



# Air Cooled Condensing Unit

RAUL 190 - 260 - 300 - 350 - 400 - 450 - 500 - 600-  
700 - 800  
R407C — R134a Refrigerant



SS-PRC003-E4



## Designed with your needs in mind

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TRANE split systems represent a totally new approach to designing products for the TRANE company. The design team's mission is to bring a system to the marketplace that will meet your job requirements every time.

TRANE's experienced design team used the newest computer technology and an entirely new manufacturing process to develop a new standard in split systems.

Couple the TRANE reputation for quality and reliability in split system air conditioners with improvements in efficiency, flexibility and installation ease and you have systems that will give you "Simply the best value."

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## Features and benefits

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### Installation

#### Mounting on site

The compact size of the Scroll condensing units simplifies the installation on site and the low height profile permits easy integration in the building environment. The surface area taken up by the unit is relatively small. Isolating pads are supplied as standard to avoid direct contact between the unit base and the mounting surface.

#### Refrigerant connections

The refrigerant connections are brought to the outside of the unit so that it is not necessary to remove or pierce the panels.

#### Electrical connections

Stuffing boxes located on the back of the panel allow for easy connection of the power cable.

### Reliable and quiet operation

#### Reliability

The use of the Trane Scroll compressors ensures excellent reliability. Versus a reciprocating compressor, the Scroll has the following advantages :

- 64 % fewer parts.
- The Scroll compressor generates significantly less vibration therefore; reducing the risk of discharge line failure.

#### Performance

The absence of dead volume at the end of the compression cycle ensures better performance. The absence of fragile moving parts, such as springs and valves, also means that this performance is maintained with time.

#### Part load performance

The Scroll compressor always operates at full load. The unit capacity is a function of the number of compressors running.

In this way, the power factor is maintained at a high level even at low loads.

#### Low sound level

The Scroll compressor is significantly less noisy and generates less vibration than a reciprocating compressor. In addition, on sites where the noise level is critical, the compressors can be fitted with an optional sound jacket.

### Reduced maintenance

The Scroll compressor does not require routine maintenance due to the absence of fragile parts, such as springs and valves which require regular replacement.

#### Mechanical options

Condenser fins:

- Aluminum Fins with copper tubes (standard)
- Aluminum fins coated with black epoxy paint.
- Copper fins with copper tubes

Refrigerant type:

- R407C
- R134a

Low ambient operation with a 2 speed fan on each circuit

Sound jackets for compressors  
Pressure gauges on each circuit.

#### Note

For control options, please refer to the end of the control section.

#### Other standard features

- Thermal insulation of the low pressure refrigerant lines.
- Operation up to + 45°C ambient temperature.
- Shipped with rubber pads.
- Low sound level fans with asymmetric blades.
- Pressure transducers to obtain an optimal control of the fans and to allow to display the low and high refrigerant pressure.
- Electrical panel IP 54.

## Controls

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Figure 1 - Operator interface



### Human Interfaces

The operator interface is an LCD touchscreen display (Figure 1) that is navigated by file tabs. This is an advanced interface that allows the user to access any important information concerning setpoints, active temperatures, modes, electrical data, pressures, and diagnostics. It uses full text display available in 15 languages.

### Adaptive Safety Controls

A centralized microcomputer offers a higher level of machine protection.

Since the safety controls are smarter, they limit compressor operation to avoid compressor failures, thereby minimizing nuisance shutdown.

Tracer™ CH530 Controls directly senses the control variables that govern the operation of the unit:

- Motor current draw
- Evaporator pressure
- Condenser pressure.

When any one of these variables approaches a limit condition where damage may occur to the unit or shutdown on a safety, Tracer CH530 Controls takes corrective action to avoid shutdown and keep the unit operating. This happens through combined actions of compressor stage modulation and fan staging.

Tracer CH530 Controls optimizes total unit power consumption during normal operating conditions.

During abnormal operating conditions, the microprocessor will continue to optimize unit performance by taking the corrective action necessary to avoid shutdown. This keeps cooling capacity available until the problem can be solved.

Whenever possible, the condensing unit is allowed to perform its function; produce cooling. In addition, microcomputer controls allow for more types of protection such as phase reversal protection. Overall, the safety controls help keep the building or process running and out of trouble.

## Controls

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### **Stand-alone controls**

Interfacing to stand-alone units is very simple: only a remote auto/stop for scheduling is required for unit operation. Signals from a time clock or some other remote device are wired to the external auto/stop input.

