

# D SERIES MODULAR AIR-COOLED SCROLL CHILLER

(GC201307-I)

TECHNICAL SALES GUIDE-80Hz  
CAPACITY RANGE:65~160kW  
SUPER HIGH AMBIENT OPERATION TO 45 °C



R410A



GREE ELECTRIC APPLIANCES INC.OF ZHUHAI

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## 1 MODELS LIST

Nominal Capacity	Model		Power Supply
TR	Refrigerant	Model Name	Ph, V, Hz
17.06	R410A	LSQWRF65M/NaD-M	3,380-415,60
20.19		LSQWRF80M/NaD-M	3,380-415,60
34.12		LSQWRF130M/NaD-M	3,380-415,60
41.23		LSQWRF160M/NaD-M	3,380-415,60

## 2 NOMENCLATURE

LS QW R F 130 M / NaD-M		
Model	Model Description	Options
LS	Water Chiller	-
QW	Scroll Compressor	-
R	Heat Pump	Default- Cooling only R-Heat pump
F	Air Cooled	-
130	Nominal Cooling Capacity	65:60kW=17.06TR 80:71kW=20.19TR 130:120kW=34.12TR 160:145kW=41.23TR
M	Module	-
Na	Refrigerant	Default-R22 Na-R410A
D	Development series number	-
M	Voltage	M:380-415V,3Ph,60Hz

## 3 FEATURES



### 3.1 Brief Introduction

D series modular air-cooled scroll chillers are well-developed products incorporated with multiple advanced technologies. It mainly features the low noise level, compact structure, easy and safe operation, and convenient maintenance and service etc., widely used at newly built or retrofitted industrial and civil buildings in various sizes, such as, hotels, apartments, restaurants, office buildings, shopping malls, theaters, gyms, workshops, hospitals and other places where there are high requirements on noise level and air but the cooling tower is going to be installed troublesomely.

D series modular air-cooled scroll chillers are constructed of one or up to 16 single units which may varies in structure and in capacity of either 65NaD, 80NaD(two independent refrigeration cycle) or 130NaD,160NaD (four independent refrigeration cycle) so as to build up a array of products with the cooling capacity ranging from 60 to 1160kW.



## 3.2 Major Features

### ◆ High energy efficiency

It is initially certified as one of the energy-saving chiller products in China.

### ◆ Free master unit design

Any single unit can operate as the master once connected with the wired controller. It overcomes the problem which would occur to the product of other manufacturer that the whole system would fail to work properly when the fixed master unit malfunctions.

### ◆ Excellent compatibility

Each chiller is constructed of up to 16 single units of 65NaD, 80NaD or up to 8 single units of 130NaD,160NaD.

### ◆ Hermetic scroll compressor

Compared with other type of compressor under the same cooling load, it has few movable components, smaller rotating torque, lower noise and vibration and higher reliability and efficiency.

### ◆ Super protection

It is equipped with the top-end microcomputer control system which is capable of providing well-rounded protection and self-diagnosis.

### ◆ High reliability

It is constructed of well-designed refrigeration parts for multiple refrigeration cycles, adequately guaranteeing the reliable operation.

### ◆ Compact structure

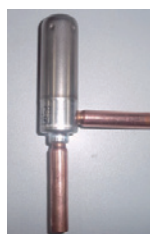
The modular design enables the compact structure, reduced volume, light weight, easy handling and shipping and flexible installation.

### ◆ Low noise

The unit runs with low noise and vibration, widely applicable for various projects.

### ◆ Quiet mode

The unit is allowed to run in the quiet mode based on the user's requirement, which can not only save energy but also create a comfortable and pleasant living environment.



## ◆ Economy mode

The unit can run in the economy mode without lessening the air conditioning effect so as to cut down the electricity consumption.

## ◆ Equilibrium running

It indicates each compressor will run alternately so as to extend their service life.

## ◆ Humanized alert

When the unit runs out of the allowable temperature range, an alert will rise on the display.

## ◆ Powerful remote monitoring

Gree centralized air conditioning system can be perfectly integrated to the BMS or Gree remote monitoring system through the BACnet interface and realize communication through the RS485.



## 3.3 Standard Control & Safety Devices

The chiller's Unit Control Module is an innovative, modular microprocessor control design. It coordinates the actions of the chiller in an efficient manner and provides stand-alone operation of the unit. A Human Interface Panel is a standard component of the Chiller. Access to all unit controls is via the Human Interface Panel.

Compressor In-built protection device: Motor winding temperature, discharge gas temperature and phase reversal for direction of rotation.

Crankcase heaters: Protects the unit against refrigerant migration, oil dilution and potential compressor failure.

High pressure switch: Provides protection in case of excessive discharge pressure.

Low pressure switch: Provides protection in case of unsafe low suction pressure.

## 4 PRODUCT DATA



### 4.1 Ratings

Model Name	kW/TR	EER
LSQWRF65M/NaD-M	60 / 17.06	2.84
LSQWRF80M/NaD-M	71/20.19	2.76
LSQWRF130M/NaD-M	120 /34.12	2.84
LSQWRF160M/NaD-M	145/41.23	2.74

EER=Energy Efficiency Ratio at full load-the cooling capacity in Btu's per hour(Btu/h) divided by the power input in watts, expressed in Btu/h per watts((Btu/h)/watt).



