



# ***Service Manual***

## **MARINE AIR CONDITIONNERS SERVICE MANUAL**

Capacity: 1.35kW~5.85kW

Rated Frequency: 50/60Hz

Operation Range : -10°C~43°C

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# PRODUCT

# PRODUCT

## 1 MODELS LIST

Model	Product Code	Capacity		Refrigerant	Power Supply	Appearance	
		Cooling (Btu/h)	Heating (Btu/h)				
CYR5/NaC-A	EY10000561	4600	5300	R410A	115V~ 1Ph 60Hz		
CYR9/NaC-A	EY10000581	7100	8800		220-240V~1Ph 50Hz		
CYR5/NaC-T	EY10000571	3700	4800		230V~1Ph 60Hz		
		4400	5100		220-240V~1Ph 50Hz		
CYR9/NaC-T	EY10000591	7100	7500		230V~1Ph 60Hz		
		8000	8400		220-240V~1Ph 50Hz		
CYR20/NaC-T	EY10000601	17400	17700		230V~1Ph 60Hz		
		19800	19900		220-240V~1Ph 50Hz		

## 2 NOMENCLATURE

C	Y	—	R	20	/	Na	C	—	T
1	2	3	4	5	6	7			

NO.	Description	Options
1	Unit Series Type	CY: marine air conditioner;
2	The Type of the Unit	Cold/Hot Air Default; Cold/Hot Water S.
3	Function Characteristics	Heat Pump R; Heat Pump with Auxiliary Electric Heater Rd; Cooling-only Default.
4	Nominal Cooling Capacity	5=5000 Btu/h; 9=9000 Btu/h; 20=20000 Btu/h.
5	The Type Of Refrigerant	R22 Default; Na: R410A.
6	Design serial No.	Generation 1 Default; B: Generation 2.
7	Power Supply	A: 1Ph, 115V~, 60Hz ; T: 230V~ 60Hz, 220-240V~50Hz.

### 3 FUNCTION

Function	Description
Applied Sites	It is applied for all kinds of ships.
Compact design	It can be installed in incapacious place, like the space under the closet and seats of the ship, which affects the outlook of the ship and is coordinate with the ambience.
Rust prevention and rot-proof	Corrosion-resistant material and the special technics- spray coating on the complete unit are adopted, which enable the unit to be durable.
Unique Structure Design	The angle of supplying air of indoor fan can be 0°.90°.180°.270°, which is convenient for connecting duct.
Two Exhaust Outlets	The condensate can be drained in time no matter how ship shakes.

### 4 PRODUCT DATA

#### 4.1 Product Data at Rated Condition

Model			CYR5/NaC-A	CYR9/NaC -A	CYR5/NaC-T	
Product Code			EY10000561	EY10000581	EY10000571	
Cooling	Nominal Capacity	W	1350	2100	1100	1300
	Running Current	A	5.00	9.00	3.50	2.70
	Power Input	W	580	970	560	580
Heating	Nominal Capacity	W	1550	2600	1400	1500
	Running Current	A	4.80	7.80	3.40	2.50
	Power Input	W	540	840	530	550
Power Supply		—	115V~ 60Hz		220-240V-50Hz-1Ph	230V-60Hz-1Ph
Compressor Type		—	Rotary			
Refrigerant Control		—	Capillary			
Refrigerant	Type	—	R410A			
	Charge	kg	0.35	0.45	0.32	0.32
Condenser	Type	—	Coaxial heat exchanger			
	Pipe Diameter	mm	19			
Evaporator Type		—	Hydrophilic-louver			
Filter		—	PP			
Fan	Type	—	Centrifugal fan			
	Drive Type	—	Direct			
	Quantity	—	1			
	Diameter-Height	Inch	Φ6.59×3.07	Φ6.59×3.07	Φ6.59×3.07	Φ6.59×3.07
Sound Pressure Level		dB(A)	58			

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Unit Dimensions	width	mm	285	380	285	285
	depth	mm	408	408	408	408
	high	mm	295	310	295	295
Net weight		kg	25.5	28.5	25.5	25.5

Model			CYR9/NaC -T		CYR20/NaC -T	
Product Code			EY10000591		EY10000601	
Cooling	Nominal Capacity	W	2100	2350	5100	5800
	Running Current	A	4.90	4.00	7.50	8.00
	Power Input	W	900	920	1500	1750
Heating	Nominal Capacity	W	2200	2450	5200	5850
	Running Current	A	4.80	3.90	8.00	8.50
	Power Input	W	880	860	1550	1800
Power Supply		—	220-240V-50Hz-1Ph	230V-60Hz-1Ph	220-240V-50Hz-1Ph	230V-60Hz-1Ph
Compressor Type		—	Rotary compressor			
Refrigerant Control		—	Capillary tube			
Refrigerant	Type	—	R410A			
	Charge	kg	0.34		0.66	
Condenser	Type	—	Coaxial heat exchanger			
	Pipe Diameter	mm	19		34	
Evaporator Type(Material)		—	Hydrophilic-louver			
Filter		—	PP			
Fan	Type	—	Centrifugal fan			
	Drive Type	—	Direct			
	Quantity	—	1		2	
	Diameter-Height	Inch	Φ6.59×3.07		Φ7.48×3.00	
Sound Pressure Level		dB(A)	58		60	
Unit Dimensions	width	mm	380		595*	
	depth	mm	408		520	
	high	mm	310		385	
Net weight		kg	28		57.5	

Note: \* means the max size of A will be 620 mm if include the fan.

Note: Fluctuation of the current and voltage can't be beyond ±10%

- 1) Test Condition of Nominal Cooling Capacity: Indoor side-dry/wet bulb temp: 27/19.5°C; Water-in temp: 32°C; Water-out temp: 36°C and static pressure is 20Pa;
- 2) Test Condition of Nominal Heating Capacity: Indoor side-dry/wet bulb temp: 22/-°C; Water-in temp: 15°C; Flow is as the test of nominal cooling capacity and static pressure is 20Pa;
- 3) Noise Measurement shall comply with QJ/JD.20.00.52..
- 4) Input power excludes that of user's water pump.
- 5) Specification will change with the revision of the product. Parameter on nameplate of the unit is the standard.