### **Standard Features External Auto/Stop**

A job-site-provided contact closure will turn the unit on and off.

### **External Interlock**

A job-site-provided contact opening wired to this input will turn the unit off and require a manual reset of the unit microcomputer. This closure is typically triggered by a job-site provided system such as a fire alarm.

### **Additional Features that May Be Added (require some optional factory-installed hardware)**

- LON communication card
- Temperature display, compressor kW inhibit, setpoint reset, external setpoint, auxiliary setpoint
- Customer report relay (alarm latching, alarm auto reset, unit running, unit at full load).

### **Easy Interface to a Generic Building Management System**

Controlling the RAUL unit with building management systems is state-of-the-art, yet simple with either:

- The LonTalk Communications Interface for Condensing units (LCI-C)
- Generic Building Management System Hardwire Points.

### **Simple Interface with Other Control Systems**

Microcomputer controls afford simple interface with other control systems, such as time clocks, building automation systems, and ice storage systems. This means you have the flexibility to meet job requirements while not having to learn a complicated control system.

This setup has the same standard features as a stand-alone condensing unit, with the possibility of having additional optional features.

## Controls

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### What are LonTalk, Echelon, and LonMark?

LonTalk is a communications protocol developed by the Echelon Corporation. The LonMark association develops control profiles using the LonTalk communication protocol. LonTalk is a unit level communications protocol, unlike BACNet used at the system level.

#### LonTalk Communications Interface for Chillers (LCI-C)

On RAUL condensing unit, CH530 is using the Chiller profile on LON

LonTalk Communications Interface for Chillers (LCI-C) provides a generic automation system with the LonMark chiller profile inputs/outputs. The inputs/outputs include both mandatory and optional network variables.

**Note:** LonMark network variable names are in parentheses when different from chiller naming convention.

#### Unit Inputs:

- Unit Enable/Disable
- External setpoint or kW limitation setpoint
- Unit emergency stop report
- Auxiliary setpoint enable.

#### Unit Enable/Disable

Allows the unit to be started or stopped depending on if certain operating conditions are met.

#### External setpoint or kW limitation setpoint

Allow to modify, remotely, the setpoints of the unit:

- By modifying the air leaving temperature setpoint of the unit
- Or by limiting the load of the unit thus the electrical input.

## Controls

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### Unit Outputs:

- On/Off
- Active Setpoint
- Leaving Air Temperature
- Entering Air Temperature
- Alarm Descriptor
- Unit Status

### On/Off

It indicates the current state of the unit.

### Active Setpoint

Indicates the current value of the leaving air temperature setpoint

### Leaving Chilled Air Temperature

Provides the current leaving air temperature.

### Entering Chilled Air Temperature

Provides the current entering air temperature.

### Alarm Descriptor

Provides alarm messages based on predetermined criteria.

### Unit Status

Indicates the running modes and states of the unit, i.e. Running in alarm mode, unit enabled, unit being locally controlled, etc.

### Generic Building Management System Hardwire Points

GBAS may be achieved via hardware input/output as well. The input/outputs are as follows:

### Unit hardwire inputs include:

- Unit enable/disable
- External Air setpoint reset (Optional feature)

### External Air Setpoint Reset (Optional feature)

Allows the external setting independent of the front panel setpoint by one of two means:

- 2-10 VDC input
- or 2. 4-20 mA input.

### Unit hardwire outputs (optional)

- Compressor running indication
- Alarm indication (Ckt 1/Ckt 2)
- Maximum capacity



# Controls

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## Control options

### Auxiliary setpoint

Allow to activate a secondary air temperature setpoint

### Hot gas bypass

See below

### External Capacity Control

See below

### Programmable four relay report card

Allows you to activate a signal in case of the following events:

- Alarm - Latching (standard)
- Alarm Auto reset
- Alarm
- Warning
- Unit Limit Mode (standard)
- Compressor Running (standard)
- Maximum Capacity reached (standard)
- Circuit fault.

### Communication card for LON protocol

### Phase protection device

Disable the unit from running in case of wrong electrical phase connection.

### External setpoint / capacity limiting

Entry to modify the setpoint or to limit the unit capacity.

## Unit Control type

As standard, the unit is fitted with the Air temperature control mode. As an option, External capacity control is also available.

### CAUTION!

Be careful when a control type is selected. It is not possible to switch on site to the other mode.

