

# Cooline<sup>®</sup>

AIR CONDITIONERS

from **Zamil**

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## Concealed Systems

DQ18/KQ018 thru DQ60/KQ060

1.5 TR thru 5 TR

5 kW thru 17.5 kW

Cool & Heat pump models



*Higher quality of indoor living*

*Our product line ...*



## **Company Business**

Zamil Air Conditioners was founded in 1974 as one of the first air conditioning business to be established in Saudi Arabia and today is a leading international manufacturer of air conditioning systems and is No. 1 in the Middle East.

Zamil Air conditioners manufactures both consumer and central air conditioners and has sales operations in over 55 countries in the Middle East, Europe, Africa and Asia.

The company's operations are structured into four Strategic Business Units (SBUs) supporting five in-house product and service brands as well as a number of international brands under the OEM sales.

The five in-house brands are Classic, Cooline, CoolCare, Clima Tech and Geoclima.

The four SBUs are:

1. Consumer Business Unit supporting Classic, Cooline, GE and OEM brands for consumers.
2. Unitary & Applied Business Unit supporting Classic, Cooline, GE and OEM brands for commercial and industrial customers.
3. Zamil CoolCare providing engineering & project management services, HVAC maintenance, retrofit services and parts.
4. Geoclima srl is an independent business supporting other SBUs for their requirement of Chillers & Double skin AHU's.

The first three SBUs - Consumer Products, Unitary & Applied Products and CoolCare Service direct their business operations from the corporate headquarters at Dammam, Saudi Arabia.

Geoclima has its engineering & production departments located at Monfalcone, Italy and has a design center in Austria.

All the four SBUs, while operating independently, supplement each other's activities in a way that makes synergy work at its best and achieve the corporate goals of maximizing customer satisfaction.

## **Factories and Productions**

Zamil Air Conditioners has two manufacturing plants in Dammam, Saudi Arabia and has one speciality production facility in Italy operated by Geoclima.

The company can produce up to 550,000 Room Air Conditioners, 300,000 Mini-Split systems and 50,000 Central Air Conditioning systems per year.

## **Quality & Product Certificates**

The Quality systems and policies at Zamil Air Conditioners comply with the required ISO 9001:2000 certification.

Zamil Air Conditioners is the first company in Saudi Arabia to receive the SASO (Saudi Arabia's Standard Organization) Certificate for Room Air Conditioners. ZAC's products are also certified with:

1. CE (Council of European Community)
2. UL (Underwriters Laboratory)
3. Eurovent
4. DEMKO
5. ETL

Other awards include the prestigious Engineering Excellence Award of General Electric and the inaugural Prince Mohammed bin Fahd Al Saud Award for Factory Safety.

## **Our Products**

In addition to the consumer products such as the Room Air Conditioners (RAC) and the Mini Splits, Zamil Air Conditioners manufacturers a host of residential, commercial and industrial air conditioners. This broad range extends from the Concealed Units up to 5 tons, the Ducted Splits up to 30 tons, the Packaged Units up to 90 tons, the Single and Double Skin Air Handling Units up to 70,630 CFM and the Water Chillers up to 660 tons cooling capacity.

# INDEX

<b>Contents</b>	<b>Page</b>
Features .....	2
Model decoding .....	3
Matching condensing units .....	3
Indoor unit features .....	4
Standard specifications .....	4
Outdoor unit features .....	5
Microprocessor controlled thermostat .....	6
Physical data .....	7
Cooling capacities .....	8
Fan performance data .....	9
Dimensions, indoor units .....	10
Dimensions, outdoor units .....	11-12
Typical schematic wiring diagram .....	13-14
Installation, operation & maintenance .....	15-16
Electrical .....	17
System design .....	17
Servicing instructions .....	18
Recommended spare parts list .....	19
Parts list .....	20

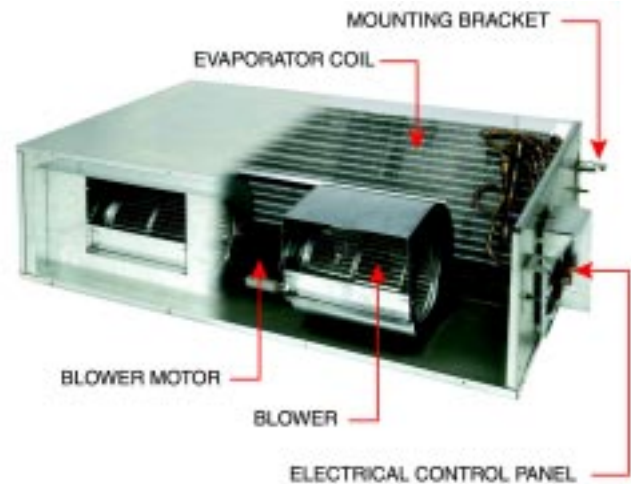
*CONTINUING RESEARCH RESULTS IN STEADY IMPROVEMENTS.  
THEREFORE, THESE SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.*

# FEATURES

## HYBRID DESIGN BETWEEN MINI SPLITS AND CENTRAL UNITS

### INDOOR UNIT :

- \* *COMPACT DESIGN WITH LOW PROFILE*
- \* *HEIGHT RANGES FROM 9.6" TO 14.5"*
- \* *UNITS ARE FOR DUCTED APPLICATIONS*
- \* *LOW SOUND LEVELS*
- \* *DRAW THRU AIRFLOW CONFIGURATION*
- \* *3 SPEED MOTORS*
- \* *REAR RETURN AIR FILTER*
- \* *EASY MAINTENANCE AND INSTALLATION*
- \* *G-90 GALVANIZED HEAVY GAUGE PANELS*
- \* *DIGITAL MICRO PROCESSOR CONTROL*
- \* *WIRED LCD DISPLAY THERMOSTAT*



**DQ SERIES (FAN COIL UNIT)**

### OUTDOOR UNIT :

- \* *G-90 GALVANIZED HEAVY GAUGE PANELS*
- \* **PAINT:** *ELECTROSTATIC POWDER COAT*  
*COOL GRAY COLOR*
- \* *HIGH EFFICIENCY TROPICAL DESIGN*
- \* *POWERFUL COMPRESSOR*
- \* *24 VOLT CONTROL*
- \* *OPERATES UP TO 55°C AMBIENT TEMPERATURE*
- \* *EXTERNAL SERVICE VALVES WITH GAUGE PORTS*
- \* *LOW PRESSURE SWITCH*
- \* *OPTIONAL COPPER OR COATED ALUMINUM FINS*
- \* *COIL GUARD PROTECTION*
- \* *SIDE AIR DISCHARGE*



**KQ SERIES (OUTDOOR UNIT)**

# MODEL DECODING

## INDOOR UNIT

1 & 2 BASIC (SERIES)	3 & 4 COOLING CAPAC- ITY (x 1000 BTUH)	5 ELECTRICAL SUPPLY (V-Ph-Hz)	6 REFRIGERATION SYSTEM	7 ACCESSORIES	8 FIN	9 COIL CONNECTION	10 FILTER	11 OPTION
DQ: DUCTED SPLIT FAN COIL UNIT	18	B : 220/240-1-50	C : COOL ONLY H : HEAT PUMP	N : STANDARD	D : ALUMINUM FINNS WITH ORIFICE E : COATED FINNS WITH ORIFICE F : COPPER FINNS WITH ORIFICE *A : ALUMINUM FINNS WITH CAPILLARY *B : COATED ALUMINUM FINNS WITH CAPILLARY *C : COPPER FINNS WITH CAPILLARY	R : RH SIDE (FACING AIR DISCHARGE)	N : NONE A : ALUMINUM C : SYNTHETIC	N : STANDARD UNIT
	24							
	30							
	36							
	42							
	48							
	60							

\* These options are for matching DQ18/DQ24 heat pump units with KQ018/KQ024 condensing units and also for matching DQ30 to DQ60 heat pump units with CL030 to CL060 condensing units.

## OUTDOOR UNIT

1 & 2 BASIC	3, 4 & 5 NOMINAL COOLING CAPACITY (MBH)	6 ELECTRICAL SUPPLY ( V-Ph-Hz )	7 REFRIGERA- TION CIRCUIT	8 COMPRESSOR TYPE	9 MODE	10 CONDENSER MOTOR	11 CONDENSER COIL	12 ACCESSORIES	13 OPTIONS
KQ COOLINE CONDENSING UNIT	018	B : 220/240-1-50 <sup>+</sup> L : 380/415-3-50* (4 WIRE)	S : SINGLE	R : HERMETIC RECIPRO- CATING	C : COOL ONLY H : HEAT PUMP	N : STANDARD L : LOW AMBIENT	A : ALUMINUM FINNS B : COATED ALUMINUM FINNS C : COPPER FINNS	N : STANDARD UNIT F : STANDARD UNIT WITH FILTER DRIER & SIGHT GLASS	N : STANDARD UNIT B : SECOND GENERATION UNIT (FOR KQ030 ONLY)
	024								
	030								
	036								
	042								
	048								
	060								

NOTES: \* - Applicable for KQ030 - KQ060 models only.

+ - Applicable for KQ018 - KQ036 models only.