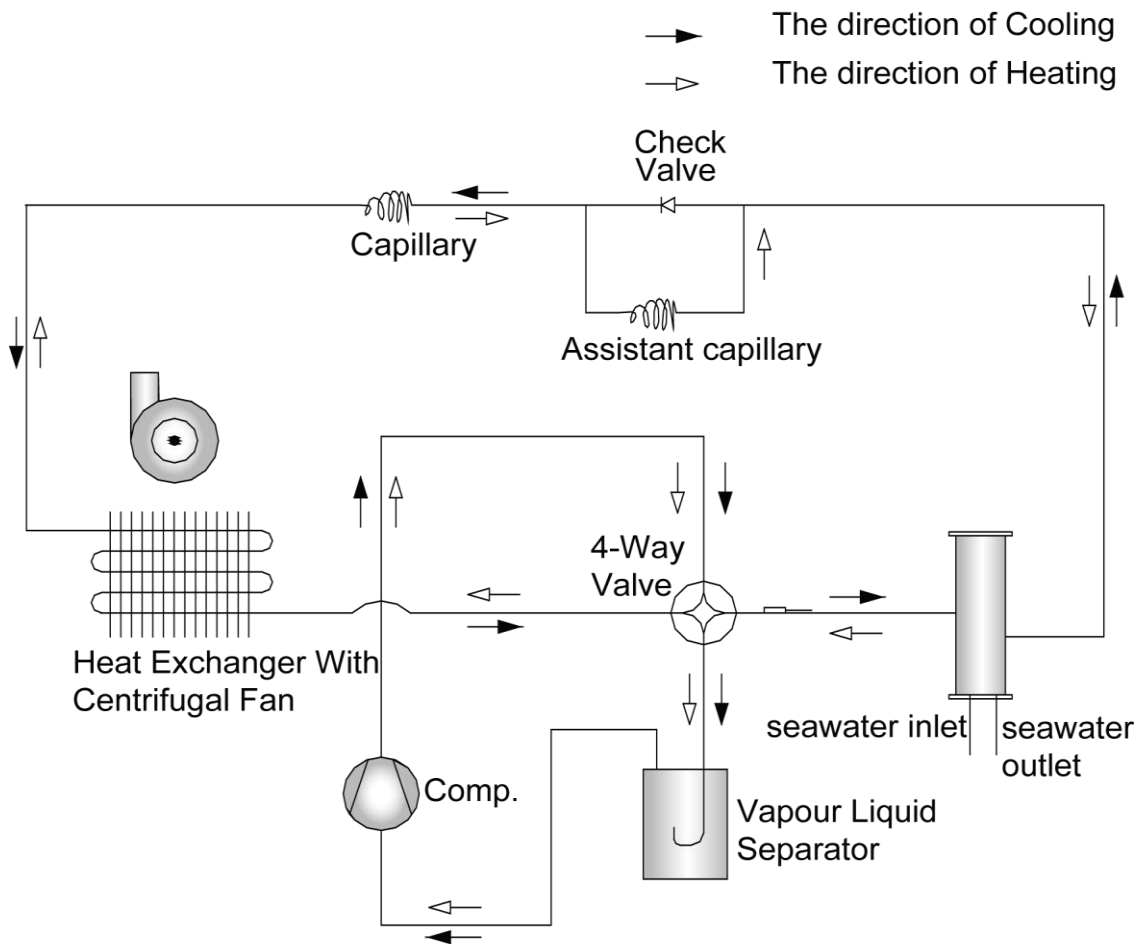
## 4.2 Operation Range

Rated Test Condition				
Item	Air Side		Water Side	
	DB Tem( °C)	WB Tem( °C)	Inlet Tem( °C)	Outlet Tem( °C)
Cooling	27	19.5	32	36
Heating	22	-	15	/