### Air Temperature Control (standard)

Standard control «Air temperature Control» is a control fully managed by CH530. It controls capacity steps depending on the entering and leaving air temperature sensors (supplied) to be mounted on site.

The capacity control method is identical to that used for chilled water control, with setting changes being used to adjust the control appropriately.

### External Capacity Control (option)

External capacity control allows the staging to be controlled by an external control by acting on dry contacts. Due to the absence of necessity, the air temperature sensors are not provided.

The cooling steps can be controlled through a 2-3 or 4 contacts card, depending on the number of stages. It allows another control to manage the capacity steps while the CH530 takes care of other operation such as fan staging, operating safeties, compressors sequencing, etc.

## Controls

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### Customer Benefit

This option allows the RAUL to be controlled by any kind of other control. All that is required is a binary input for each required step:

For example, for a unit with 3 steps, a RAUL 450 will be fitted with a 3 contacts card. Each of these contacts will be equivalent to a step. None of the contacts works with a defined compressor or group of compressors. Either one may be started or stopped depending on the short cycle, compressor balance time, compressor failure, etc.

### CAUTION!

This option is not compatible with the following feature and options:

- Air temperature control
- Auxiliary setpoint option
- Hot Gas bypass control option
- External setpoint / capacity limiting option

### Hot Gas-bypass Card

Hot gas bypass is a physical change to the condensing unit. An additional refrigerant line and solenoid valve, both not supplied, must be added on site between the discharge line and the suction line on Circuit 1. When the solenoid valve is activated, refrigerant vapor will flow from the discharge line to the suction line.

This refrigerant vapor satisfies the compressor mass flow requirement, but because no phase change has occurred, this flow does not contribute to unit capacity. The amount of capacity shed by the hot gas bypass line depends on the size of the line (restriction) and the pressure difference between the discharge line and the suction line.

Closing the solenoid valve in the hot gas bypass line deactivates hot gas bypass.

### Explanatory Comments

Hot Gas Bypass is an option that is intended to reduce the capacity of the condensing unit at minimum load conditions by bypassing compressor discharge gas to the suction line. By adding HGBP, a portion of the compressor refrigerant flow comes directly from the discharge line, thus reducing the amount of capacity produced by the condensing unit.

### Customer Benefit

Hot gas bypass may eliminate or reduce cycling on process or other installations having load variations that occasionally include brief periods of no load or very light load. Eliminating cycling shortens the time required to respond to load increases, and prevents condensing unit starts and stops during periods when condensing unit starts/stops are prohibited.

# General Data

Table 1 - R407C Units Characteristics

		RAU 190	RAU 260	RAU 300	RAU 350	RAU 400	RAU 450	RAU 500	RAU 600	RAU 700	RAU 800
		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
<b>Performances (1)</b>											
Gross cooling capacity (1)	(kW)	54.8	66.6	81.1	95.3	108.3	118.8	133.0	162.0	194.7	218.8
Power input in cooling (1)	(kW)	16.7	23.6	28.2	31.0	36.1	43.2	48.7	57.9	61.8	74.5
Main Power supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dB(A))	88	90	91	91	92	93	93	94	98	98
<b>Units Amps</b>											
Nominal (4)	(A)	35.4	44.3	53.2	62	70.9	79.8	88.6	106	124	142
Start-up Amps	(A)	138	193	202	210	219	228	237	255	272	290
Recommended Fuse Size (Am)	(A)	Depend of installation									
Max supply cable size	(mm <sup>2</sup> )	35	35	35	50	50	95	95	95	150	150
Max. Wire Length	(m)	Depend of installation									
<b>Compressor</b>											
Number		2	2	2	3	3	3	4	4	6	6
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		10T+10T	10T+15T	2x15T	2x10T+15T	10T+2x15T	3x15T	2x(10T+15T)	4x15T	4x10T+2x15T	2x10T+4x15T
Speeds number		1	1	1	1	1	1	1	1	1	1
Motors Number		1	1	1	1	1	1	1	1	1	1
Rated Amps (2)(4)	(A)	30	42	50	55	65	75	84	101	109	130
Locked rotor Amps (2)	(A)	120	175	175	175	175	175	175	175	175	175
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
Sump Heater (2)	(W)	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V
<b>Liquid and Suction connection</b>											
Suction connection	brazed	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	2"1/8	2"1/8
Liquid connection	brazed	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1"1/8	1"1/8
<b>Coil</b>											
Type		Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin
Tube size	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Tube type		Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
Height	(mm)	1219	1219	1219	1219	1219	1219	1219	1219	1219	1219
Length	(mm)	2743	2743	2743	3455	4115	4115	5486	5486	5486	5486
Face Area	(m <sup>2</sup> )	3.34	3.34	3.34	4.21	5.02	5.02	6.69	6.69	6.69	6.69
Rows	#	2.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0
Fins per foot (fpf)	#	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0
<b>Fan</b>											
Type		Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Number		2	2	2	3	3	3	4	4	6	6
Diameter	(mm)	962	962	962	962	962	962	962	962	962	962
Drive type		Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Speeds number		1	1	1	1	1	1	1	1	1	1
Air flow	(m <sup>3</sup> /h)	27000	27000	25300	35900	37900	37900	54000	50700	89100	89100
Motors Number		2	2	2	3	3	3	4	4	6	6
Motor HP (2)	(kW)	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	1.72	1.72
Rated Amps (2)	(A)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.26	3.26
Locked rotor Amps (2)	(A)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	15.5	15.5
Motor RPM	(rpm)	705	705	705	705	705	705	705	705	930	930
<b>Dimensions</b>											
Height	(mm)	1582	1582	1582	1582	1582	1582	1584	1584	1598	1598
Length	(mm)	2061	2061	2061	2921	2921	2921	2225	2225	3090	3090
Width	(mm)	995	995	995	995	995	995	1865	1865	1948	1948
Weight uncrated	(kg)	514	584	650	810	900	926	1040	1168	1575	1634
Weight crated	(kg)	555	625	691	869	959	985	1123	1251	1695	1754
<b>System Data</b>											
Refrigerant circuit		1	1	1	2	2	2	2	2	2	2
<b>Refrigerant Charge (3)</b>											
Circuit A & B	(kg)	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system