### 4.2 Unit Application Data

Voltage Variation Min./Max.	342/456(60Hz)
Ambient Air on Condenser coil Min./Max. (°C / °F )	-15/45 ( 5/113)



### 4.3 Specification

Models		Heat Pump	LSQWRF__M/D-M			
			65	80	130	160
Capacity steps		%	0-50-100	0-50-100	0-25-50-75-100	0-25-50-75-100
Capacity	Cooling	kW	60	71	120	145
		Ton	17.06	20.19	34.12	41.23
	Heating	kW	65	79.5	130	170
		Ton	18.48	22.61	36.97	48.34
Power Input	Cooling	kW	21.1	25.7	42.3	53.0
	Heating	kW	21.0	27.0	44.4	56.0
EER		W/W	2.84	2.76	2.84	2.74
COP		W/W	3.09	2.94	2.93	3.04
Power Supply		—	380-415V ,3Ph,60Hz			
Running Control		—	Microcomputer Auto Control; Running Status Display; Abnormal Status Alarm			
Safeties		—	High-low pressure protection, discharge temp. protection, motor overload protection, anti-freeze, water flow protection , phase-sequence protection, compressor overload protection			
Compressor	Type	—	Constant Speed Scroll			
	Starting mode	—	Direct starting			
	Quantity	—	2	2	4	4

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Refrigerant Type		—	R410A			
Water side heat exchanger	Type	—	Dry Expansion Evaporator			
	Water flow volume	m <sup>3</sup> /h	10.3	12.2	20.6	24.9
		GPM	45.0	54.0	91.0	110.0
	Pressure Drop	kPa	15	20	30	35
		ft.WG	4.92	6.56	9.84	11.48
	Max. working Pressure	MPa	1			
	water in/outlet pipe flange specification	mm	DN65	DN65	DN80	DN80
Air side heat exchanger	Type	—	Aluminum Fin-copper Tube			
	Fan type/ Number of fans	—	Axial Fan/2	Axial Fan/2	Axial Fan/4	Axial Fan/4
	Total fan air flow	m <sup>3</sup> /h	2.7×10 <sup>4</sup>	3.0×10 <sup>4</sup>	5.4×10 <sup>4</sup>	6.0×10 <sup>4</sup>
		L/s	0.75×10 <sup>4</sup>	0.83×10 <sup>4</sup>	1.5×10 <sup>4</sup>	1.67×10 <sup>4</sup>
		CFM	1.59×10 <sup>4</sup>	1.764×10 <sup>4</sup>	3.18×10 <sup>4</sup>	3.528×10 <sup>4</sup>
	Total fan motor power	kW	0.65×2	0.95×2	0.65×4	0.95×2
Sound pressure level		dB(A)	70	71	72	74
Outline Dimension	Width	mm	2040	2040	2226	2226
	Depth	mm	1000	1000	1650	1650
	Height	mm	2230	2230	2230	2230
Net Weights		kg	710	760	1256	1440
Operating weight (Heat Pump)		kg	781	836	1382	1584
uxiliary electric heater-power (Ref.)		kW	15	15	30	30
Loading quantity	40'GP/40'HQ	—	10/10	10/10	6/6	6/6

## 5 PERFORMANCE CORRECTION

Performance Correction Value					
Leaving Chilled Water (°C / °F )	Ambient Temperature ( °C / °F )				
	25(77)	30(86)	35(95)	40(104)	45(113)
5(41.0)	1.07	1.00	0.94	0.84	0.81
6(42.8)	1.10	1.03	0.97	0.87	0.83
7(44.6)	1.14	1.07	1.00	0.91	0.86
8(46.4)	1.17	1.10	1.03	0.94	0.88
9(48.2)	1.20	1.13	1.06	0.98	0.91
10(50.0)	1.23	1.16	1.09	1.01	0.93
11(51.8)	1.27	1.19	1.12	1.04	0.96
12(53.6)	1.31	1.23	1.15	1.07	0.99
13(55.4)	1.34	1.26	1.17	1.09	1.01
14(57.2)	1.37	1.29	1.20	1.12	1.03
15(59.0)	1.41	1.32	1.23	1.14	1.06

Performance Correction Value						
Hot Water Outlet (°C / °F )	Ambient Temperature ( °C / °F )					
	-10(14)	-5(23)	0(32)	5(41)	10(50)	15(59)
30(86)	0.70	0.77	0.86	0.96	1.07	1.21
35(95)	0.68	0.76	0.85	0.96	1.07	1.19
40(104)	0.67	0.75	0.85	0.95	1.06	1.18
45(113)	0.66	0.74	0.84	0.95	1.05	1.18
50(122)	0.64	0.74	0.84	0.94	1.05	1.17

Water side			Air side
Item	Outlet water temp. (°C )	Difference of the in/outlet water temp. (°C )	Ambient temp. Db (°C )
Cooling	5 ~ 15	2.5 ~ 6	15 ~ 45
Heating	40 ~ 50	2.5 ~ 6	-15 ~ 24

## 6 FREEZE PROTECTION

When the flow passage of the shell-and-tube heat exchanger is frozen up, it would cause serious damage to the heat exchanger, such as cracking and leakage which are out of warranty, therefore, the user should take measures stated below for freeze protection.

1. Under subzero conditions, it is necessary to shut down the chiller installed outdoor and then drain the evaporator completely.
2. Failure of the chilled water flow switch and the anti-freezing temperature sensor will cause the tube frozen up, so the flow switch shall be interlocked with the chiller.
3. When charging or recovering the refrigerant, the evaporator would crack because of frostbite provided the refrigerant pressure inside the evaporator is under 0.71MPa. Therefore, be sure to keep the water flow continually inside the evaporator or drain it completely.