## MATCHING INDOOR/OUTDOOR UNITS

INDOOR UNIT (FAN COIL UNIT)	MODE	INDOOR UNITS	OUTDOOR UNITS
DQ18	COOL	DQ18BCNDRAN	KQ018BSRCNANN
	HEAT PUMP	DQ18BHNARAN	KQ018BSRHNANN
DQ24	COOL	DQ24BCNDRAN	KQ024BSRCNANN
	HEAT PUMP	DQ24BHNARAN	KQ024BSRHNANN
DQ30	COOL	DQ30BCNDRAN	KQ030BSRCNANB
	HEAT PUMP	DQ30BHNDNAN	KQ030BSRHNANB
DQ36	COOL	DQ36BCNDRAN	KQ036LSRCNANN
	HEAT PUMP	DQ36BHNDNAN	KQ036LSRHNANN
DQ42	COOL	DQ42BCNDRAN	KQ042LSRCNANN
	HEAT PUMP	DQ42BHNDNAN	KQ042LSRHNANN
DQ48	COOL	DQ48BCNDRAN	KQ048LSRCNANN
	HEAT PUMP	DQ48BHNDNAN	KQ048LSRHNANN
DQ60	COOL	DQ60BCNDRAN	KQ060LSRCNANN
	HEAT PUMP	DQ60BHNDNAN	KQ060LSRHNANN

NOTE: Refer to indoor/outdoor model decoding for other available voltages.

## INDOOR UNIT FEATURES

### COMPACT DIMENSIONS

Low height units are ideal to fit into tight spaces. Maximum height of unit ranges from 9.6" to 14.5" (24cm to 37cm).

### EASY INSTALLATION WITH FLARE NUT CONNECTIONS

No need for complicated brazing for connecting the refrigerant piping.

### EASY MAINTENANCE / ONE SIDE ACCESS

Filters can be easily removed by lifting/sliding. Piping and controls are on one side for easy access.

### DIGITAL & MICROPROCESSOR CONTROL WITH LCD DISPLAY THERMOSTAT

Programmable wired thermostat loaded with all required functions and features for safe and smooth operation.

### QUIET, PULSE FREE AIR SUPPLY

Centrifugal fans that are statically and dynamically balanced, handle upto 0.5" w.g. (125pa) external static pressure allowing you to keep the unit away from your comfort zone.

### MATCHED WITH RELIABLE CONDENSING UNITS

For optimum performance in cooling and heat pump applications.



Quiet Operation



Digital Thermostat



Compact Dimensions



High Cooling Capacity



Easy Installation

## STANDARD SPECIFICATIONS

### UNIT CONSTRUCTION

These ducted indoor fan coil unit consists of a coil, motor/blower assembly, aluminum filter and a drain pan securely mounted on heavy gauge galvanized steel housing. Steel sheet panels are zinc coated and galvanized by the hot dip process of lock-forming quality conforming to ASTM A 653 commercial weight G-90.

This unit is designed for those concealed overhead installations which require supply ductwork. A 1.5" duct collar is provided into the front panel for supply air duct connection. Return air is from the rear side.

Access to the blower assembly is provided through the removable bottom panel from where the complete fan/motor deck can be removed for servicing. The panels are insulated with 5/16" thick polyethylene acoustic and thermal insulation. 1/2" (13mm) thick washable type aluminum filter is provided.

### BLOWER ASSEMBLY

The direct drive blower motor assembly is easily accessible for complete servicing after removal of fan deck from the unit. The blower wheels are large in diameter and are of the forward curved design. Constructed of steel, they are statically and dynamically balanced for quiet and smooth performance.

### MOTORS

Motors are permanent split capacitor type with three speed tapped windings. The bearings are of sleeve type.

### COILS

All cooling coils are of corrugated fin & tube type, constructed of enhanced copper tubes and mechanically bonded to aluminum fins. As an option to aluminum fins, coated aluminum fins or corrugated copper fins may be provided. Tube support sheets are of galvanized steel, formed to provide structural strength. Coils are provided with the orifice type refrigerant metering device on all models (except DQ18/DQ24 heat pump models). This provides for ease of serviceability. Unlike capillaries there is no need for de-brazing/brazing required for site replacements of the orifice pistons. Accurately sized pistons can be easily fitted for non-standard applications (e.g. high rise buildings). Also this metering device eliminates the need for check valves in reverse cycle heat pump applications. All coils are factory tested at 350 psig.

### DRAIN PAN

The condensate drain pan is fabricated of 18 gauge galvanized steel. The drain pan is powder coat painted and the outer surface is thermally insulated. Since water never touches the metal pan, then possibility of corrosion is eliminated.

# OUTDOOR UNIT FEATURES

## A. GENERAL

The COOLINE side discharge condensing units incorporate the latest innovative technology to provide quiet, reliable performance. The wrap-around coil not only adds to the aesthetical appeal, it also gives optimum heat transfer efficiency. The access panels provide access to the compressor and to the electrical control box. Removal of top panel gives access to fan motor and coil.

These condensing units can be combined with a wide variety of evaporator coils and blower packages to provide quiet and dependable comfort.

These units are available as standard cool only models, and also as heat pump versions as an option for added comfort during cold season.



Low Noise Level



Powerful Reciprocating Compressor



High Energy Efficiency Ratio

## B. UNIT ENCLOSURE

All panels are of heavy gauge (G-90) galvanized steel sheet and completely weatherized for outdoor installation. Steel sheet panels are zinc coated and galvanized by the hot dip process of lock-forming quality conforming to ASTM A 653 commercial weight G-90, followed by baked on electrostatic polyester dry powder coat.

## C. COMPRESSOR

Compressors are fully hermetic type and are provided with all the standard controls necessary for proper and safe operation. These compressors have improved internal pressure relief valve which provides high pressure protection to the refrigerant system and rubber vibration isolators for quiet and efficient operation.

## D. AIR COOLED CONDENSER

1. The condenser coil is of corrugated fin & tube type, constructed of seamless copper tubes with wall thickness of 0.014" (0.356mm), and mechanically bonded to aluminum fins. All copper tube return bends have 0.022" (0.56mm) wall thickness. As an option to aluminum fins, coated aluminum fins or corrugated copper fins may be provided. Tube support sheets are of galvanized steel, formed to provide structural strength. Tubes are circuited to ensure minimum pressure drop and maximum heat transfer. Each coil is completely dehydrated, charged and sealed at the factory upon completion of pressure tests.
2. The fans are propeller type and direct-driven, front discharge & provided with fan guards.
3. Units are equipped with totally enclosed fan motors for greater reliability and dependable performance for many years. Inherent thermal protection is automatic reset type.
4. For heat pump version units, fixed orifice expansion device is inherent within the condensing units as standard (except DQ18/DQ24 heat pump models where capillary is provided in the indoor units).

## E. SERVICE VALVES

Both suction and liquid service valves are brass, back seating type with flare connections. Valves are externally located so refrigerant tube connections can be made quickly and easily. Each valve has a gauge pressure port for ease of checking refrigerant operating pressures.

## F. LOW PRESSURE SWITCH

Auto reset SPST switch activated by refrigerant pressure - locks out the compressor, if the refrigerant pressure falls below 25 PSIG. Also provides additional protection against evaporator freeze up due to loss of indoor airflow.



# MICROPROCESSOR CONTROLLED THERMOSTAT



FEATURES	BENEFITS
Wired remote controller with Liquid Crystal Display (LCD)	Unit operation controlled remotely with a large LCD display.
FAN/HEAT/AUTO/COOL/DRY mode of operation	5 modes of operation with automatic shift between COOL & HEAT when on AUTO.
Three speed fan with AUTO mode	Cover the whole range of CFM/capacity requirements.
SLEEP mode	To raise/lower temperature setting by a maximum of 2°F during night time for added comfort and energy.
Auto Restart	Thermostat settings are preserved in the memory in case of power interruption and will be retrieved to operate the unit accordingly when power is restored.
Real Time Clock	Display the day and time in AM/PM format.
7 Day Programmable Timer	To select up to 7 days in advance when to start and when to stop operation.
Hot Start	No cold air blow in the room at start-up on HEAT mode.
Cold Stop	Use of the remaining thermal energy stored in evaporator coil after unit stop (HEAT mode).
De-icing	To avoid freezing of indoor coil during COOL cycle.
Electronic Defrost cycle	Prevent freezing of outdoor coil during HEAT cycle.
Child Lock	To restrict the number of persons tampering with the control.
Room Temperature Display	Both room & set point temperatures can be displayed in either °C or °F.
ON/OFF status LED indicator	To inform on the status of operation.



