204-1 electrical directive. Unit shall be powered by 400V/3/50Hz supply (without neutral) on a single point of power connection.

**Ventilation Override** shall allow a binary input from the fire/life safety panel to cause the unit to override standard operation and assume one of two factory preset ventilation sequences, exhaust or pressurization. The two sequences shall be selectable based open a binary select input.

### **Phase monitoring relay: Standard**

Unit shall detect phase loss, phase reversal from main power supply. In case of fault, the unit shall stop.

### **Through-The-Base Electrical Provision: Standard**

An electrical service entrance shall be standard which allows access to route all high and low voltage electrical wiring inside the curb, through the bottom (vertically) and through the side (Horizontally) of the outdoor section of the unit and into the control box area.

### **Disconnect Switch: Standard**

A factory installed disconnect switch with external handle shall be standard. The disconnect switch shall be mounted inside the unit control box. It should avoid power side access when switch is set in ON position.

## Options and Accessories

### **Manual Fresh Air damper**

A manually controllable outside air damper shall be adjustable for up to 25 percent outside air. Manual damper is set at desired position at unit start up.

### **Economizer**

Economizer shall be factory installed. The assembly includes: fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness, and differential enthalpy control.

### **Barometric Relief**

The barometric relief damper shall be optional with the economizer. It shall be available as a factory installed option on all units. Option shall provide a pressure operated damper for the purpose of space pressure equalization and be gravity closing to prohibit entrance of outside air during the equipment "off" cycle.

### **Power Exhaust Fan**

Power exhaust shall be optional with the economizer. It shall be available as a factory installed option on all units. It shall assist the barometric relief damper in maintaining building pressurization.

### **Remote Potentiometer**

A remote potentiometer shall be available to remotely adjust the unit economizer minimum position.

### **CO<sub>2</sub> Sensor**

This accessory shall be compatible with economizer options. It shall measure CO<sub>2</sub> concentration in order to increase or decrease the fresh air amount in the building.

### **Variable Frequency Drives (VFDs)**

VFDs shall be factory installed and tested to provide supply fan motor speed modulation. The VFD shall receive speed reference from the unit controller based upon supply zone heating/cooling demand and shall cause the drive to accelerate or decelerate as required to maintain the zone temperature setpoint. The fan coupling shall be direct type with the motor shaft. Units shall have a soft rubber direct coupling between centrifugal fans and motor. Motor, fan and VFD shall be individually replaced in case of maintenance operation.

### **Fan Fail Switch**

This option allows checks for supply fan pressure. The fan failure switch will stop all unit functions and report Service alarm on the zone sensor module or Building management system.

### **Clogged Filter Switch**

This option allows for individual dirty filter indication. The switch will light the Service LED on the zone sensor and will allow continued unit operation.

### **Smoke Detector**

This option shall trip off in case of presence of smoke in the supply side of the unit and shall close the return air damper, if any, and stop the unit.

### **Phase Monitoring Relay**

The phase monitoring relay shall detect phase loss, phase reversal and phase imbalance from main power supply. In case of fault, the unit must stop.

### **Black Epoxy Fin Coating**

An optional coil corrosion resistant coating shall protect indoor and outdoor aluminum fins.

### **Fire Thermostats**

Field installed manually resettable high temperature thermostats shall provide input to the unit controls to shut down the system if the temperature sensed at the return is 57°C or at the discharge 115°C.

### **Roof Curb – Downflow**

The roof curb shall be designed to mate with the downflow unit and provide support and watertight installation when installed properly.

The roof curb design shall allow field fabricated rectangular supply/return ductwork to be connected directly to the curb.

Curb shall be shipped knocked down for field assembly.



## Mechanical Specifications

### Adjustable Roof Curb

This factory assembled accessory is adjustable on site and allows correction of the slope of the roof up to 5%.

### Hot Water Coil

This option shall be factory mounted and placed in the discharge section. It shall be shipped with one 3-way valve, 0 to 100% modulating built-in control and freeze protection. If needed, on reversible unit, hot water coil shall be selected as first source of heat before mechanical heating.

### Electric Heaters

Electric heat shall be available for factory installation within basic unit. Electric heater elements shall be constructed of heavy-duty nickel chromium elements we connected for 380 and 415 volt. Staging shall be achieved through the unit controller. Each heater package shall have automatically reset high limit control operating through heating element contactors. All heaters shall be individually fused from factory, where required.

### Staged Gas Heater

The heating section shall have a drum and tube heat exchanger(s) design using corrosion resistant steel components. A forced combustion blower shall supply premixed fuel to a single burner ignited by a pilotless hot surface ignition system. In order to provide reliable operation, a negative pressure gas valve shall be used that requires blower operation to initiate gas flow. On an initial call for heat, the combustion blower shall purge the heat exchanger(s) 45 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat. Units shall be suitable for use with natural gas or propane (field installed kit). All units shall have two stage heating.