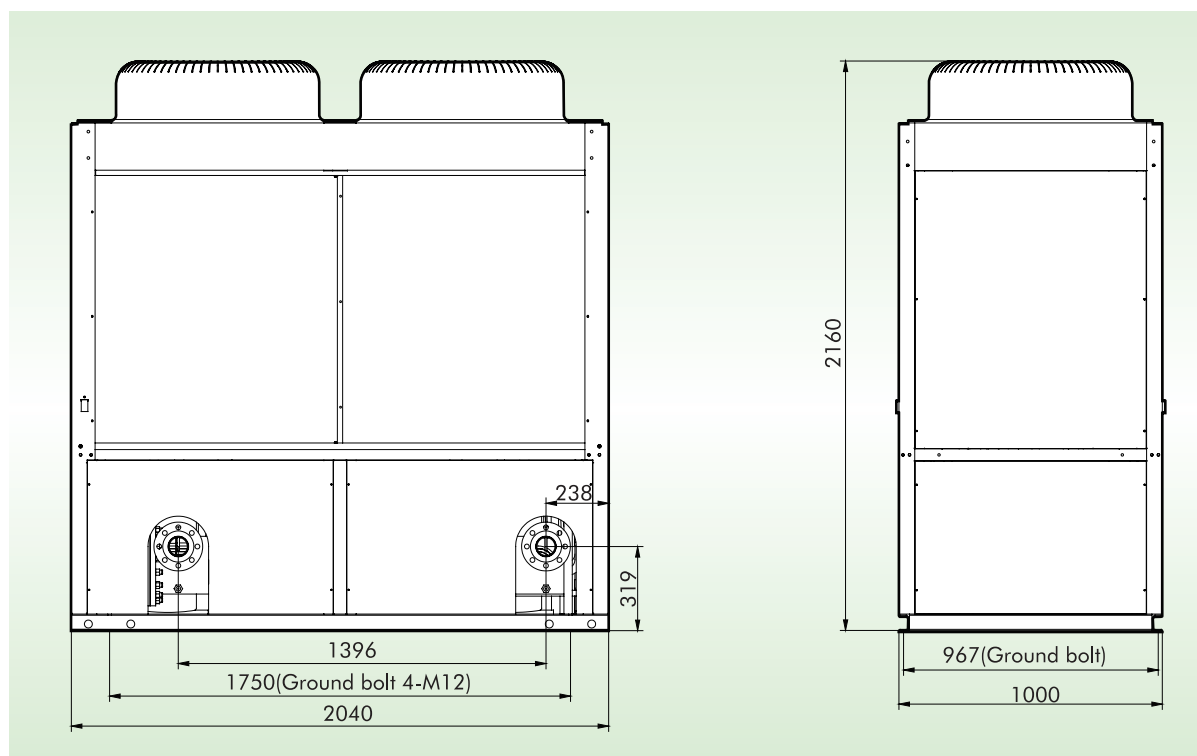
## 7 INSTALLATION



### 7.1 Dimensions

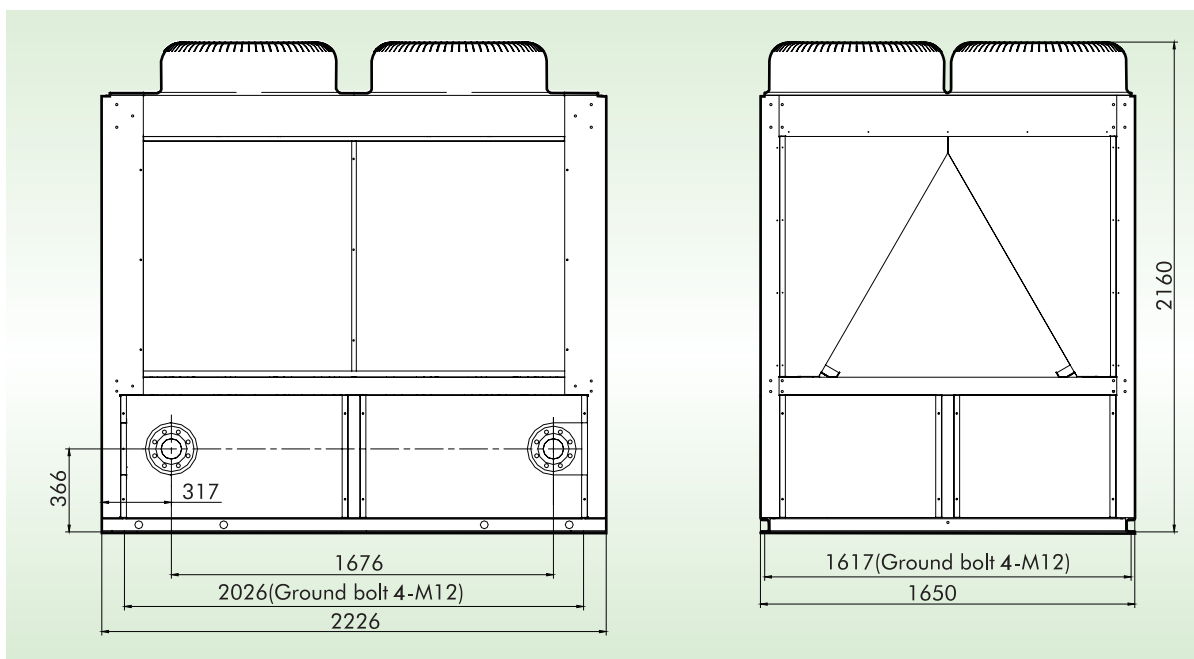
◆ Graph for the shape and dimensions for LSQWRF65M/NaD-M, LSQWRF80M/NaD-M