## PHYSICAL DATA

MODEL	INDOOR UNIT	DQ18	DQ24	DQ30	DQ36	DQ42	DQ48	DQ60
	OUTDOOR UNIT	KQ018	KQ024	KQ030	KQ036	KQ042	KQ048	KQ060
<b>PERFORMANCE</b>								
Cooling capacity at high fan speed, BTUH/kW	17800/5.21	23700/6.94	30000/8.8	36800/10.78	42000/12.3	48500/14.21	59100/17.31	
Total unit power input, kW/EER	2.1/8.1	2.8/7.8	3.4/8.6	4.1/8.7	4.1/9.8	5.0/9.4	6.2/9.2	
Heating capacity at high speed, BTUH/kW	18000/5.27	23000/6.74	29500/8.9	35000/10.24	38000/11.12	45000/13.1	55000/16.1	
Total unit power input, kW/COP	2.0/2.6	2.65/2.5	3.0/3.0	3.45/3.0	3.7/3.0	4.1/3.2	5.0/3.2	
Evaporator airflow, CFM (high/medium/low)	650/550/500	700/650/550	1050/900/750	1200/1050/900	1200/1100/1000	1650/1500/1300	1800/1650/1520	
Sound pressure level, dBA (high/medium/low)	36/35/34	42/36/35	44/43/41	44/43/41	46/44/40	38/35/33	40/38/35	
Minimum circuit ampacity, Amps (Indoor/Outdoor unit)	1.5/13	1.5/15.1	3.6/22.7	3.6/11.9	3.6/13.5	5.5/16.2	5.5/15.2	
Maximum fuse size, Amps (Indoor/Outdoor)	15/20	15/25	15/35	15/20	15/20	15/25	15/20	
<b>INDOOR UNIT</b>								
Power supply (V-Ph-Hz)	220/240-1-50							
Blower size, mm & quantity	146 x 240 (2)	146 x 240 (2)	180 x 240 (2)	180 x 240 (2)	180 x 240 (2)	200 x 216 (2)	200 x 216 (2)	
Blower motor	Watts - RPM	130 - 1250	152 - 1350	403 - 1310	423 - 1350	423 - 1355	525 - 1245	579 - 1330
	FLA	1.2	1.2	2.9	2.9	2.9	4.4	4.4
Evaporator coil	Face area, ft <sup>2</sup>	2.2	2.2	3.0	3.0	3.0	4.4	4.4
	Tube dia, inch	3/8	3/8	3/8	3/8	3/8	3/8	3/8
	No. of rows/FPI	3/14	3/14	3/14	3/14	4/14	4/14	4/14
Suction - Liquid line, inch	5/8 - 3/8	5/8 - 3/8	3/4 - 3/8	3/4 - 3/8	3/4 - 3/8	3/4 - 1/2	3/4 - 1/2	
Return air filter (1/2" thick) size, inch & quantity	8 x 16.5 (2)	8 x 16.5 (2)	9.5 x 18.5 (2)	9.5 x 18.5 (2)	9.5 x 18.5 (2)	11 x 22.75 (2)	11 x 22.75 (2)	
Weight, Kg.	40	40	52	52	55	65	65	
<b>OUTDOOR UNIT</b>								
Power supply (V-Ph-Hz)	220/240-1-50				380/415-3-50			
Compressor (hermetic type), RLA/LRA	10/51	11.7/79	15.8/92	8.2/50	8.2/50	10.4/55	9.6/65	
Condenser airflow, CFM	1400	1400	1575	1900	3600	3600	3600	
Condenser Fan motor	HP - RPM	1/10 - 875	1/10 - 875	1/8 - 945	1/4 - 900	1/4 - 900 (2)	1/4 - 900 (2)	1/4 - 900 (2)
	FLA	0.5	0.5	1.1	1.6	1.6	1.6	1.6
Condenser coil	Face area, ft <sup>2</sup>	5.6	5.6	5.6	6.5	10.5	10.5	10.5
	Tube dia, inch	5/16	5/16	5/16	3/8	3/8	3/8	3/8
	No. of rows/FPI	2/16	2/16	3/16	3/16	2/16	2/16	2/16
Refrigerant (R-22) charge, oz.	64	71	80	121	125	132	134	
Suction - Liquid line, inch	5/8 - 3/8	5/8 - 3/8	3/4 - 3/8	3/4 - 3/8	7/8 - 3/8	7/8 - 3/8	7/8 - 3/8	
Dimensions, mm (depth x width x height)	800 x 325 x 685	800 x 325 x 685	800 x 325 x 685	965 x 390 x 726	965 x 396 x 1158	965 x 396 x 1158	965 x 396 x 1158	
Weight, Kg.	65	66	75	101	115	120	130	

- NOTES:**
1. Cooling capacities & power input data @ 80°F (26.7°C) DB/67°F (19.4°C) WB indoor & 95°F (35°C) ambient temperatures.
  2. Heating capacities & power input data @ 70°F (21.1°C) DB/60°F (15.6°C) WB indoor & 47°F (8.3°C) outdoor temperatures.
  3. Sound pressure level @ 9 feet distance and 0.15 ESP.
  4. Pipe sizes are for runs up to 25 feet (7.6 meters) to indoor unit.

# COOLING CAPACITIES

CONDENSER ENTERING AIR TEMP. (°F)		MODEL NUMBER (INDOOR UNIT/OUTDOOR UNIT)																																									
		DQ18/KQ018			DQ24/KQ024			DQ30/KQ030			DQ36/KQ036			DQ42/KQ042			DQ48/KQ048			DQ60/KQ060																							
		650/0.112						700/0.120						1050/0.127						1200/0.145						1200/0.077						1650/0.070						1800/0.080					
		EVAPORATOR AIRFLOW, CFM/DR																																									
		EVAPORATOR ENTERING AIR, WBE (°F)																																									
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72	62	67	72	62	67	72	62	67	72	62	67	72	62	67	72												
85	TC	17.25	18.91	20.73	23.09	24.88	27.00	30.29	32.73	36.00	36.03	39.80	43.81	40.52	44.79	49.40	47.67	52.50	57.68	58.51	64.07	69.98																					
	SC	16.59	14.11	11.01	21.46	17.78	14.15	29.86	24.30	19.24	34.47	28.80	23.00	37.69	31.60	25.39	46.33	39.30	30.81	56.29	46.76	37.08																					
	kW	1.92	2.01	2.1	2.54	2.71	2.85	2.96	3.11	3.26	3.58	3.81	4.04	3.7	3.91	4.12	4.36	4.61	4.86	5.46	5.7	5.94																					
95	TC	16.20	17.78	19.58	21.87	23.70	25.80	27.18	30.00	33.04	33.31	36.78	40.55	37.91	41.98	46.40	43.93	48.50	53.34	53.80	59.15	64.78																					
	SC	15.68	13.78	10.69	21.02	17.40	13.78	26.63	23.92	18.76	32.64	28.17	22.29	36.93	30.79	24.56	43.48	38.50	29.88	52.73	45.75	35.97																					
	kW	2.01	2.1	2.2	2.64	2.81	2.95	3.24	3.41	3.59	3.85	4.11	4.37	3.88	4.12	4.36	4.73	5.02	5.32	5.91	6.21	6.49																					
105	TC	15.35	16.91	18.66	20.10	21.88	23.90	27.04	29.86	32.95	32.94	36.42	40.19	36.97	40.99	45.36	43.14	47.71	52.56	53.10	58.53	64.24																					
	SC	14.80	13.41	10.35	19.41	15.98	12.56	26.50	23.40	18.36	32.28	27.53	21.77	36.15	30.10	23.95	42.04	37.61	29.15	52.04	44.61	35.07																					
	kW	2.1	2.21	2.32	2.83	3.01	3.16	3.32	3.51	3.70	3.95	4.21	4.47	4.06	4.32	4.58	4.82	5.11	5.42	6.07	6.41	6.73																					
115	TC	13.31	14.71	16.25	17.69	19.39	21.21	25.70	28.45	31.40	31.27	34.60	38.22	35.14	39.02	43.19	40.76	45.21	49.86	50.43	55.72	61.37																					
	SC	12.70	12.50	9.47	17.34	15.58	12.07	25.15	22.76	17.72	30.64	26.90	21.14	34.88	29.43	23.26	39.74	36.70	28.27	49.42	43.61	34.14																					
	kW	2.18	2.3	2.43	2.92	3.10	3.28	3.41	3.61	3.81	4.03	4.30	4.59	4.24	4.50	4.79	4.9	5.20	5.53	6.34	6.70	7.08																					
125	TC	11.56	12.79	14.18	15.71	17.30	18.95	24.16	26.77	29.60	29.49	32.67	36.16	33.20	36.94	40.91	38.39	42.56	47.08	47.61	52.75	58.19																					
	SC	10.52	11.30	8.43	15.39	15.10	11.53	23.67	22.27	17.25	28.90	26.17	20.44	32.85	28.53	22.39	37.37	35.66	27.31	46.66	42.65	33.17																					
	kW	2.28	2.41	2.54	3.12	3.31	3.49	3.68	3.91	4.14	4.31	4.61	4.91	4.41	4.71	5.02	5.09	5.41	5.76	6.68	7.1	7.52																					

**LEGEND:**

- TC – Total Capacity (1000 Btu/h) Gross
- SC – Sensible Heat Capacity (1000 Btu/h)
- kW – Total unit power input
- DR – Wet Bulb depression ratio
- DBE – Dry Bulb Temp. (°F) of Air Entering Coil
- WBE – Wet Bulb Temp. (°F) of Air Entering Coil
- DBL – Dry Bulb Temp. (°F) of Air Leaving Coil
- WBL – Wet Bulb Temp. (°F) of Air Leaving Coil

**NOTES:**

1. Capacities above are based on DBE = 80°F. For higher or lower DBE, add following Correction Factor = 1.08 x CFM (1 – DR) (DBE – 80).
2. To calculate leaving conditions, follow this procedure: DBL = DBE – (Sensible Capacity (Btu/h) / 1.08 x CFM); WBL = DBL – [DR (DBE – WBE)].
3. Multiply cooling capacities by 0.95 for heat pump units.