Note: Water flow is as the test of nominal cooling capacity

Operation Range of Unit	Item	Water Side( °C)
	Cooling	10~35 °C
	Heating	4~25 °C

## 5 PIPING DIAGRAM



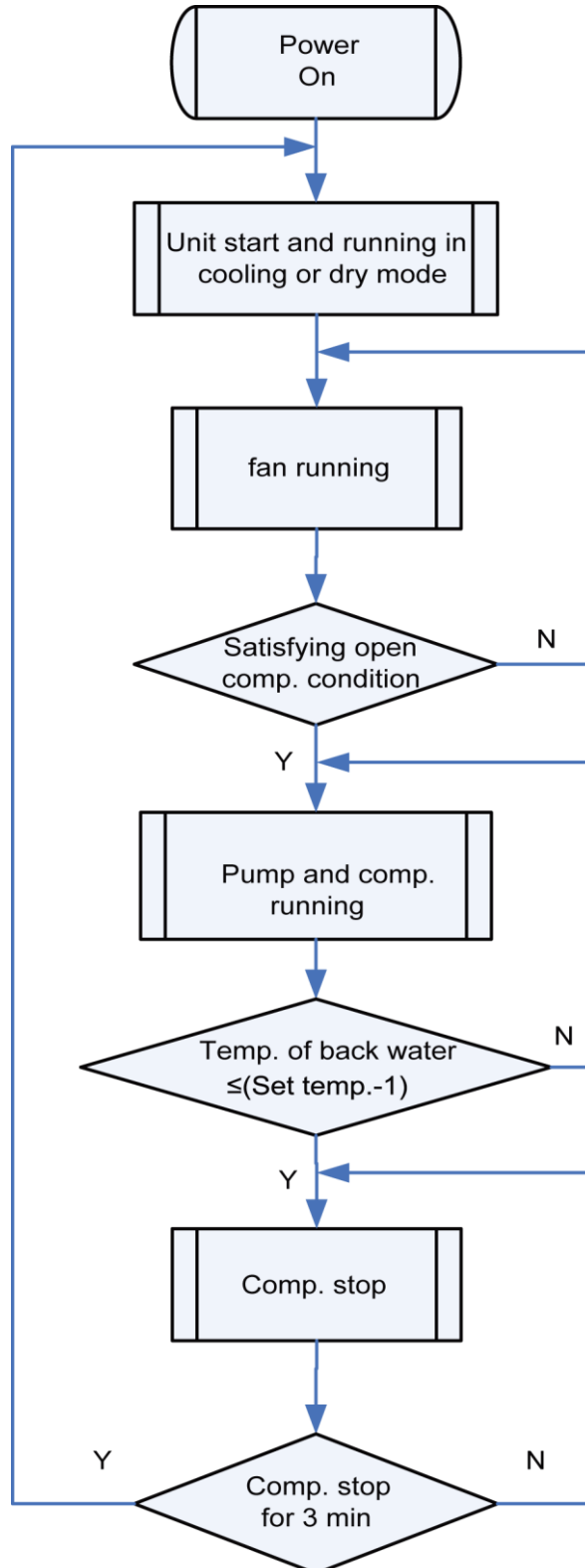


# CONTROL

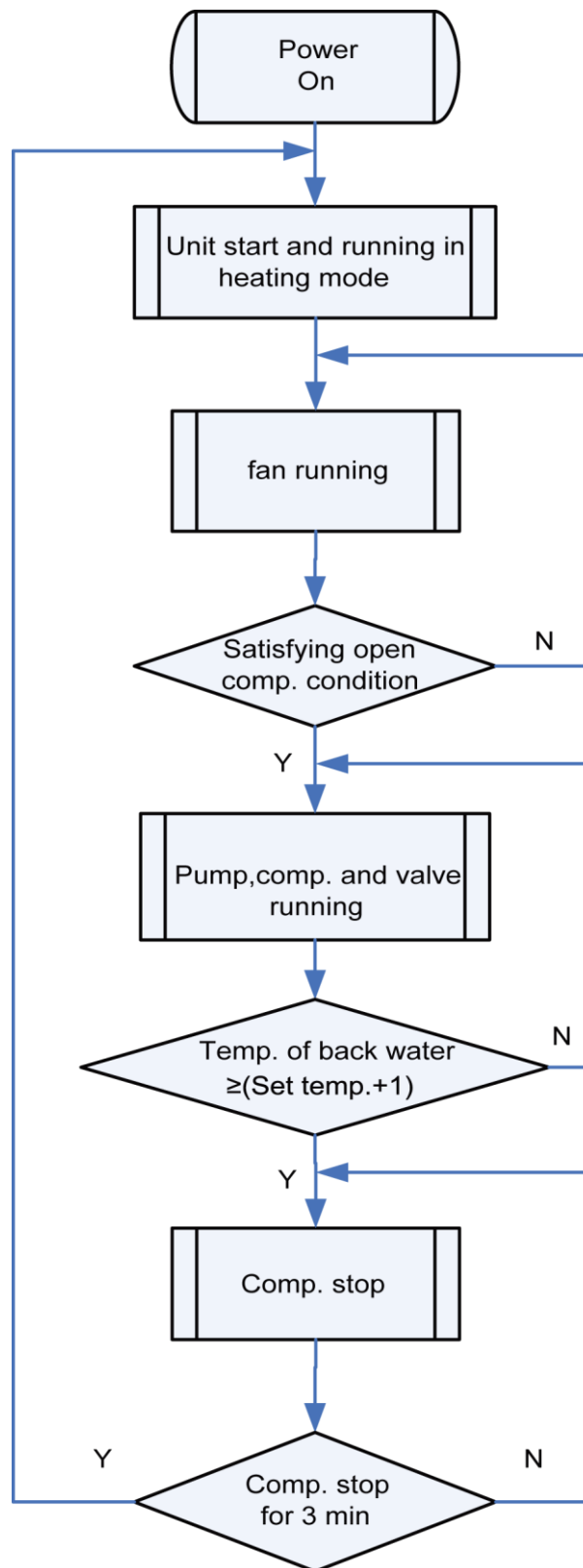
# CONTROL

## 1 OPERATION FLOWCHART

### 1.1 Cooling/Dry Operation



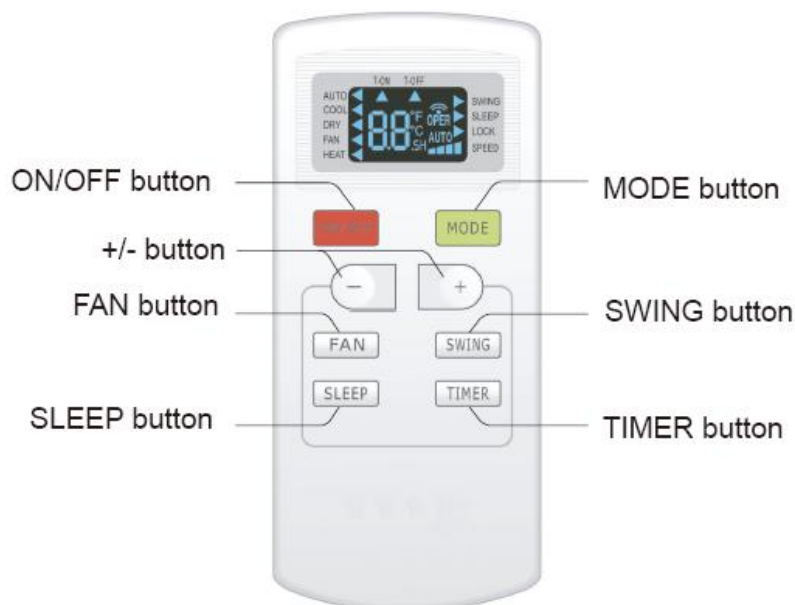
## 1.2 Heating Operation



## 2 REMOTE CONTROLLER

### 2.1 Wireless Remote Controller

#### Operation View



#### 2.1.1 ON/OFF button

Press this button to turn unit on/off.

#### 2.1.2 MODE button

Pressing this button once can select your required mode circularly as below (the corresponding icon "◀" will be lit up after the mode is selected):



- When selecting auto mode, air conditioner will operate automatically according to ambient temperature. Set temperature can't be adjusted and won't be displayed either. Press FAN button to adjust fan speed.
- When selecting cool mode, air conditioner will operate under cool mode. Then press + or - button to adjust set temperature. Press FAN button to adjust fan speed.
- When selecting dry mode, air conditioner will operate at low fan speed under dry mode. In dry mode, fan speed can't be adjusted.
- When selecting fan mode, air conditioner will operate in fan mode only. Then press FAN button to adjust fan speed.
- When selecting heat mode, air conditioner will operate under heat mode. Then press + or - button to adjust set temperature. Press FAN button to adjust fan speed. (Cooling only unit can't receive heating mode signal. If set HEAT mode by remote controller, press ON/OFF button can't turn on the air conditioner.)

**Note:**

The unit can only receive the signal for cool/fan/heat and it has no action when receiving the signal of other mode.

**2.1.3 + / - button**

- Pressing + or - button once will increase or decrease set temperature by 1°F(°C). Hold + or - button for 2s, set temperature on remote controller will change quickly. Release the button after your required set temperature is reached.
- When setting Timer On or Timer Off, press + or - button to adjust the time. (See TIMER Button for setting details)

**2.1.4 FAN button**

Pressing this button can select fan speed circularly as: AUTO, SPEED 1 (▲), SPEED 2 (▲▲), SPEED 3 (▲▲▲), SPEED 4 (▲▲▲▲).

**Note:**

- 1) Under Auto speed, air conditioner will select proper fan speed automatically according to ambient temperature.
- 2) Fan speed can't be adjusted under Dry mode.
- 3) SPEED 4 is not available for this model.

**2.1.5 SWING button**

Press this button to turn on up & down air swing.