Unit:mm



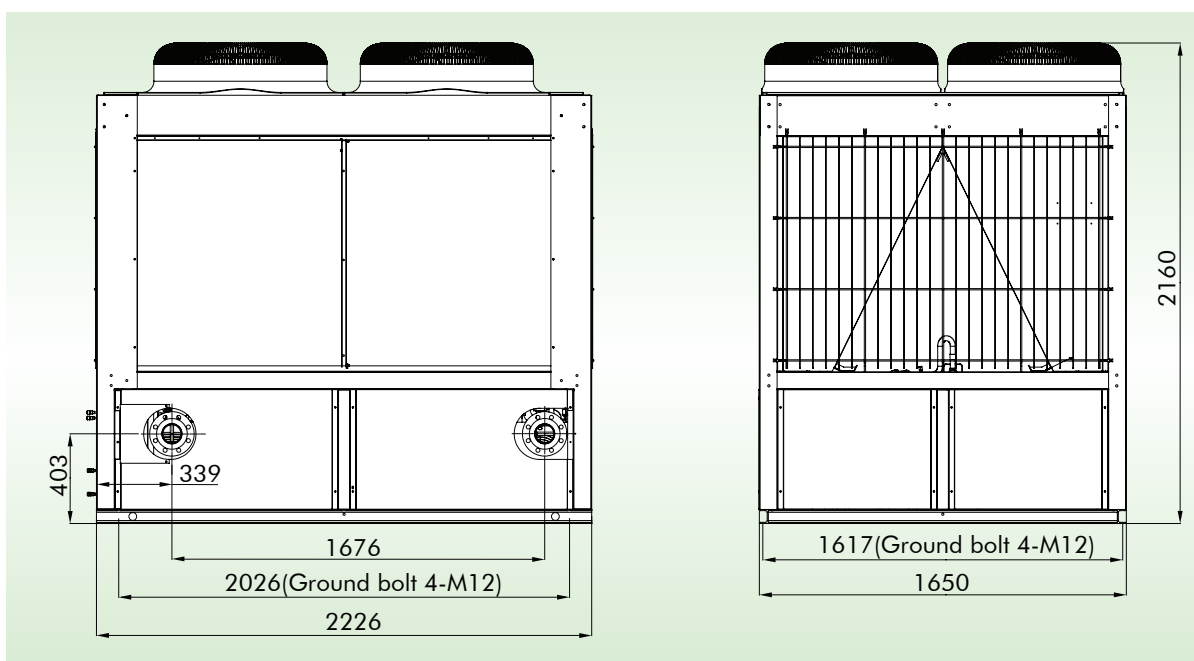
◆ Graph for the shape and dimensions for LSQWRF130M/NaD-M

Unit:mm



◆ Graph for the shape and dimensions for LSQWRF160M/NaD-M

Unit:mm



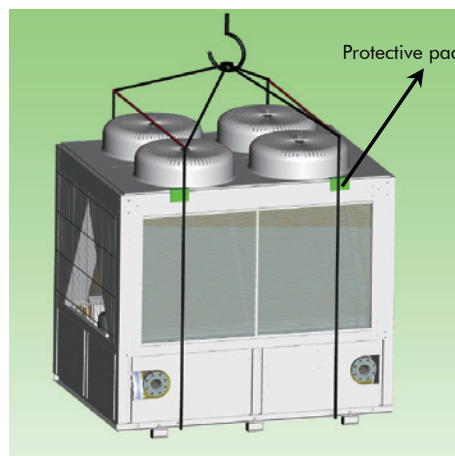
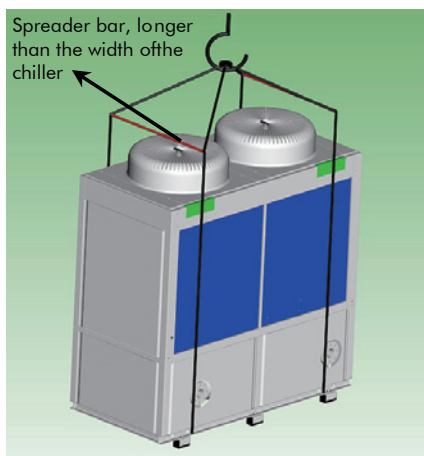
## 7.2 Rigging Instruction

Each unit will undergo a series of strict factory inspections and tests to guarantee the expected performance and quality. However, special attention should be paid during handling and shipping to prevent the control system and the piping system from being damaged.

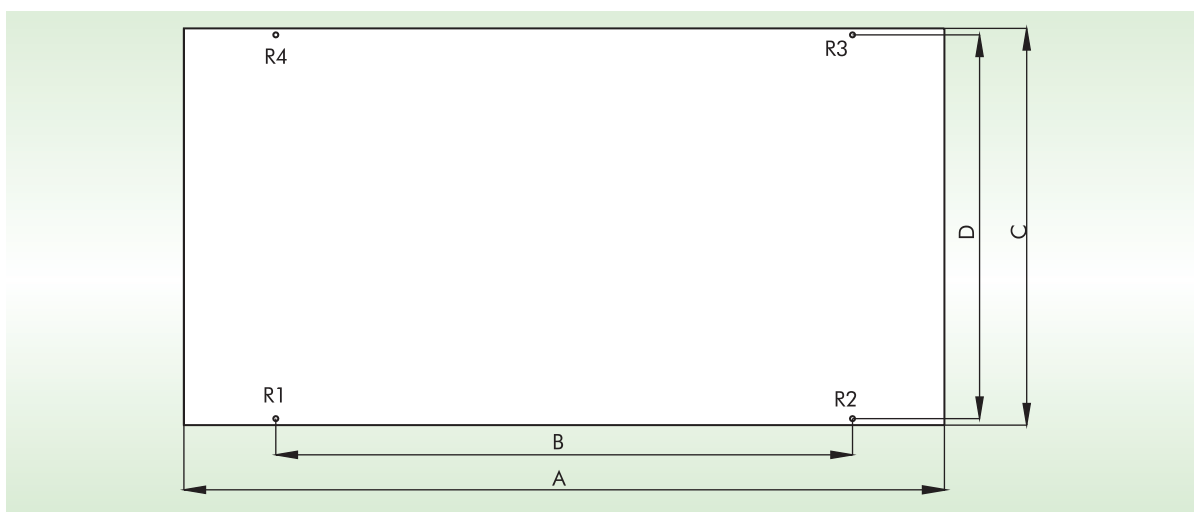
It is best to unpack the chiller at the installation location and keep the chiller upward. When the chiller is unpacked during handing, please follow the lifting instructions stated below.