- (1) at 7°C SST and 35°C ambient
- (2) per motor
- (3) per circuit
- (4) 5°C sat suction temp. - 60°C sat discharge temp.
- (5) In accordance with ISO 3746



# General Data

Table 2 - R134a Units Characteristics

		RAU 190	RAU 260	RAU 300	RAU 350	RAU 400	RAU 450	RAU 500	RAU 600	RAU 700	RAU 800
		R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
<b>Performances (1)</b>											
Gross cooling capacity (1)	(kW)	43.8	53.2	63.9	75.4	85.1	93.6	106.3	127.9	153.8	172.7
Power input in cooling (1)	(kW)	10.6	14.2	16.9	18.8	21.9	25.4	28.5	34.0	37.6	44.5
Main Power supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level (5)	(dB(A))	88	90	91	91	92	93	93	94	98	98
<b>Units</b>											
<b>Start-up Amps</b>											
Nominal (4)	(A)	35.4	44.3	53.2	62	70.9	79.8	88.6	106	124	142
Start-up Amps	(A)	138	193	202	210	219	228	237	255	272	290
Recommended Fuse Size (Am)	(A)	Depend of installation									
Max supply cable size	(mm <sup>2</sup> )	35	35	35	50	50	95	95	95	150	150
Max. Wire Length	(m)	Depend of installation									
<b>Compressor</b>											
Number		2	2	2	3	3	3	4	4	6	6
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		10T+10T	10T+15T	2x15T	2x10T+15T	10T+2x15T	3x15T	2x(10T+15T)	4x15T	4x10T+2x15T	2x10T+4x15T
Speeds number		1	1	1	1	1	1	1	1	1	1
Motors Number		1	1	1	1	1	1	1	1	1	1
Rated Amps (2)(4)	(A)	30	42	50	55	65	75	84	101	109	130
Locked rotor Amps (2)	(A)	120	175	175	175	175	175	175	175	175	175
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
Sump Heater (2)	(W)	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V	50W - 400V
<b>Liquid and Suction connection</b>											
Suction connection	brazed	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	1"5/8	2"1/8	2"1/8
Liquid connection	brazed	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1"1/8	1"1/8
<b>Coil</b>											
Type		Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin
Tube size	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Tube type		Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
Height	(mm)	1219	1219	1219	1219	1219	1219	1219	1219	1219	1219
Length	(mm)	2743	2743	2743	3455	4115	4115	5486	5486	5486	5486
Face Area	(m <sup>2</sup> )	3.34	3.34	3.34	4.21	5.02	5.02	6.69	6.69	6.69	6.69
Rows	#	2.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0
Fins per foot (fpf)	#	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0
<b>Fan</b>											
Type		Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Number		2	2	2	3	3	3	4	4	6	6
Diameter	(mm)	962	962	962	962	962	962	962	962	962	962
Drive type		Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Speeds number		1	1	1	1	1	1	1	1	1	1
Air flow	(m <sup>3</sup> /h)	27000	27000	25300	35900	37900	37900	54000	50700	89100	89100
Motors Number		2	2	2	3	3	3	4	4	6	6
Motor HP (2)	(kW)	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	1.72	1.72
Rated Amps (2)	(A)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.26	3.26
Locked rotor Amps (2)	(A)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	15.5	15.5
Motor RPM	(rpm)	705	705	705	705	705	705	705	705	930	930
<b>Dimensions</b>											
Height	(mm)	1582	1582	1582	1582	1582	1582	1584	1584	1598	1598
Length	(mm)	2061	2061	2061	2921	2921	2921	2225	2225	3090	3090
Width	(mm)	995	995	995	995	995	995	1865	1865	1948	1948
Weight uncrated	(kg)	514	584	650	810	900	926	1040	1168	1575	1634
Weight crated	(kg)	555	625	691	869	959	985	1123	1251	1695	1754
<b>System Data</b>											
Refrigerant circuit		1	1	1	2	2	2	2	2	2	2
<b>Refrigerant Charge (3)</b>											
Circuit A & B	(kg)	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system	Split system