**2.1.6 SLEEP button**

Under Cool, Heat and Dry mode, press this button to turn on Sleep function. Press this button to cancel Sleep function. Under Fan and Auto mode, this function is unavailable.

**Note:**

Sleep and swing functions are not available for this model.

**2.1.7 TIMER button**

- When unit is on, press this button to set Timer Off. T-OFF and H icon will be blinking. Within 5s, press + or - button to adjust the time for Timer Off. Pressing + or - button once will increase or decrease the time by 0.5h. Hold + or - button for 2s, time will change quickly. Release the button after your required set time is reached. Then press TIMER button to confirm it. T-OFF and H icon will stop blinking.
- When unit is off, press this button to set Timer On. T-ON and H icon will be blinking. Within 5s, press + or - button to adjust the time for Timer On. Pressing + or - button once will increase or decrease the time by 0.5h. Hold + or - button for 2s, time will change quickly. Release the button after your required set time is reached. Then press TIMER button to confirm it. T-ON and H icon will stop blinking.

- Cancel Timer On/Off: If Timer function is set up, press TIMER button once to review the remaining time. Within 5s, press TIMER button again to cancel this function.

**Note:**

- 1) Range of time setting is: 0.5~24h.
- 2) The interval between two motions can't exceed 5s, otherwise the remote controller will exit setting status.

## 2.1.8 Introduction for special function

### 2.1.8.1 Child lock function

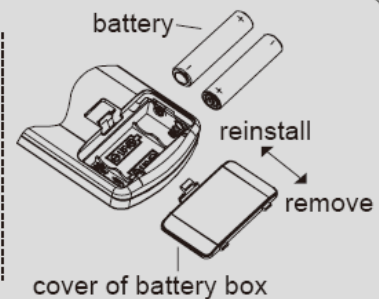
Press “+” and “-” buttons simultaneously can turn on or turn off child lock function. When child lock function is started up, LOCK indicator on remote controller is ON. If you operate the remote controller, remote controller won't send signal.

### 2.1.8.2 Temperature display switchover function

Under OFF status, press “-” button and “MODE” button simultaneously can switch between °C and °F.

## 2.1.9 Replacement of batteries

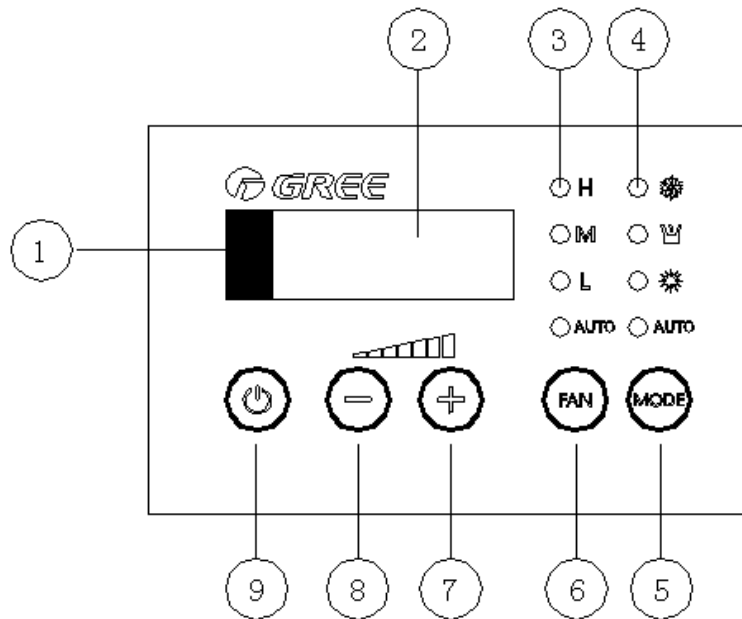
1. Press the back side of remote controller on the spot marked with "🔪", and then push out the cover of battery box along the arrow direction.
2. Replace two No.7 (AAA 1.5V) dry batteries and make sure the positions of + and - polar are correct.
3. Reinstall the cover of battery box.



- Replace new batteries of the same model when replacement is required.
- When you don't use remote controller for a long time, please take out the batteries.
- If the display on remote controller is fuzzy or there's no display, please replace batteries.


## 2.2 Wired Remote Controller

### 2.2.1 Operation View



①. Remote receiver	②. Digital display
③. Fan speed display (HIGH-MID-LOW and AUTO speed)	④. Display of mode operation (COOL-DEHUMIDIFY-HEAT and AUTO)
⑤. Mode button	⑥. Fan control button
⑦. Temp. Setting button (Increasing)	⑧. Temp. Setting button (Decreasing)
⑨. ON/OFF button	

This manual controller has memory function, if power off happened during the operation, the controller will memorize the status of ON/OFF, operation mode, set temperature, operation fan speed, temperature display format and time of starting interval. After powered on, the manual controller will display the setting status before power off automatically; and if the operation status before power off is on, the fan runs at once, after 1 minute, the compressor shall automatically run in the operation status before power off. (The units has not been set up the time of starting interval)

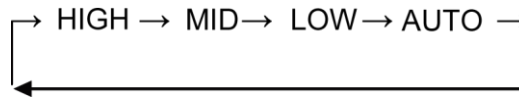
 **In cooling/heating/dehumidify mode, the pump starts before the compressor starts, stops after 5 seconds delay of the compressor stopping**

### 2.2.2 Power ON/OFF

- Press ON/OFF button to turn the unit on
- Pressing the ON/OFF button a second time will turn the unit off

### 2.2.3 FAN Control

- Press the FAN button, the fan speed will change in the following order:



- In “DEHUMIDIFY” mode, the fan will work at low speed automatically.

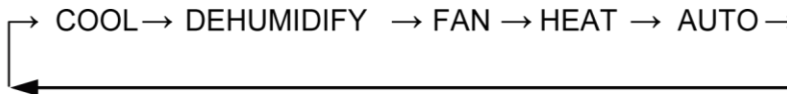
### 2.2.4 Temperature Setting




- Press temperature setting key:
  - ⊕ To increase in 1°C increments;
  - ⊖ To decrease in 1°C increments.
- The setting range of temperature in each mode:

COOL	61°F~86°F or 16°C ~30°C
DEHUMIDIFY	61°F~ 86°F or 16°C~30°C
HEAT	61°F~86°F or 16°C~30°C
FAN	In this mode, temperature cannot be changed.
AUTO	61°F~86°F or 16°C~30°C

### 2.2.5 Mode Setting

- Press this key to change the operation mode in order of



- In “COOL” mode, the LED marked  will be light, If set temperature is higher than room temperature, only the fan will run.
- In “DEHUMIDIFY” mode, the LED marked  will be light and fan will work at low speed within a certain temperature range. Dehumidifying is more efficient than in cooling mode and it will save energy.
- In “FAN” mode, all LED marked work pattern will extinguish, and hand controller will indicate room temperature. But this temperature cannot be set
- In “HEAT” mode, the LED marked  will be light, When the setting temperature is lower than the room temperature, it will not run.
- In “AUTO” mode, the LED marked AUTO will be light.