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- Move the chiller by placing three levers 1/5 wider than the width of the chiller under the base and meanwhile always keep the chiller in balance.
- See the figure below for more details



## 7.3 Mounting Location



Unit:mm

Model	A	B	C	D
LSQWRF160M/NaD-M	2226	1900	1650	1580
LSQWRF130M/NaD-M	2226	1900	1650	1580
LSQWRF80M/NaD-M	2040	1510	1000	930
LSQWRF65M/NaD-M	2040	1590	1000	930



## 7.4 Load Distribution

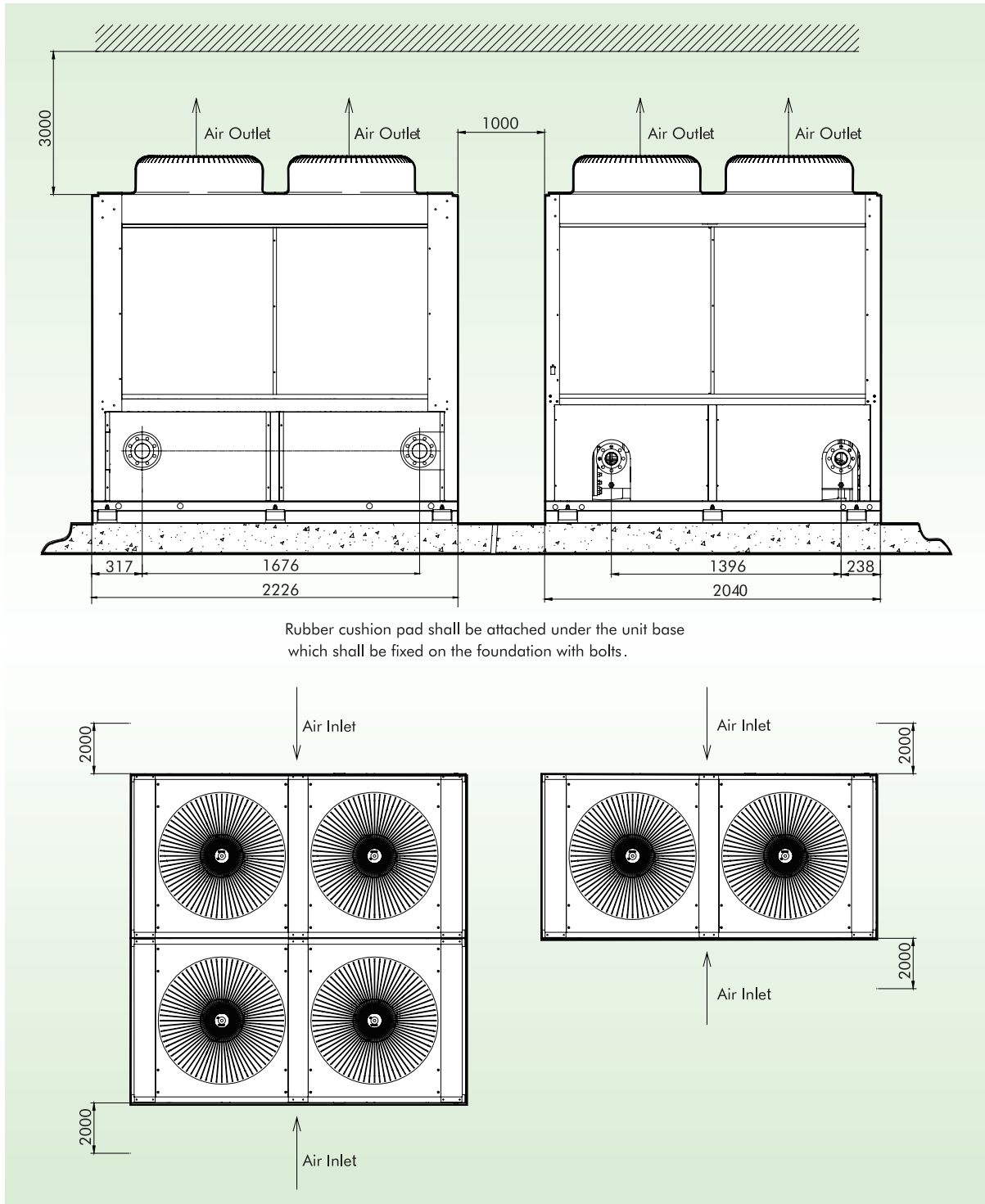
LOAD DISTRIBUTION (kg)				
Model	R1	R2	R3	R4
LSQWRF160M/NaD-M	345	345	375	375
LSQWRF130M/NaD-M	300	300	320	320
LSQWRF80M/NaD-M	187.5	187.5	192.5	192.5
LSQWRF65M/NaD-M	170	170	175	175



## 7.5 Installation Interspace

A minimum spacing of 1m should be left between any two modules for unobstructed air intake and equipment service. Additionally, a minimum of 2m should be kept between the chiller and any barrier. If allowable, it would be better to set up a suncover 3m ahead of the chiller.

Unit:mm



## 8 ELECTRICAL DATA

Model	Power Supply	Min. sectional area of the power cable (mm <sup>2</sup> )			Capability of the Air Switch(A)
		Live Line	Neutral Line	Earth Line	
LSQWRF65M/NaD-M	380-415V,3Ph,60Hz	16	4	16	63
LSQWRF80M/NaD-M		25	4	16	80
LSQWRF130M/NaD-M		50	4	25	125
LSQWRF160M/NaD-M		70	4	35	160