**MULTIPLIERS FOR LOWER CFM**

% of rated airflow	100%	95%	90%	85%	80%	75%	70%	60%
TC	1	0.98	0.96	0.93	0.91	0.89	0.87	0.83
SC	1	0.965	0.93	0.90	0.87	0.845	0.82	0.78
kW	1	0.992	0.985	0.97	0.965	0.96	0.94	0.93

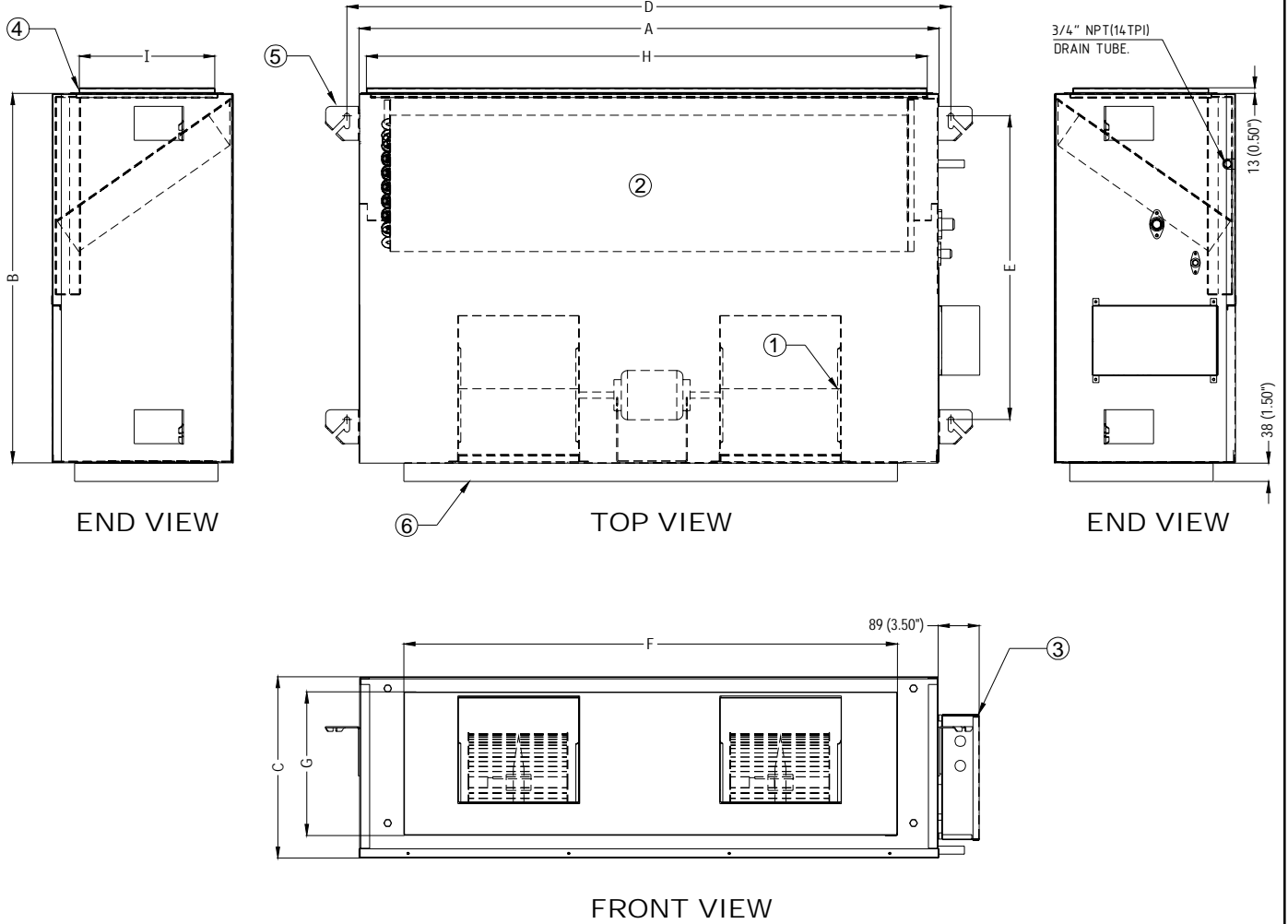
## FAN PERFORMANCE DATA

MODEL NUMBER	BLOWER MOTOR SPEED	CFM @ EXTERNAL STATIC PRESSURE (Inches of water)								
		0.0	0.05	0.1	0.15	0.2	0.25	0.3	0.4	0.5
DQ18	HIGH	650	594	562	523	484	434	383	285	138
	MEDIUM	579	547	515	474	433	338	242	227	135
	LOW	525	495	465	435	400	350	-	-	-
DQ24	HIGH	700	653	618	580	541	490	439	338	168
	MEDIUM	625	594	562	523	484	434	383	285	138
	LOW	579	547	515	474	433	338	-	-	-
DQ30	HIGH	1050	1020	983	942	901	862	824	705	586
	MEDIUM	867	858	850	812	774	736	698	608	497
	LOW	733	711	690	671	652	613	-	-	-
DQ36	HIGH	1200	1162	1132	1074	1017	966	915	797	676
	MEDIUM	1058	1020	983	942	901	862	824	705	586
	LOW	867	858	850	812	774	736	-	-	-
DQ42	HIGH	1200	1172	1132	1088	1044	1001	958	844	710
	MEDIUM	1130	1110	1090	1027	965	928	876	753	628
	LOW	1037	995	954	915	876	836	-	-	-
DQ48	HIGH	1650	1625	1577	1525	1472	1413	1354	1223	1084
	MEDIUM	1518	1475	1432	1386	1339	1279	1218	1108	970
	LOW	1304	1266	1228	1188	1147	1101	-	-	-
DQ60	HIGH	1800	1758	1692	1622	1552	1503	1454	1296	1188
	MEDIUM	1673	1625	1577	1525	1472	1413	1354	1223	1084
	LOW	1518	1475	1432	1386	1339	1279	-	-	-

**NOTE:** Values include losses for dry coil and filters.

# DIMENSIONS - INDOOR UNITS

## DQ18 - DQ60



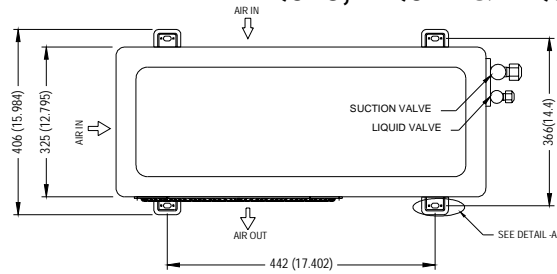
- 1. Blower & motor assembly
- 2. Evaporator coil
- 3. Control box
- 4. Filter rack
- 5. Unit mounting brackets (4 Nos.)
- 6. Duct connection

**NOTE:** All dimensions are in mm (dimensions in brackets are in inches).

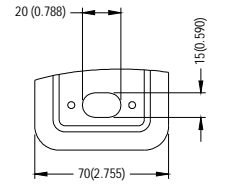
MODEL	DIMENSIONS								
	A	B	C	D	E	F	G	H	I
DQ18	904 (35.6)	610 (24)	244 (9.6)	960 (37.8)	521 (20.5)	769 (30.3)	183 (7.2)	841 (33.1)	206 (8.1)
DQ24	904 (35.6)	610 (24)	244 (9.6)	960 (37.8)	521 (20.5)	769 (30.3)	183 (7.2)	841 (33.1)	206 (8.1)
DQ30	1011 (39.8)	762 (30)	318 (12.5)	1067 (42)	640 (25.2)	858 (33.8)	241 (9.5)	945 (37.2)	259 (10.2)
DQ36	1011 (39.8)	762 (30)	318 (12.5)	1067 (42)	640 (25.2)	858 (33.8)	241 (9.5)	945 (37.2)	259 (10.2)
DQ42	1011 (39.8)	762 (30)	318 (12.5)	1067 (42)	640 (25.2)	858 (33.8)	241 (9.5)	945 (37.2)	259 (10.2)
DQ48	1194 (47)	762 (30)	368 (14.5)	1245 (49)	625 (24.6)	894 (35.2)	266 (10.5)	1155 (45.5)	292 (11.5)
DQ60	1194 (47)	762 (30)	368 (14.5)	1245 (49)	625 (24.6)	894 (35.2)	266 (10.5)	1155 (45.5)	292 (11.5)

# DIMENSIONS - OUTDOOR UNITS

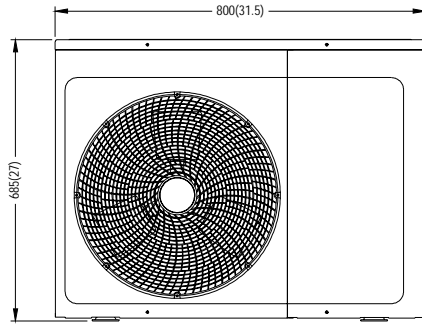
## KQ018, KQ024 & KQ030



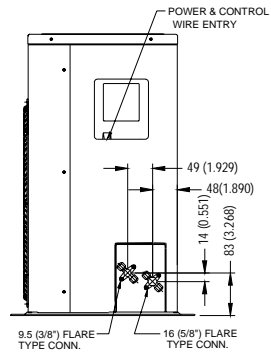
TOP VIEW



DETAIL - A  
(TYPICAL AT FOUR PLACES)