 **COOLING ONLY TYPE WITHOUT HEAT MODE.**

### 2.2.6 Display Fahrenheit or Centigrade

Pressing MODE and ⊖ key simultaneously for 5 seconds, the temperature can switch between Fahrenheit and Centigrade modes.



## 2.2.7 Error Codes

When there are faults within the system, an error code will be displayed on the display controller: Power off the unit and contact professional service.

Error code	Description
E1	Compressor high pressure protection
E2	Evaporator freezing protection
E3	Compressor low pressure protection
E6	Communication error
F0	Ambient temperature sensor error
F1	Evaporator temperature sensor error

## 2.2.8 Key Lock

- Pressing  $\ominus$  and  $\oplus$  key simultaneously for 5 seconds, all keys will be locked. Then pressing  $\ominus$  and  $\oplus$  key simultaneously for 5 seconds again, all keys will be unlocked.
- After all keys are locked, the controller would not response to any operations. And wired controller will display "EE" for 3 seconds when users press the key.

## 2.2.9 Checking Voltage Function

When numerical value displayed on the Nixie tube does not flicker, pressing  $\ominus$  and FAN key simultaneously for 5 seconds, then you can check the current voltage. The display will last for 5 seconds before it exits automatically. If you have controller or other key to control the signal during this period, the display will exit directly.

## 2.2.10 Starting Interval Setting

- If there are several A/C units in a yacht, you can set starting time interval between one by one.
- After hand controller powering on, pressing  $\oplus$  and FAN key simultaneously for 5 seconds without any other operations, you can set up starting interval. Nixie tube will flicker every 0.5 second. Then, pressing  $\oplus$  key or  $\ominus$  key to set up interval number. Next, pressing  $\oplus$  and FAN key simultaneously for 5 seconds to confirm the number. If you do not confirm, the number you set up will flicker for 10 seconds, then hand controller will exit the setting interface and the time interval you set up just now will be invalid.
- The value be displayed by nixie tube is the figure of interval time, each interval time is 20s, for example the set up value is 128, it means that the actual setting interval time should be  $128 \times 20 = 2560s$ .
- When the value be displayed by flashing nixie tube, then to shield each signal of wireless remote controller, excepting to press the  $\oplus$  button and fan speed button at the same time for 5 seconds, and to shield other buttons.
- After manual controller powered on, if there is wireless remote controller or at the same time to press other buttons except the  $\oplus$  button and fan speed button simultaneously, and then

press the ⊕ button and fan speed button simultaneously for 5 seconds, it will display the figure of interval time for 5s. During the period, if there is wireless remote controller or other remote controller signal, it will directly quit the display interface of starting interval time.

- The new setting starting interval time would be executed after manual controller re-powered on.
- The setting range of starting interval value is 0-255; accordingly, the setting range of starting interval time is 0-5100s (85min).
- If there is malfunction happened, cannot set up or display the time of starting interval.



### 2.2.11 Auto –off function of the manual controller

The display of ambient temperature will automatically blank in 5-minute lag if there is no operation on the manual controller.

1) After receiving the signal from the manual controller, the indicator will light on automatically, in which case, the unit will not operation at all and the manual controller can be active after it lights on.

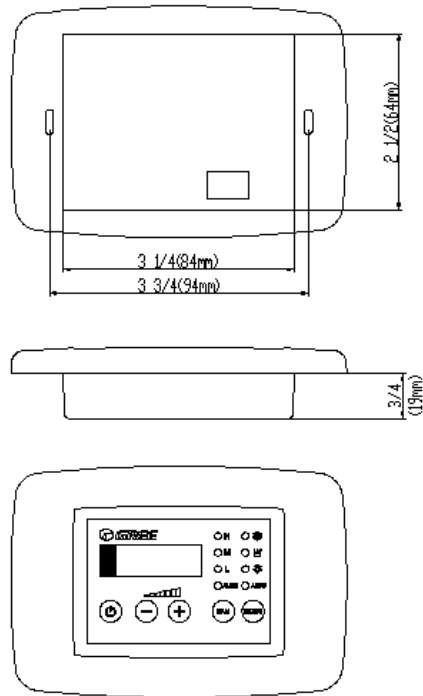
2) After receiving the signal from remote controller, the display of temperature on the manual controller will light on; meanwhile, the unit carries out corresponding operation.

- After the unit stops, there is no display on the manual controller.
- Powered on again if the unit status is on before power off, temperature indicator and mode indicator of the manual controller will light on automatically.
- If the unit receives the stop signal, it will directly blank off the temperature indicator and mode indicator of the manual controller.

#### Note:

The starting interval time setting function only is available in the same yacht and there are should be two or more units installed. After the starting time interval be set up, after powered off and re-powered on, Units will delay 3min and base on this, it will delay for a while then can start up, the delay time is called time of starting interval.

## 2.3 Dimension



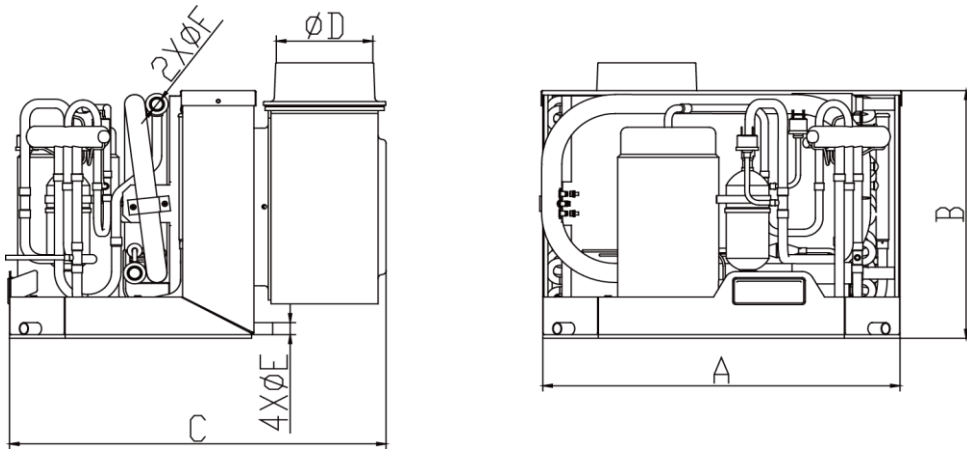
## 2.4 Installation

Before mounting the manual controller, consider the location. The manual controller should be mounted on an inside wall, slightly higher than mid-height of the cabin. The cut out size for the manual controller is  $2\ 1/2$ " (64mm) wide by  $3\ 5/16$ " (84mm). Do not mount the manual controller in direct sunlight, near any heat producing appliances or in a bulkhead where temperatures radiating from behind the panel may affect performance. Do not mount the manual controller in the supply air stream. Do not mount the manual controller above or below a supply or return air grille. Do not mount the manual controller behind a door, in a corner, under a stairwell or any place where there is no freely circulating air. Mount the manual controller within display cable length (custom lengths available) of the air conditioner. Plug the display cable into the circuit board in the electric box and into the back of the manual controller.