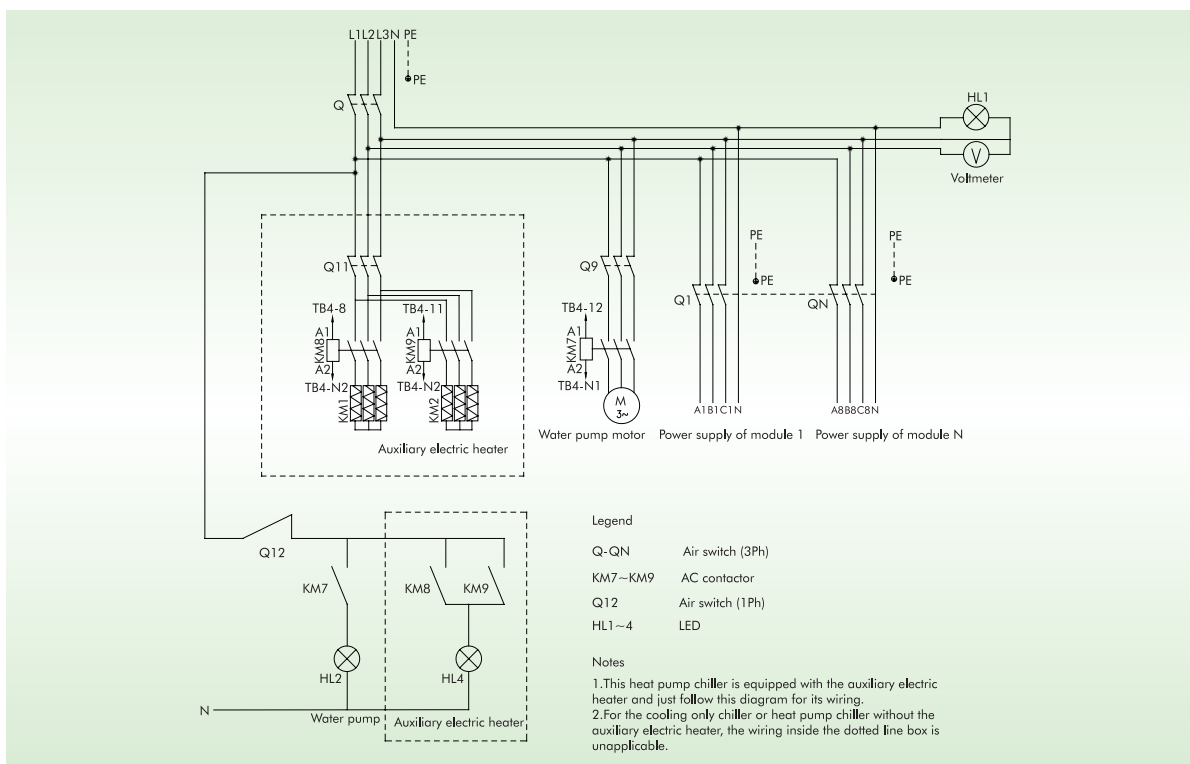
Notes:

1. The specifications of the minimal size of the neural line should be 4mm<sup>2</sup>, that is, the selected size of the neutral line should be equal to or larger than 4mm<sup>2</sup>.
2. The specifications of the breaker and power cable listed in the table above are determined based on the maximum power (maximum amps) of the unit.
3. The specifications of the power cable listed in the table above are applied to the conduit-guarded multi-wire copper cable (like, JYV copper cable, consisting of PV insulated wires and a PVC cable jacket) used at 40 °C and resistible to 90 °C (see IEC60364-5-523:1999). If the working condition changes, they should be modified according to the related national standard.
4. The specifications of the breaker listed in the table above are applied to the breaker with the working temperature at 40°C . If the working condition changes, they should be modified according to the related national standard.

## 9 FIELD WIRING DIAGRAM



### 9.1 Field Wiring Diagram





The output control lines of the auxiliary electric heater 1, auxiliary electric heater 2 and the water pump AC contactor are allowed to the terminal boards 11/12/13/14/15/16 of any module.

### 9.3. Wiring between Chiller Modules



1. Connect CN33 and CN25 between each module by the four-wire communication line as shown in the diagram above.
2. Connect the power line to L1, L2, and L3 on the terminal block of each module through a four-wire rubber sleeve cable.
3. There are two remote monitoring modes

- 1) Install the remote monitoring software on the PC;
- 2) Provide the user the Modbus protocol for further development.

**Note:** The remote monitoring devices are enclosed inside the dotted line box. When the communication module exceeds 30 m or the communication line exceeds 800 m, it is required to install a relay. The relay, communication line and communication module are optional parts, and the PC should be prepared by the user.

4. 160: LSQWRF160W/NaD-M, consisting of two modules;  
130: LSQWRF130W/NaD-M, consisting of two modules;  
80: LSQWRF80W/NaD-M, consisting of one module.  
65: LSQWRF65W/NaD-M, consisting of one module.

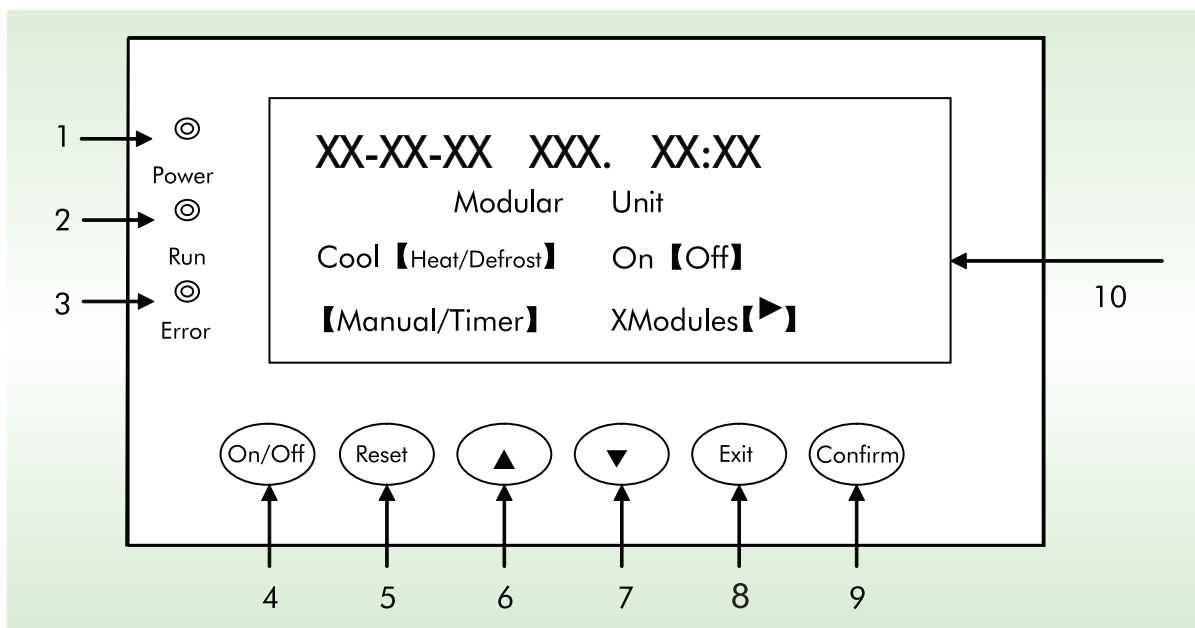
5. When accessed to the electric network, the power cable shall be equipped with an at least 3mm all-pole disconnecting switch.