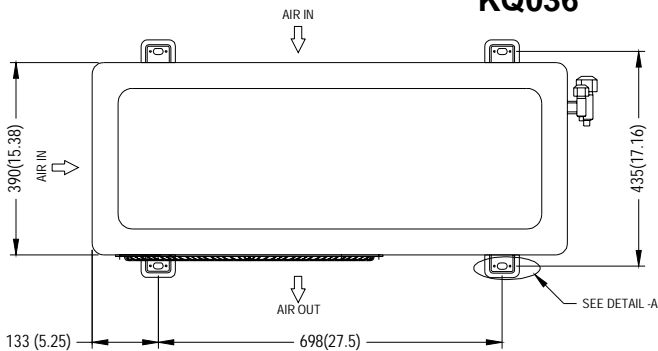


FRONT VIEW

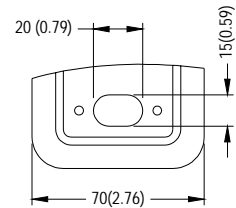


END VIEW

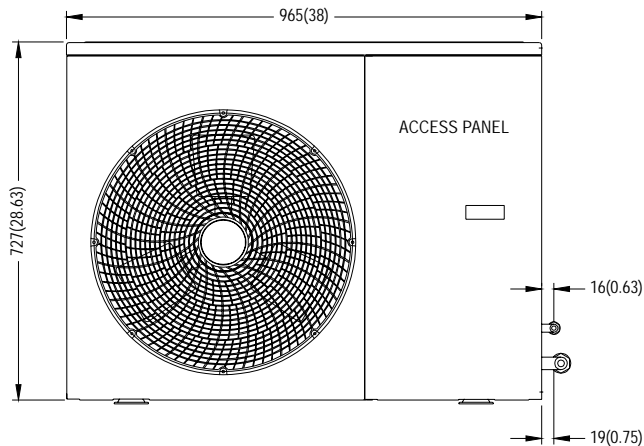
## KQ036



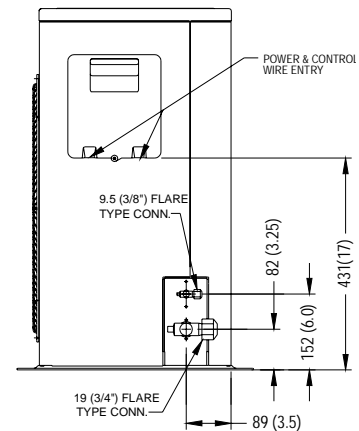
TOP VIEW



DETAIL - A  
(TYPICAL AT FOUR PLACES)



FRONT VIEW

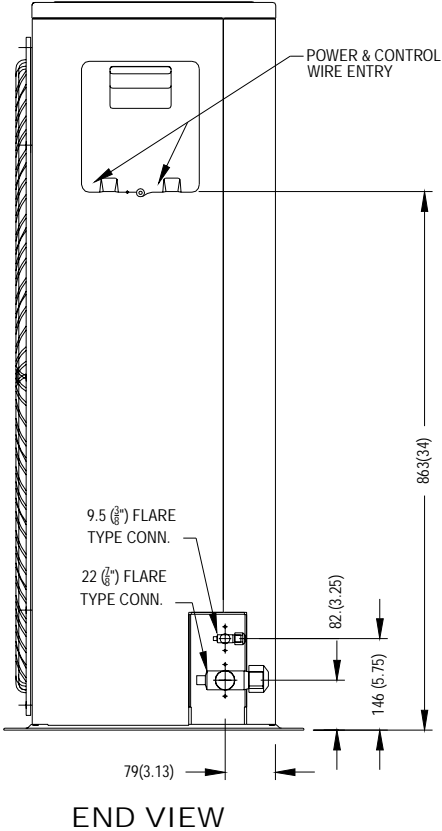
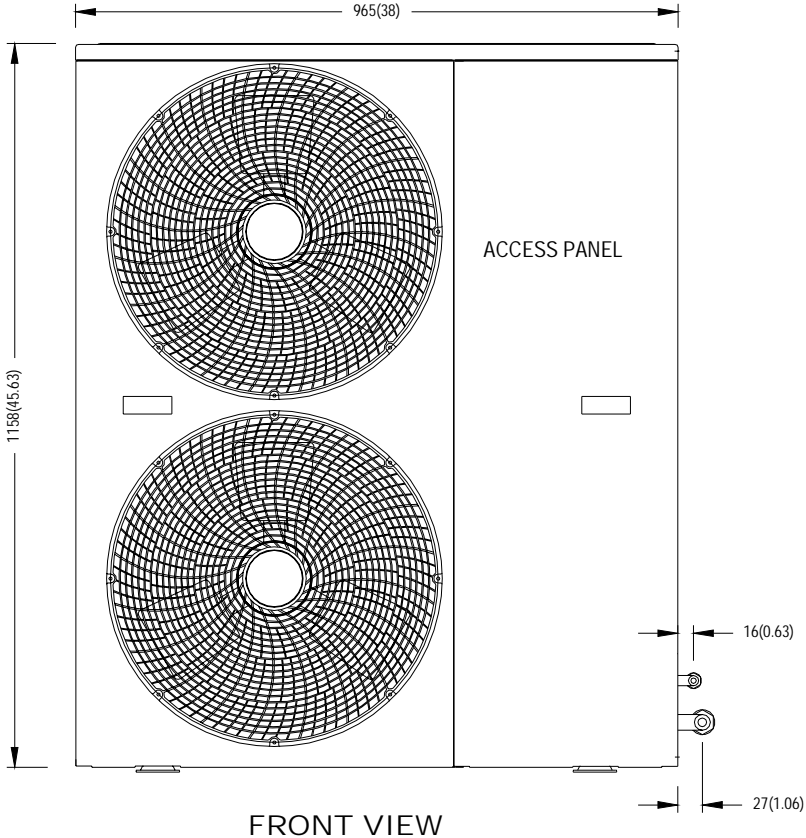
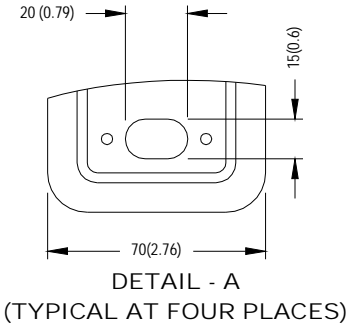
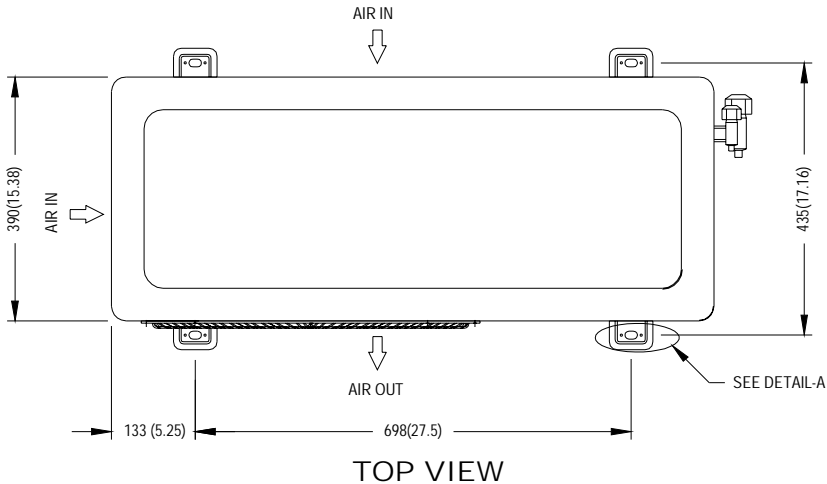


END VIEW

**NOTE:** All dimensions are in mm (dimensions in brackets are in inches).

# DIMENSIONS - OUTDOOR UNITS

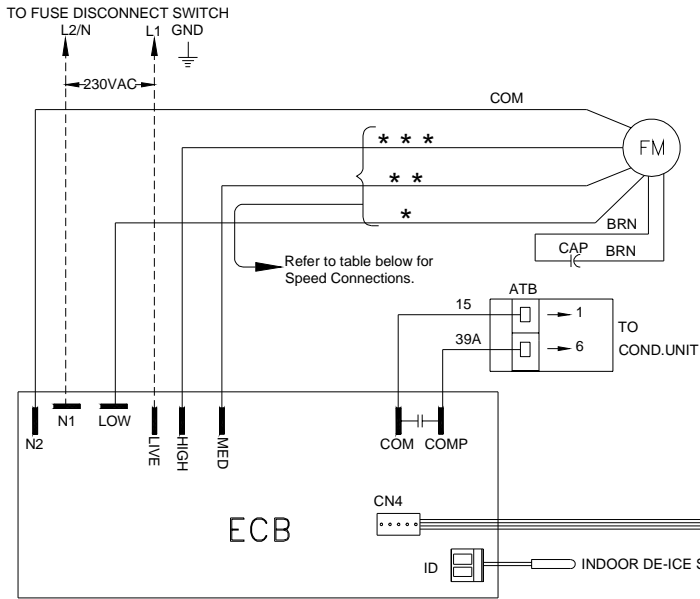
## KQ042, KQ048 & KQ060



**NOTE:** All dimensions are in mm (dimensions in brackets are in inches).

# TYPICAL SCHEMATIC WIRING DIAGRAM

## COOL MODELS



LEGEND	
ATB	AUXILIARY TERMINAL BLOCK
CAP	CAPACITOR
COMP	COMPRESSOR
COM	COMMON
ECB	ELECTRONIC CONTROL BOARD
FL	FUSE LINK
FM	FAN MOTOR
GND	LUG GROUND
HF	HIGH FAN
L1	LINE 1
L2	LINE 2 OR NEUTRAL
LF	LOW FAN
MF	MEDIUM FAN
---	FIELD WIRING
—	FACTORY WIRING