# INSTALLATION

# INSTALLATION

## 1 Dimension Data

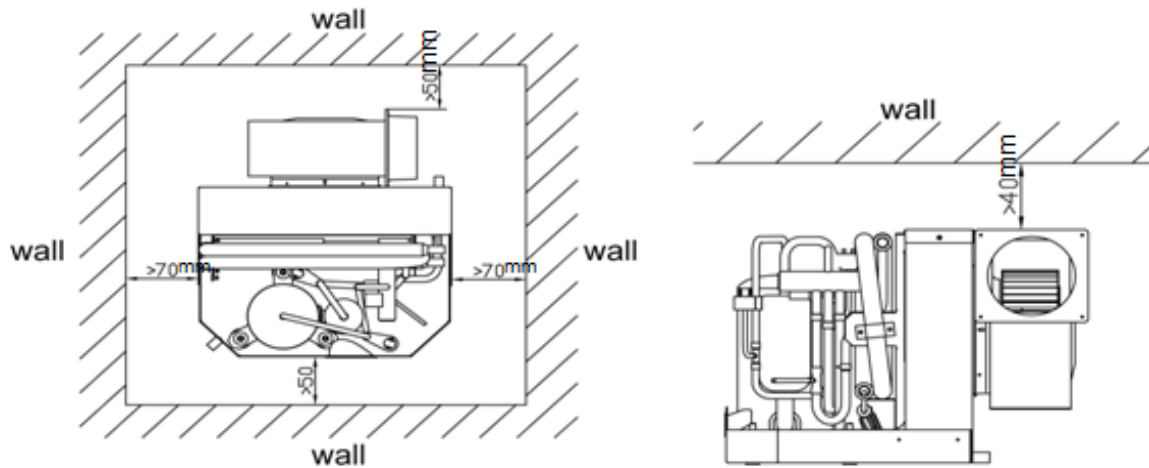


Units: mm

Model	A	B	C	D	E	F
CYR5/NaC-A	285	295	408	91.5	16	19
CYR5/NaC-T						
CYR9/NaC-A	380	310	408	91.5	16	19
CYR9/NaC-T						
CYR20/NaC-T	595*	385	520	119.4	16	19

Note: \* means the max size of A will be 620 mm if include the fan.

## 2 Installation Clearance Data



**Note:** Air outlets on bottom and both sides shall be away from the ceiling for 40mm at least; Air outlet shall be away from the ceiling for 100mm at least.

### Drain Piping Work

The condensate drain pan is 2" (50mm) high with two drain locations. During conditions of high humidity, condensate may be produced at a rate of approximately 1/2 gallon per hour (1.9 liters per hour). Please pay more attention, it is important to route condensate drains downward to a sump pump. It is not recommended to route condensate drains to the bilge. After the condensate drain installation is complete, test the installation by pouring water into the pan and checking for good flow.

For installation of the condensate drain:

- Attach a 5/8" I.D. reinforced hose to the hose barb and secure with stainless steel hose clamps.
- Install the condensate drain hose downhill from the unit and aft to a sump.

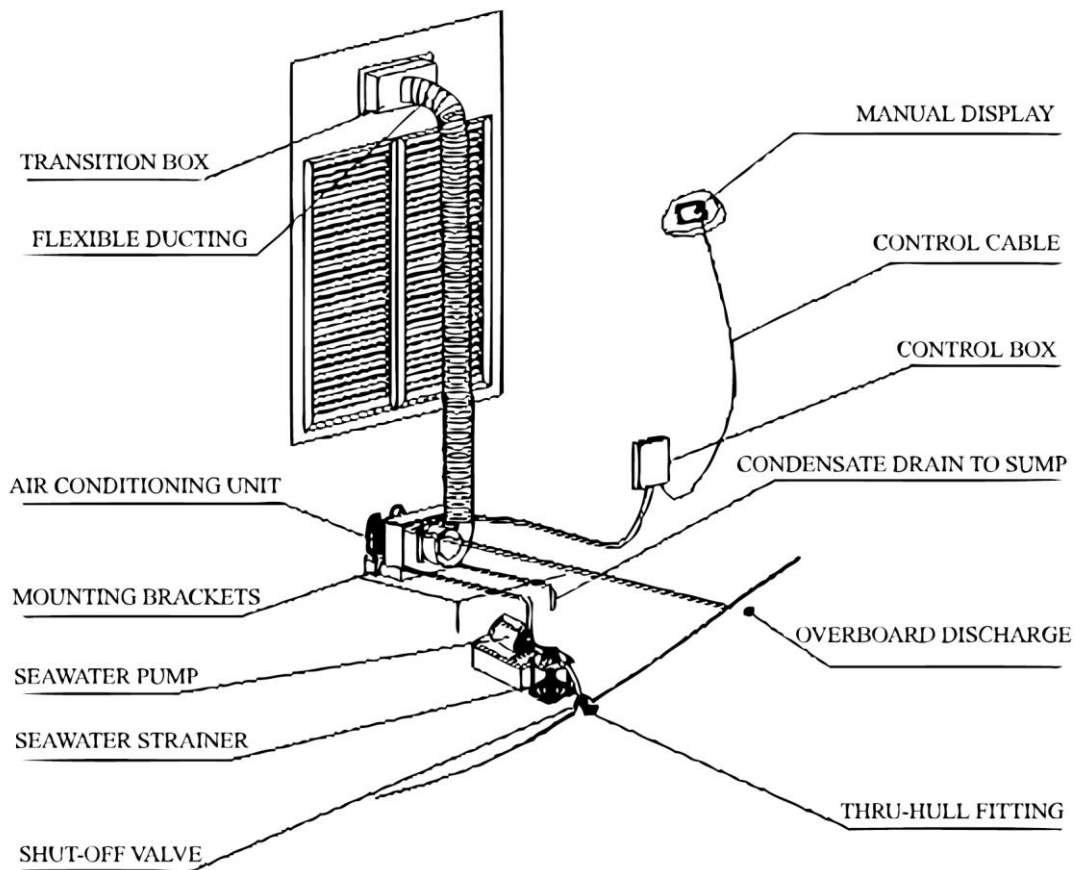
Two drain fittings may be used and the hoses (teed) together using a tee fitting provided there is a minimum

 **2" drop from the bottom of the base pan to the tee connection.**

Do not terminate condensate drain line within three 3' (914mm) of any outlet of engine, generator exhaust systems, compartment housing an engine or generator, nor in a bilge, unless the drain is connected properly to a sealed condensate or shower sump pump. Seal all condensate hose penetrations.