## 10 MICROPROCESSOR CONTROLLER

1. Automatic control of compressor start/stop, condenser fans, evaporator pump, evaporator heater, unit alarm contacts, and chiller operation from 5 °F to 110 °F (-15°C to 43°C ) ambient. Automatic reset to normal chiller operation after power failure.
2. Software stored in non-volatile memory.
3. Liquid Crystal Display, descriptions in English, numeric data in Metric unit. Sealed keypad with sections for On/Off Switch, Reset, Up, Down, Exit and Entry.
4. Programmable set-points (within Manufacturer limits): chilled liquid temperature set-point and range, evaporate heater on/off temperature set-point and range, daily schedule/holiday for start/stop.
5. Display Data: Return and leaving liquid temperatures, outdoor air temperature, discharge temperature, suction temperature, compressor run status, fan run status, day, date and time, compressor starts/operating hours.
6. System Safeties: Shall cause individual compressor systems to perform auto shut down. Manual reset required after the third trip of low pressure switch in 60 minutes. Manual reset required after every trip, including: high discharge temperature, high pressure switch. Compressor motor protector shall protect against damage due to high input current or thermal overload of windings.
7. Unit Safeties: Shall be automatic reset and cause compressors to shut down under low leaving chilled liquid temperature, and flow switch operation. Contractor shall provide flow switch and wiring per chiller manufacturer requirements.
8. Alarm Contacts: low leaving chilled liquid temperature, high discharge temperature, high pressure, low pressure.