### NOTES

1. POWER SUPPLY, REFER TO UNIT NAMEPLATE.
2. USE COPPER CONDUCTOR WIRES ONLY.
3. MOTORS ARE THERMALLY PROTECTED.
4. REFER TO INTERCONNECTING WIRING DIAGRAM BEFORE INSTALLATION
5. DO NOT ROUTE ATB1(5) FROM CONDENSING UNIT

CABLE CONNECTIONS AT LCD CONTROL PANEL TB

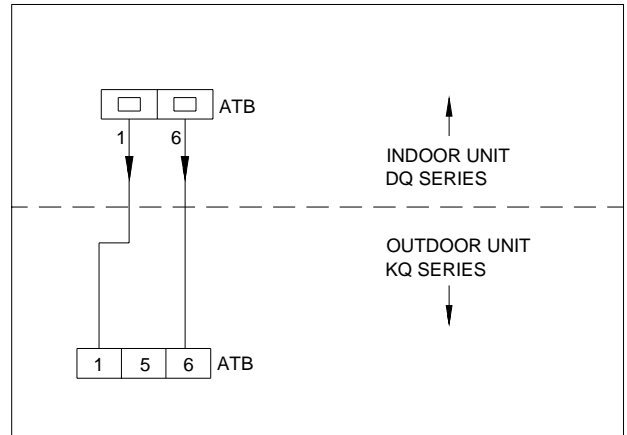
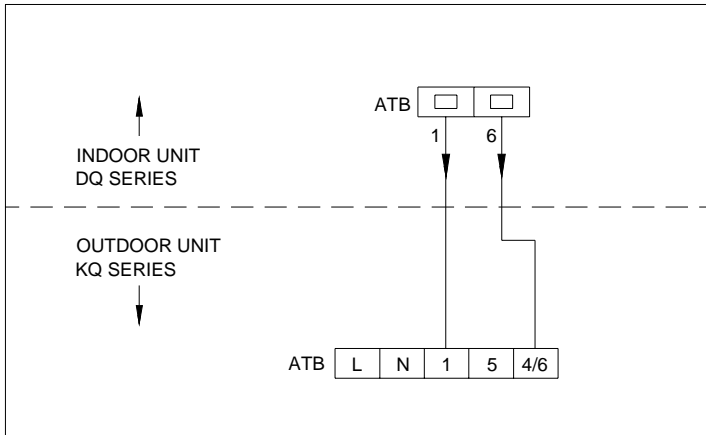
- 1) RED - +5V
- 2) BLK - GND
- 3) WHT - TX
- 4) YEL - TX/RXV

### FM SPEED CONNECTIONS

SPEED	HI	MED-HI	MED	MED-LOW	LOW	LOWEST	COM	APPLICABLE
WIRE COLOR	BLK	VIO	BLU	ORN	RED	GRY	YEL	FREQUENCY
MODEL								IN HERTZ
DQ 18	***	**	*	---	---	---	---	50
DQ 24	***	**	*	---	---	---	---	50
DQ 30	---	***	**	*	---	---	---	50
DQ 36	***	**	*	---	---	---	---	50
DQ 42	***	**	*	---	---	---	---	50
DQ 48	---	***	**	*	---	---	---	50
DQ 60	***	**	*	---	---	---	---	50

## INTERCONNECTING DETAILS BETWEEN INDOOR & OUTDOOR UNIT

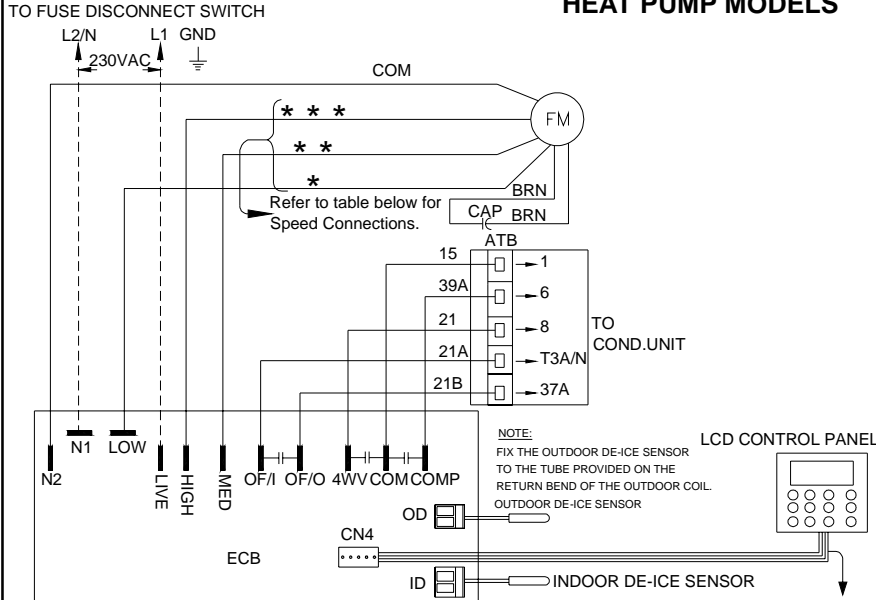
NOTE: Route wires according to diagram below & ignore all other terminal connection on outdoor unit.





# TYPICAL SCHEMATIC WIRING DIAGRAM

## HEAT PUMP MODELS



LEGEND	
ATB	AUXILIARY TERMINAL BLOCK
CAP	CAPACITOR
COMP	COMPRESSOR
COM	COMMON
ECB	ELECTRONIC CONTROL BOARD
FL	FUSE LINK
FM	FAN MOTOR
GND	LUG GROUND
HF	HIGH FAN
L1	LINE 1
L2	LINE 2 OR NEUTRAL
LF	LOW FAN
MF	MEDIUM FAN
OF	OUTDOOR FAN
4WV/RV	FOUR WAY/REVERSING VALVE
---	FIELD WIRING
---	FACTORY WIRING

CABLE CONNECTIONS AT LCD CONTROL PANEL TB

- 1) RED - + 5V
- 2) BLK - GND
- 3) WHT - TX
- 4) YEL - TX/RV

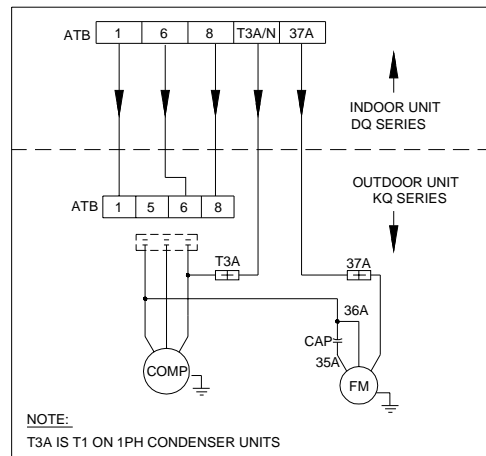
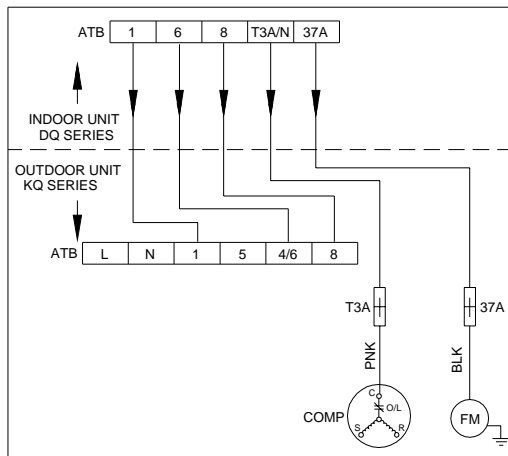
- NOTES**
1. POWER SUPPLY, REFER TO UNIT NAMEPLATE.
  2. USE COPPER CONDUCTOR WIRES ONLY.
  3. MOTORS ARE THERMALLY PROTECTED.
  4. REFER TO INTERCONNECTING WIRING DIAGRAM BEFORE INSTALLATION
  5. DO NOT ROUTE ATB1(5) FROM CONDENSING UNIT
  6. T3A/N & 37A ARE TERMINAL MARKINGS FOR JP4 ON CONDENSER FAN MOTOR CONNECTION. T3A/N IS T1 ON SINGLE PHASE CONDENSING UNITS.

## FM SPEED CONNECTIONS

SPEED	HI	MED-HI	MED	MED-LOW	LOW	LOWEST	COM	APPLICABLE
WIRE COLOR	BLK	VIO	BLU	ORN	RED	GRY	YEL	FREQUENCY
MODEL								IN HERTZ
DQ 18	***	**	*	---	---	---	---	50
DQ 24	***	**	*	---	---	---	---	50
DQ 30	---	***	**	*	---	---	---	50
DQ 36	***	**	*	---	---	---	---	50
DQ 42	***	**	*	---	---	---	---	50
DQ 48	---	***	**	*	---	---	---	50
DQ 60	***	**	*	---	---	---	---	50

## INTERCONNECTING DETAILS BETWEEN INDOOR & OUTDOOR UNIT

NOTE: Route wires according to diagram below & ignore all other terminal connection on outdoor unit. Also route outdoor coil sensor wire from indoor to outdoor sensor holder



## INSTALLATION - INDOOR UNIT

The complete shipment should be inspected for damage. Any damage, visible or concealed, should be reported immediately to the delivery man or driver and noted on the shipping invoice.