- (1) at 7°C SST and 35°C ambient
- (2) per motor
- (3) per circuit
- (4) 5°C sat suction temp. - 60°C sat discharge temp.
- (5) In accordance with ISO 3746

# Application considerations

Optimum performance of a RAUL unit will be achieved only if proper application guidelines are followed.

## Unit sizing

Intentionally oversizing a unit to assure adequate capacity is not recommended. Erratic system operation and excessive compressor cycling are often a direct result of an oversized unit. In addition, an oversized unit is usually more expensive to purchase, install and operate. If oversizing is desired, consider using two units.

## Unit placement

### Foundation

A base or foundation is not required if the selected unit location is level and strong enough to support the unit's operating weight.

### Isolation and sound emission

4 or 6 rubber pads isolators provided as standard. They have to be installed between the unit and the ground. An acoustical engineer should always be consulted on critical applications to provide anti-vibration mounts.

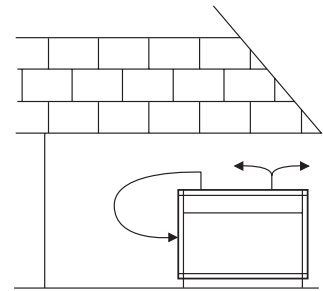
### Vertical clearance

Vertical condenser air discharge must be unobstructed. While it is difficult to predict the degree of warm air recirculation, a unit installed as shown below would have its capacity and efficiency significantly reduced - possibly to the degree of nuisance high head pressure trip-outs. Performance data is based on free air discharge.

### Lateral clearance

The condenser coil inlet must not be obstructed. Minimum distance between condenser and wall 0.8 m (1 m for sizes 700-800). A unit installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, resulting in unit capacity and efficiency reductions. If two units are installed side by side, the minimum clearance is 1.6 m between coils (2 m for sizes 700 and 800).

Figure 2 - Vertical and lateral clearance



### Walled enclosure installations

When the unit is placed in an enclosure or small depression, the top of the fans should be no lower than the top of the enclosure or depression. If they are, consideration should be given to ducting the top of the unit. Ducting individual fans, however, is not recommended. The minimum clearance between unit and walled enclosure is 1 m.

### Refrigerant connections

The condensing unit is delivered with oil charge and nitrogen holding charge. On site, it is necessary to install a filter on the suction line and a filter dryer on the liquid line.



## Selection Procedure

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Unit selections and performance information can be obtained through the use of Trane's selection program.

### **Performance**

The computer selection program provides performance data for each unit selection.

### **Dimensional Drawings**

The dimensional drawings illustrate overall measurements of the unit. Also shown are the service clearances required to easily service the RAUL condensing unit. All catalog dimensional drawings are subject to change. Current submittal drawings should be referred to for detailed dimensional information. Contact the sales office for submittal information.

### **Electrical Data**

Compressor motor electrical data is shown in the General Data tables for each unit size.

## Notes

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## Safety recommendations

To avoid accidents and damage, the following recommendations should be observed during maintenance and service visits:

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

## Maintenance contract

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

## Training

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



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