# 11 WIRED CONTROLLER

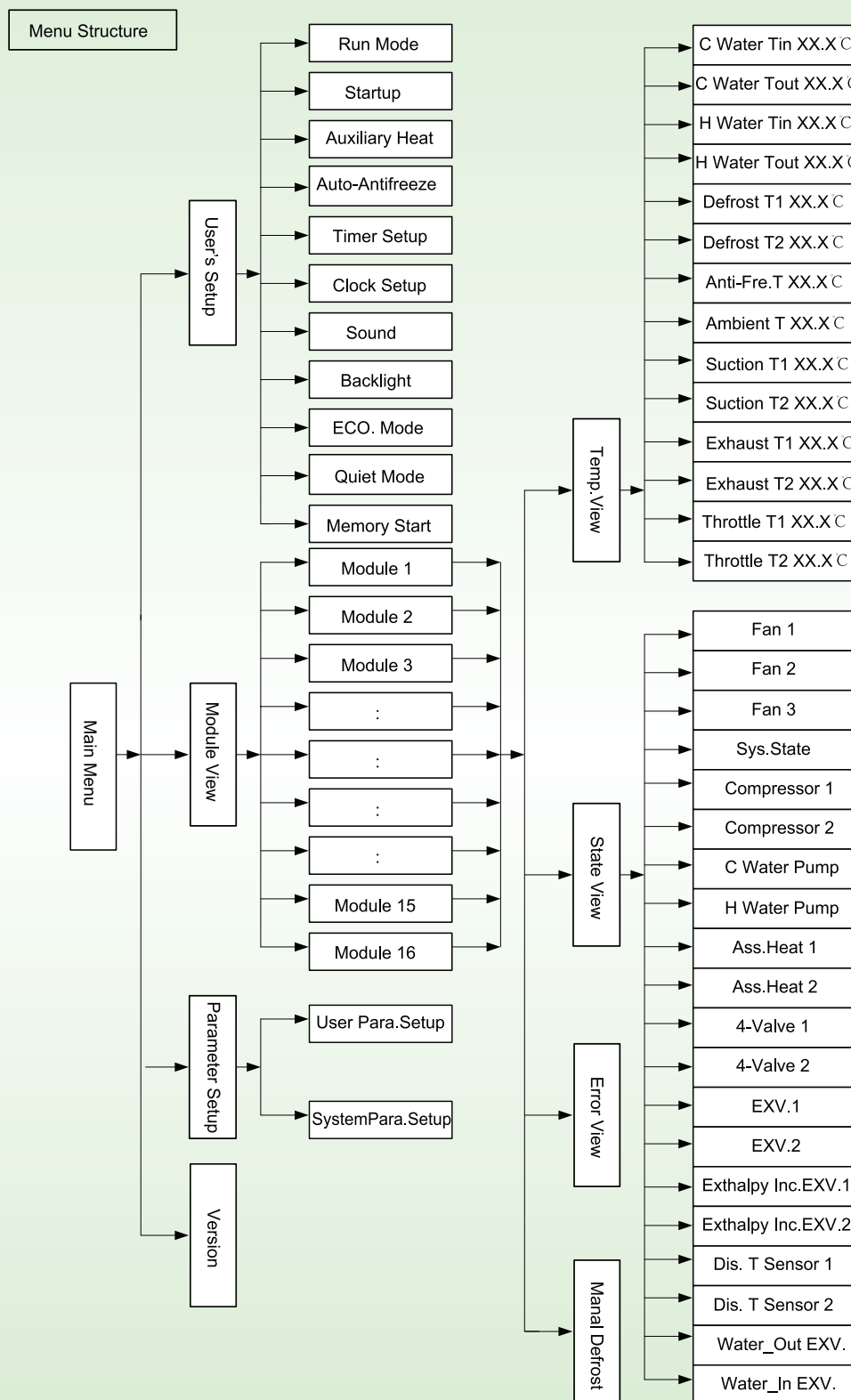
## ➔ 11.1 Operation View



1. **Power indicator(red)**: the indicator is on when the Wired Controller is powered on, or otherwise it is off.
2. **Run indicator(green)**: the indicator is on when the Wired Controller is started, or otherwise it is off.
3. **Error indicator(red)**: The indicator is on when the unit is at fault, or otherwise it is off.
4. **On/Off button**: For controlling unit conversion between start and stop, press the button (for 3 seconds) in stop state to start the unit and press the button (for 3 seconds) in operation state to stop the unit.
5. **Reset button**: Press the button to clear fault and relieve the air discharge temperature sensor locking.
6. **Up selection button**: in menu selection, press the button to move the cursor upward or leftward; and in data modification mode, press the button to increase the value.
7. **Down selection button**: In menu selection, press the button to move the cursor downward or rightward; and in data modification mode, press the button to decrease the value.
8. **Exit button**: Press the button to go back to the previous menu.
9. **Confirm button**: In menu selection, press the button to confirm the selected item; and in data modification mode, press the button to confirm the parameter and move the cursor.
10. **LCD**: Information display zone.



## 11.2 Menu Structure of Controller



## 12 ACCESSORIES

S=Standard O= Prepared by users P=Optional

Scope of supply	Heat pump type
Single chiller module	S
Four-wire control line (8m)	S
Chiller accessories CF58	S
Electric control cabinet	O
Auxiliary electric heater	O
Power line	O
Control line	O
Flexible connector	O
Thermometer	O
Pressure gage	O
Water tank	O

## 13 APPLICATION DATA

### ◆ Unit Location

The chillers are designed for outdoor installation. When selecting a site for installation, be guided by the following conditions:

1. For outdoor locations of the unit, select a place having an adequate supply of fresh air for the condenser.
2. Avoid locations beneath windows or between structures where normal operating sounds may be objectionable.
3. Installation sites may be either on a roof, or on the ground.
4. The condenser fans are the propeller-type, and are not recommended for use with duct work in the condenser air stream.
5. When it is desirable to surround the unit(s), it is recommended that the screening be able to pass the required chiller CFM without exceeding 0.1" of water external static pressure.
6. Recommended clearances for units are given in DIMENSIONS. When the available space is less, the unit(s) must be equipped with the discharge pressure transducer option to permit high pressure unloading in the event that air recirculation were to occur.

### ◆ Foundation

The unit should be mounted on a flat and level foundation, ground or roof, capable of supporting the entire operating weight of the unit.. Operating weights are given in the Dimensions.

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For ground level installations, precautions should be taken to protect the unit from being tampered by or injuring to unauthorized persons. Screws on access panels will prevent casual tampering; however, further safety precautions, such as unit enclosure options, a fenced in enclosure, or locking devices on the panels may be advisable. Check local authorities for safety regulations.

## ◆ Chilled Liquid Piping

The chilled liquid piping system should be laid out so that the circulating pump discharges into the cooler. The inlet and outlet cooler liquid connections are given in Dimensions.

## ◆ Delivery and Handling

A. Unit shall be delivered to job site fully assembled, and charged with refrigerant and oil by the Manufacturer.

B. Unit shall be stored and handled according to the Manufacturer's instructions.

## ◆ Leveling Unit

Unit must be leveled when installed to ensure proper oil return to the compressors.

## ◆ Fluid Temperature

Maximum leaving chilled fluid temperature for unit is 59 °F (15°C). For continuous operation, it is recommended that inlet fluid temperature does not exceed 86 °F (30°C) ( If continuous operation is required for inlet water temperature above 86 °F (30°C ), please refer to GREE factory).

Minimum leaving chilled fluid temperature for standard unit is 38 °F (3.3°C) (For lower leaving temperature contact GREE factory).

## ◆ Cooler Flow Range

The cooler can operate with a leaving chilled fluid temperature from of 42 °F to 59 °F (5°C ~15°C ).

## ◆ Maximum Cooler Flow

It Will be based on Minimum permissible AT across the cooler 5.4 °F (-15°C ).

## ◆ Cooler protection

A protection against low ambient freeze-up is required for ambient temperatures below 32 °F (0°C ). Protection should be in the form of: Inhibited ethylene glycol or any other suitable glycol.

## ◆ Condenser Airflow

Any restrictions on units fan airflow will affect unit capacity, condenser head pressure, and compressor power input. Such restrictions (i.e. not providing vertical clearance or lateral clearance, insufficient unit-to-unit clearance) will cause warm air recirculation or coil starvation. Minimum required operational and maintenance clearances around the unit are shown in the figure below.

Gree Electric Appliances, Inc. of Zhuhai, founded in 1991, is the world's largest air conditioner enterprise integrating R&D, manufacturing, marketing and services. Technology Innovation and quality are always our priority. With efforts of thousands of Gree's engineers, we own more than 3500 patents for our products. Nowadays, we have 7 production bases in Zhuhai, Chongqing, Hefei and Zhengzhou(China), as well as Brazil, Pakistan and Vietnam, with annual production capacity of 30 million sets of residential air conditioners and 4 million sets of commercial air conditioners.

With the installation of Gree commercial air conditioners in important projects at home and abroad like Media Village for 2008 Beijing Olympic Games, Stadiums for 2010 World Cup in South Africa, as well as India Telecom base station, Gree commercial air conditioners are ready to develop steadily to every corner in the world, to present a more comfortable and harmonious working environment and family atmosphere.



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