Burner of 48kW and 70kW shall have a no emissions of CO (<0.001%) and NOx emission below 30ppm (class 5 according to the requirements of Standard EN483)

Burner of 77kW shall have a no emissions of CO (<0.001%) and NOx emission below 50ppm (class 4 according to the requirements of Standard EN483)

### Modulating Gas Heater

The gas burner should be modulating from 30% to 100%. Control of the burner should be delivered according to the heating demand and supply air temperature. Burner should be condensing below 60% heating output. Efficiency of the burner should be below 94% at full load and 105% at reduced load. Gas heat exchanger should be drum and tube type, build in stainless steel. A forced combustion blower shall supply premixed fuel to a single burner ignited by pilot burner integrated with spark ignition system. Premix burner shall have a no emissions of CO (0%) and NOx emission below 35ppm (class 5 according to the requirements of Standard EN483).

### Energy Recovery Module - General

Heat recovery should include direct driven exhaust fan. Fan speed should be adjusted by a separate frequency drive according to fresh air flow in order to maintain building pressurization.

Fresh air flow shall be filtered before entering in the heat exchanger in order to prevent clogging on the fresh air side.

When free cooling is needed, energy recovery should be by-passed to avoid heat exchange on the fresh flow entering into the building.

### Operation and Diagnostic Display

The unit shall be equipped with a 5" high resolution color touch screen LCD display. The display allows you to view data and make operational changes on the rooftop.

Display shall provide in 26 languages:

- 15 different reports (3 custom, 12 standard)
- 12 different graphs (4 custom, 8 standard)
- View and reset historic of last 100 detailed alarms.

Graph data shall be exported to an excel file through USB memory stick.

### Energy Recovery Module - Plate heat exchanger version

Energy recovery module should have a total efficiency of 58% or higher at -5°C outdoor, 19°C indoor and 30% fresh air rate. Module shall be equipped with freeze monitoring pressure switch that initiate defrost cycle when exchanger is clogged by frost in winter application.

### Energy Recovery Module - Heat wheel version

Energy recovery should have a total efficiency of 70% or higher at -5°C outdoor, 19°C indoor and 30% fresh air rate. Fresh air and exhaust air flow shall be filtered before entering in the heat exchanger in order to prevent exchanger clogging.

### Thermostats and Zone Sensors

The thermostats and zone sensors shall be provided to interface with the ReliaTel® unit controls and shall be available in either manual, automatic programmable with night setback, with system malfunction lights or remote sensor options.

### Communication Interface (TCI-R)

ReliaTel® Trane Communication Interface (TCI) shall be provided to interface with the Trane Integrated Comfort™ System and shall be available as a field or factory-installed. The TCI shall allow control and monitoring of the rooftop unit via a two wires communication link. The following alarm and diagnostic information shall be available:

## Mechanical Specifications

### Trane Modbus Communication Interface (PIC)

Modbus Communication Interface (PIC) shall be provided to interface with the Trane Integrated Comfort™ System and shall be available field or factory-installed. The PIC shall allow control and monitoring of the rooftop unit via a two wire communication link and Modbus protocol. The following alarm and diagnostic information shall be available:

### LonTalk® Communication Interface (LCI-R)

The field or factory-installed ReliaTel® LonTalk Communication Interface (LCI-R) will be provided to interface with the Trane Integrated Comfort™ System or LonTalk® capable third party building management networks. The LCI-R will allow control and monitoring of the rooftop unit via a two wires communication link.

### ReliaTel® Unit controller Originated Data

- Unit operating mode
- Unit failure status
  - Cooling failure
  - Heating failure
  - Emergency service stop indication
  - Supply fan proving
  - Timed override activation
  - High temperature thermostat status
- Zone temperature
- Supply air temperature
- Cooling status (all stages)
- Stage activated or not
- Stage locked out by ReliaTel
- HPC status for that stage
- Compressor disable inputs
- Heating status
- Number of stages activated
- High temperature limit status
- Economizer status
- Requested minimum position
- Damper position
- Dry bulb/enthalpy input status
- Outside air temperature
- Outside relative humidity
- Sensor Failure
  - Humidity sensor
  - Outdoor Air Temperature sensor
  - Supply Air Temperature sensor
  - Return Air Temperature sensor
  - Zone temperature sensor
  - Mode input
  - Cooling/heating setpoint from sensors
  - Unit mounted potentiometer
- Unit Configuration data
  - Gas or electric heat
  - Economizer present
- Local setpoint

- Local mode setting
- Clogged filter service indicator
- CO<sub>2</sub> setpoint
- CO<sub>2</sub> value

### Building Management System communication Originated Data

- Command operating mode
- Host controllable functions:
  - Supply fan
  - Economizer
  - Cooling stages enabled
  - Heating stages enabled
  - Emergency shutdown
- Minimum damper position
- Heating setpoint
- Cooling setpoint
- Supply air tempering enable/disable
- Slave mode (CV only)
- Tracer/Local operation
- Daytime warm-up enable/disable
- Power exhaust setpoint



## Notes



## Notes



Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services and parts. For more information visit [www.Trane.com](http://www.Trane.com)

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