Place unit in position and make sure that unit is level. This is important to assure proper drainage and operation. Slots provided in the mounting brackets should be used for installing the units.

Be sure that foreign material is not allowed to fall into or collect in the drain pan. Special care must be taken to prevent paint, plaster, insulation or other foreign material from being deposited on the motor or blower wheels.

## ELECTRICAL

Please ensure power supply (V-Ph-Hz) to the unit is as per unit nameplate requirements.

**Caution:** Operation of the unit on improper power supply will result in damage to the unit.

**Warning:** Before installation or servicing, always TURN OFF all power to the unit. There may be more than one disconnect switch. Ensure all of them are turned off.

### Ground & Power wires

Connect power wires as per wiring diagram. Connect ground wire to the ground lug inside the control box.

### Control wiring between outdoor & indoor units

Use 16 gauge color-coded wire between the indoor and outdoor units (control wiring). Then match the auxiliary terminal block (ATB) numbers (indoor and outdoor units) to interconnect the two units.

- Note:**
1. Field wiring to comply with local Safety and Fire codes.
  2. Use copper wires of proper rating for all field wiring.
  3. Install adequate branch disconnect switch as per NEC size requirements to handle unit starting current. Locate disconnect switch within sight and readily accessible from the unit.

## MAINTENANCE

**COIL:** Coil may be cleaned by removing case and brushing between fins with a stiff wire brush. Brushing should be followed by cleaning with vacuum cleaner. The coil may also be cleaned by using a high pressure air, if compressed air source is available. It should be pointed out that if air filters are used and periodically cleaned, the coils will not be clogged up prematurely.

**DRAIN PIPE:** Drain pipe should be checked before summer operation of unit is begun. If it is clogged, steps should be taken to clear the debris so that condensate will flow out easily. A standard pipe cleaner for 1/2" ID pipe may be used. Periodic checks of the drain pipe should be taken during summer operation, as there is a possibility of it becoming clogged with dirt.

**FILTER CLEANING:** Remove access panel, slide filter out of filter rack, and clean as follows:

Tap filter on solid surface to dislodge heavy particles. Wash under stream of hot water. If filter has been put to exceptional service, a mild solution of Sal-Soda, Tri-Sodium Phosphate or any other commercial solvent can be used. Set filter on end with slots in frame down, which allows it to drain. Filters should dry thoroughly before reuse.

**REPLACEMENT PARTS:** When writing for replacement parts, refer to model number and serial number on the name plate of the unit.

# INSTALLATION & START-UP INSTRUCTIONS - OUTDOOR UNIT

## SAFETY CONSIDERATIONS

Improper installation, service, maintenance or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Check with your nearest COOLINE dealer/sales office for information or assistance.

**Warning:** Before installation or servicing the system, always turn off main power supply. Electrical shock can cause personal injury or death.

## INSTALLATION

### STEP-1:

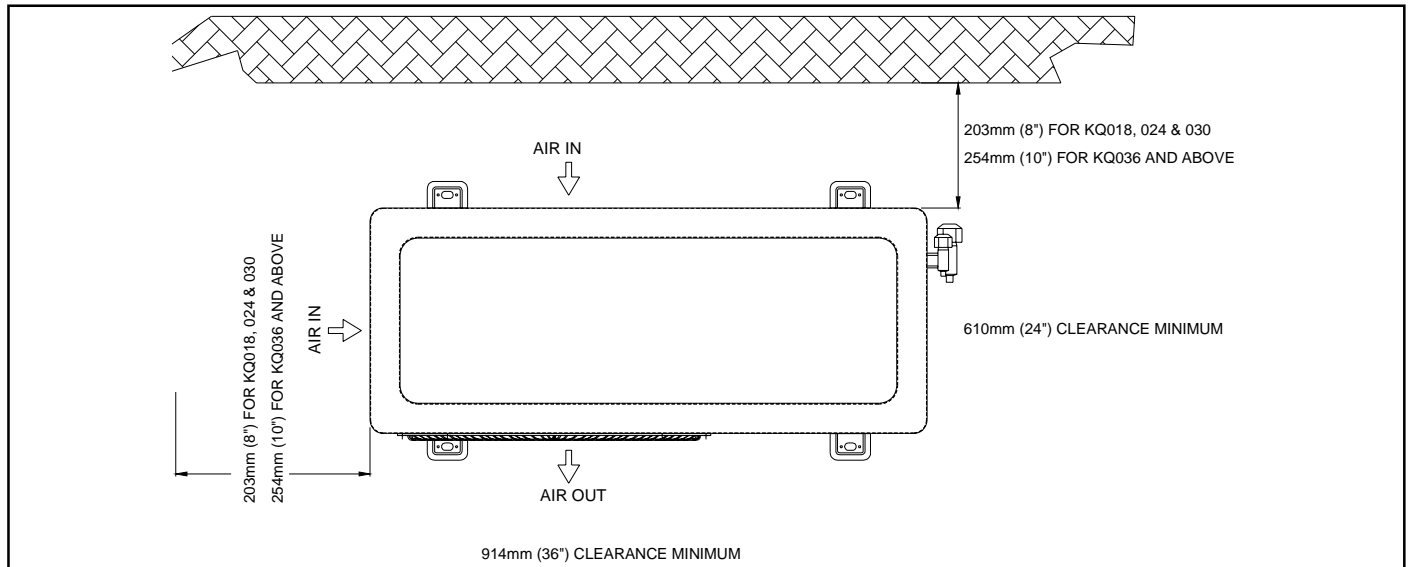
#### Check equipment and job site

Unpack unit and move to final location taking care not to damage the unit. Remove screws holding the unit to wooden pallet and remove wooden pallet.

### STEP- 2:

#### Location of unit

Place the unit with minimum clearance as shown in figure below to enable space for installation, service and optimum performance of the unit. Be sure that the discharge air from the condenser is not restricted. Double the clearance when multiple units are installed at one location. Units may be installed using mounting pads on the floor, concrete slabs, steel frames with adequate strength.



### STEP-3:

#### Piping connections

Outdoor units should be connected to indoor units using field-supplied piping of refrigerant grade and correct size. The liquid and suction line diameters can be determined from the physical data table. For piping requirements beyond 25 ft (7.62 m), obtain information from your nearest COOLINE dealer/sales office.

If either refrigerant piping or indoor coil is exposed to atmospheric conditions, it must be dehydrated to 500 microns to eliminate moisture contamination in the system.

It is advisable to size piping according to recommended ASHRAE methods. Install piping according to refrigeration standard practice. Run refrigerant pipes as directly as possible, avoiding unnecessary turns and bends. Install refrigerant pipes carefully to prevent damaging the suction pipe insulation and vibration transmission to the structure.

#### Outdoor unit connected to factory matched indoor unit

Outdoor unit contains correct system refrigerant charge for operation with matched indoor unit as given on cooling capacity table and when connected with up to 25 ft (7.62 m) of field-supplied piping. Check refrigerant charge for maximum efficiency.

# ELECTRICAL

## STEP 1: INSTALLATION

**A)** Please ensure power supply to the unit is as per unit nameplate (Volts/Ph/Hz) requirements.

**Caution:** Operation of the unit on improper power supply will result in damage to the unit.

**Note:** Use copper wires of proper rating for all field wiring.

**Warning:** Before servicing or installation of the unit, always TURN OFF all power to the unit. There may be more than one disconnect switch. Ensure all of them are turned off. Electrical shock can cause personal injury or death.

### **B) Ground & power wires**

Connect power wires to terminal block per wiring diagram.

Connect ground wire to the ground lug inside the control box.

### **C) Control wiring between outdoor & indoor unit**

Use 16 gauge color-coded wire between the indoor and outdoor units (control wiring).

## STEP 2: START-UP

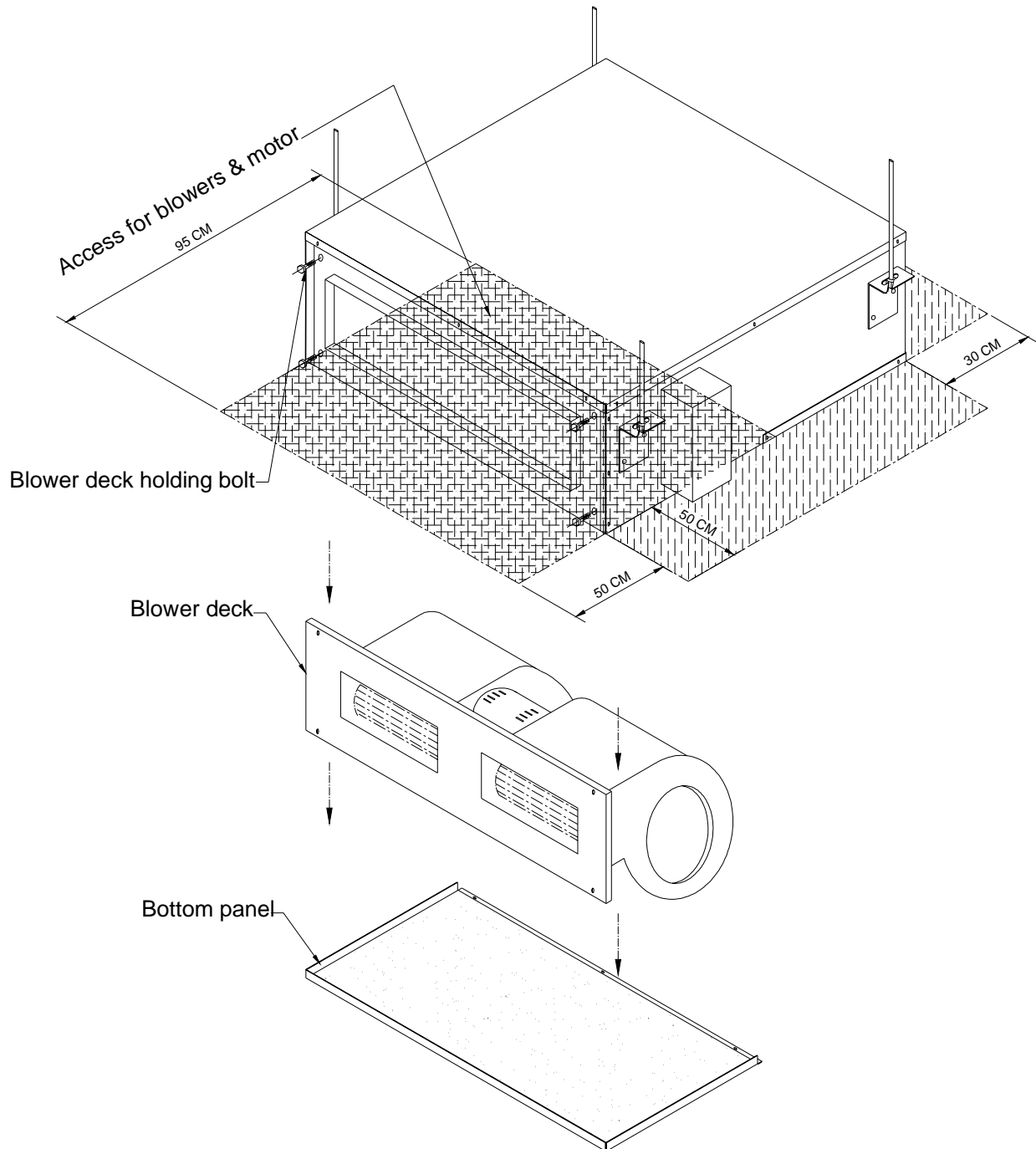
- 1) Energize crankcase heater for a minimum of 12 hours prior to the system start-up. To energize crankcase heater only, set thermostat to "off" position and close electrical disconnect switch to the outdoor unit.
- 2) Fully open liquid/suction service valves.
- 3) Close electrical disconnect switch to energize the system.
- 4) Set room thermostat to desired temperature.

# SYSTEM DESIGN

THE COOLINE CONDENSING UNIT SYSTEM HAS BEEN DESIGNED BASED ON THE FOLLOWING:

- Intended for outdoor installation with free air intake and discharge.
- Minimum outdoor operating air temperature during cooling without low ambient operation option is 55°F (12.7°C).
- Maximum outdoor operating air temperature during cooling mode is 130°F (55°C).
- For reliable operation, unit should be level on horizontal plane.
- For interconnecting refrigerant pipe lengths greater than 25 feet (7.6 meters), check with your local COOLINE sales office.
- Use only copper wire for electric connection at unit. Aluminum and clad aluminum are not acceptable for the type of connector provided.

# SERVICING INSTRUCTIONS



## NOTES:

- 1) Required indoor unit access clearances are shown as hatched area.
- 2) Free service access should be available from the bottom of the unit for removing & servicing the blower/motor deck.
- 3) Servicing instructions:
  - a) Remove the bottom panel.
  - b) Support the blower deck while unscrewing the 4 blower deck holding bolts and bring down the blower deck.

## RECOMMENDED SPARE PARTS

ITEM	PERCENTAGE OF SPARE PARTS			
	ONE YEAR SUPPLY		TWO YEAR SUPPLY	
	100 UNITS	1000 UNITS	100 UNITS	1000 UNITS
Compressor	2%	1%	3%	2%
Capacitor	3	2	5	4
Condenser Fan Motor	2	1	3	2
Evaporator Blower Motor	1	0.5	2	1
Contactora Compressor	2	1	3	2
Contactora Fan Motors	2	1	3	2
HPS/LPS/Other controls	2	1	3	2
Filter Drier	2	1	3	2
Transformer (24V. Secondary)	1	0.5	2	1
Propeller Fan	1	0.5	2	1
Blower Wheel	0.5	0.25	1	0.5
Thermostat (Wall)	1	1	2	1
Heater-Crankcase	3	1	4	2
Filter	2	1	4	4

**NOTE:** When ordering spare parts, please quote the complete model number on the unit nameplate.

# PARTS LIST

## INDOOR UNITS

MODEL NUMBER	DQ18	DQ24	DQ30	DQ36	DQ42	DQ48	DQ60
FAN DECK ASSEMBLY	700-384-88	700-384-88	700-384-89	700-384-89	700-384-89	700-384-90	700-384-90
BLOWER MOTOR	800-547-65	800-547-65	800-547-66	800-547-66	800-547-66	800-547-67	800-547-67
FILTER	800-249-39	800-249-39	800-249-38	800-249-38	800-249-38	800-249-36	800-249-36
ORIFICE DISTRIBUTOR	800-194-10	800-194-10	800-194-14	800-194-14	800-194-14	800-194-16	800-194-16
ORIFICE PISTON	800-195-13	800-195-13	800-195-15	800-195-16	800-195-17	800-195-20	800-195-22
THERMOSTAT, COOL	800-645-95	800-645-95	800-645-95	800-645-95	800-645-95	800-645-95	800-645-95
THERMOSTAT, HEAT PUMP	800-645-97	800-645-97	800-645-97	800-645-97	800-645-97	800-645-97	800-645-97

## OUTDOOR UNITS

MODEL NUMBER	KQ018B	KQ024B	KQ030B	KQ030L	KQ036B	KQ036L	KQ042B	KQ042L
COMPRESSOR, COOL ONLY	800-675-82	800-675-84	800-675-94	800-684-14	800-684-13	800-684-09	800-684-13	800-684-09
COMPRESSOR, HEAT PUMP	800-675-83	800-675-85	800-675-95	-	-	-	-	-
FAN MOTOR	800-555-31	800-555-31	800-937-12	800-937-12	800-545-97	800-545-97	800-545-97	800-545-97
FAN MOTOR CAPACITOR	-	-	800-353-15	800-353-15	800-353-15	800-353-15	800-353-15	800-353-15
CONDENSER FAN	800-224-19	800-224-19	800-224-55	800-224-55	800-941-41	800-941-41	800-941-41	800-941-41
COMPRESSOR CONTACTOR	800-736-01	800-736-01	800-097-00	800-095-00	800-095-00	800-095-00	800-097-00	800-095-00
TRANSFORMER (24V)	800-012-30	800-012-30	800-012-30	800-012-30	800-012-30	800-012-30	800-012-30	800-012-30
LOW PRESSURE SWITCH	800-557-00	800-557-00	800-557-00	800-557-00	800-557-00	800-557-00	800-557-00	800-557-00

MODEL NUMBER	KQ048L	KQ060L
COMPRESSOR	800-672-52	800-643-01
FAN MOTOR	800-545-97	800-545-97
FAN MOTOR CAPACITOR	800-353-15	800-353-15
CONDENSER FAN	800-941-41	800-941-41
COMPRESSOR CONTACTOR	800-095-00	800-095-00
TRANSFORMER (24V)	800-012-30	800-012-30
LOW PRESSURE SWITCH	800-557-00	800-557-00



# Cooline<sup>®</sup>

AIR CONDITIONERS

from  **Zamil**

In 1989, Zamil Air Conditioners (ZAC), one of the sector business of Zamil Industrial and the Number 1 Middle East manufacturer of air conditioning systems, introduced its international brand – Cooline, to the growing world market. Today, Cooline supplies air conditioners to more than 55 countries worldwide with major markets in GCC, Middle East, North Africa, Europe and Asia. In addition to the Head Office in Saudi Arabia, five regional offices handles Cooline's overall operations including more than 25 international distributors.

All ZAC Products are available under the Cooline brand. Cooline Products include an array of central air conditioners for residential, commercial and industrial use, including concealed units up to 5 tons, ducted splits up to 30 tons, packaged units up to 80 tons, single and double skin air handling units up to 70,630 CFM and water chillers up to 550 tons cooling capacity. New products include High Efficiency Ratio (EER) units which comply with the more demanding international codes and heat pump units with increased overall Coefficient of Performance (COP).

Cooline is the first brand from the Middle East to receive Eurovent for its air movement systems - a capacity/performance certification that has been made mandatory in Europe and is fast becoming a requirement in all regions. With the addition of the state-of-the-art testing facility, Ikhtebar, a 3rd party air conditioners testing facility built by Intertek Testing Services (ITS) and certified by Electrical Testing Labs (ETL) and accredited by the Saudi Accreditation Committee (SASO) for compliances with the international testing standards, Cooline is the only brand in the Middle East capable of guaranteeing product performance in compliance with local and international standards. It's no surprise that in 2003, Cooline received the Best GCC Brand of the Decade Award.

For more information, please visit our website [www.cooline.com](http://www.cooline.com)



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