## 3 Unit Installation

Selecting a good location for your air conditioner is the most important part of your preparation. Be sure to consider the size of the area you are cooling, the air distribution needs, and the size of the unit you have chosen. Keeping in mind that cool air has a tendency to fall; it is highly recommended that you locate the supply air grille as high as possible in the cabin. See diagram below.



The unit should be installed as low as possible, but never in the bilge or engine room areas, ensure that the selected location is sealed from direct access to bilge and/or engine room vapors. installing the unit as low as possible (such as under a v-berth, dinette seat or bottom of a locker) and ducting the supply air as high as possible, creates an ideal airflow condition. This type of installation will prevent short or premature cycling.

The unit should be positioned on a firm, level, horizontal surface and the condensate drain line should run downward from the unit to a suitable drain location. Plan all Connections, which must be made including ducting, condensate drain, and seawater in and out, electrical power connections, location of control, and seawater pump placement, to assure easy access for routing and servicing.

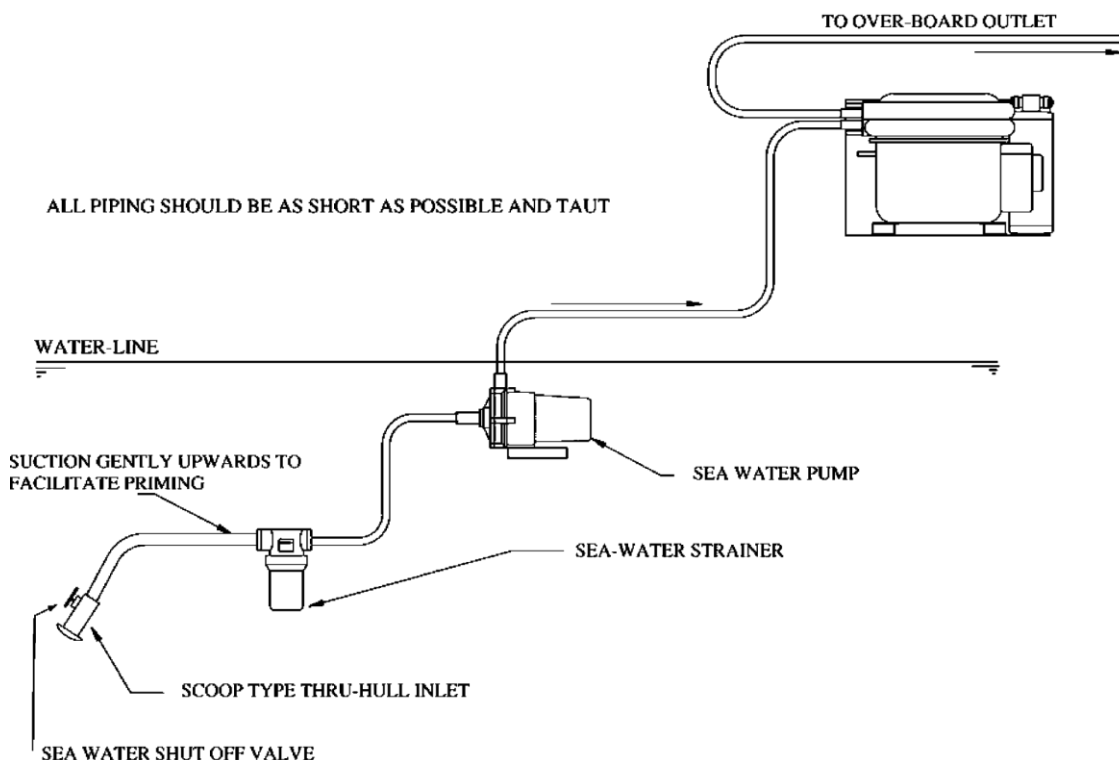
## 4 Water System Installation

Several guidelines should be followed during the installation of the seawater system. Since the circulation pump is centrifugal and not self-priming, it must be mounted so that it is always at least 1' (305mm) below the water line regardless of which tack the vessel is on. Pump may be mounted horizontally or vertically, however, the discharge must always be above the inlet. Pump head should be rotated toward the direction of water flow. Install the seawater speed scoop intake as far below the water line and as close to the keel as possible in any application, but especially on a sailboat, to keep the intake in the water when the boat heels over so that air does not get into the system. The speed scoop intake must face forward and not be shared with any other pump. A seawater strainer is mandatory between the shut off valve (seacock) and the pump to protect the pump from any foreign

matter. Failure to install a seawater strainer will void the pump warranty. The seawater system should be installed with an upward incline from the speed scoop & seacock, through the strainer, to the inlet of the pump, next to the inlet of the a/c unit's condenser coil. The discharge from the a/c unit should run to the seawater outlet thru-hull fitting that should be located where it can be visually inspected for water flow as close to the waterline to reduce noise. All hose connections shall be secured using double/reversed stainless steel hose clamps. Use Teflon tape on all threaded connections.

Summary of the seawater system installation:

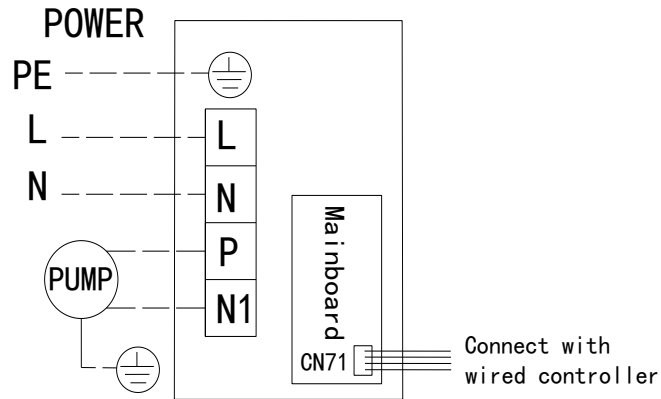
- a. Install the speed scoop thru-hull inlet as close to the keel and as far below the water line as possible, facing forward. Bed the scoop with a marine sealant designed for underwater use.
- b. Install a bronze, full flow seacock on the speed scoop thru-hull inlet.
- c. Install a seawater strainer below the level of the pump with access to filter.
- d. Mount the pump above the strainer and at least 1' (305mm) below the waterline.
- e. Connect the seacock and strainer with an uphill run of 3/4" reinforced marine grade hose.
- f. Connect the discharge from the pump uphill to the bottom inlet of the a/c unit's condenser coil with 5/8" hose. Connect the discharge from the condenser coil to the overboard discharge thru-hull fitting with 3/4" hose.
- g. Avoid loops, high spots or the use of 90° elbows with seawater hose (each 90° elbow is equivalent to 2.5' (762mm) of hose and a 90° elbow on the pump outlet is equivalent to 20' (6.1m) of hose).
- h. Double clamp all hose connections with stainless steel clamps, reversing the clamps.
- i. Use Teflon tape on all threaded connections.
- j. Connect all metallic parts in contact with seawater to the vessel's bonding system including the speed scoop inlet, strainer, pump and the air conditioner. Failure to do so will void warranty.





# 5 ELECTRIC WIRING WORK

## 5.1 Electric Wiring Design



## 5.2 Specification of Power Supply Wire and Air Switch

Model	Power Supply	Capability of Air Switch	Minimum Sectional Area of Earth Wire	Minimum Sectional Area of Power Supply Wire
	Ph V Hz	(A)	(mm <sup>2</sup> )	(mm <sup>2</sup> )
CYR5/NaC-A	1PH 115V~ 60Hz	25	2.5	2.5
CYR9/NaC-A		25	2.5	2.5
CYR5/NaC-T	1PH 230V~ 60Hz 1PH 220-240V~50Hz	16	1.5	1.5
CYR9/NaC-T		16	1.5	1.5
CYR20/NaC-T		32	4.0	4.0

# **MAINTENANCE**

# MAINTENANCE

## 1 MAINTENANCE

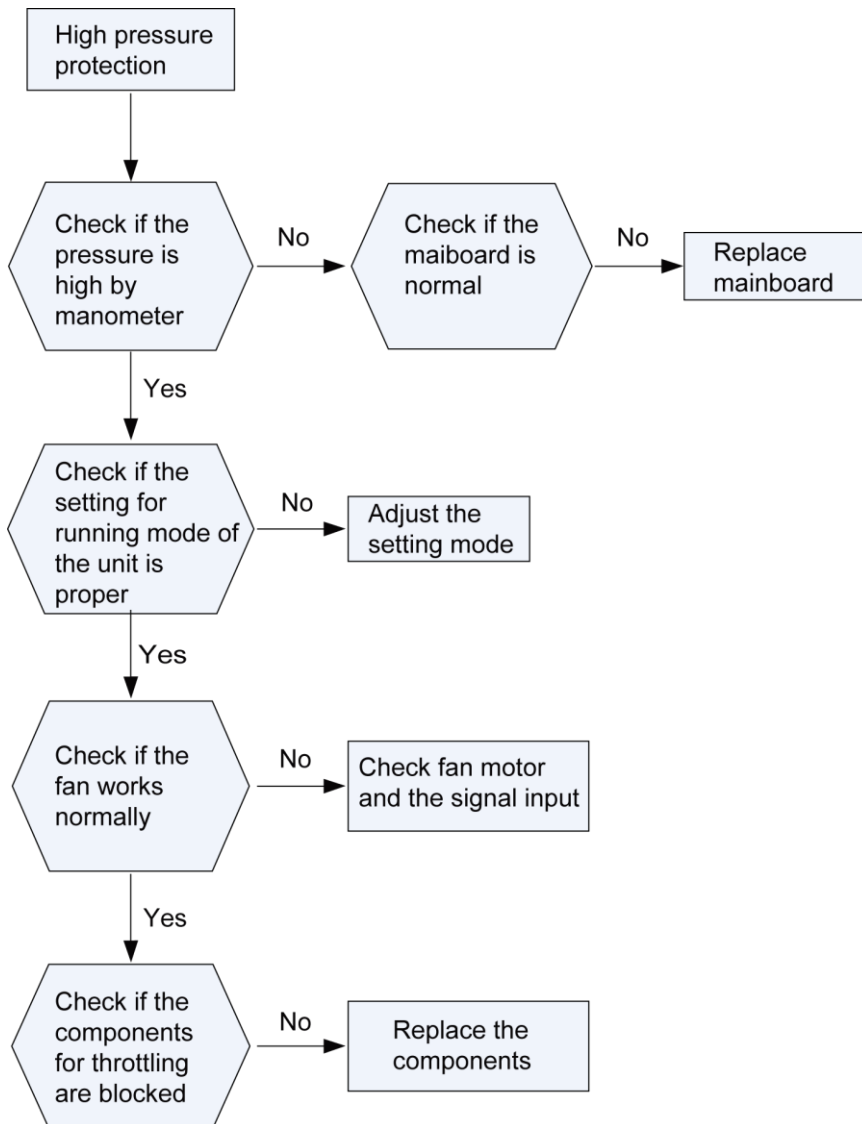
### 1.1 TROUBLE TABLE

Trouble Code	Trouble Name	Origin of Trouble Signal	Control Description
E1	High Pressure Protection of Compressor or Anoxic protection	High Pressure Switch	When high pressure is detected for continuous 3s, turn off the system( 4 way-valve is excluded when heating), and "E1" will be displayed. It cannot be recovered. "E1" is cleared by pressing button "ON/OFF". Press ON/OFF again to resume running.
E2	Indoor Antifreezing Protection	Temp Sensor	Under Cool or Dry mode, after the compressor has been running for continuous 15min, if Teva <-2℃ is detected for continuous 3min, compressor will stop, fan will keep original status, nixie display indicator will display "E2". When Teva ≥10℃ for continuous 1s, it will recover and system will work normally.
E3	Low Pressure Protection of Compressor	Low Pressure Switch	After 4min startup of compressor, detection for low pressure is executed. When detect that the low pressure switch breaks for 30s, the system is turned off (4-way valve is excluded when heating and indoor fan stops after the compressor has stopped for 30s.), E3 is displayed and buzzer is warning. It can't recover automatically. Press ON/OFF to clear the warning of voice.
E6	Communication Error Protection	Communication malfunction	When communication error has been detected for 1min, system is turned off (4-way valve is excluded when heating and indoor fan stops after the compressor has stopped for 30s.)and E6 is displayed. After the communication turns to normal, system resumes running and error code is cleared.
F0	Indoor Ambient Temp Sensor Error	Temp Sensor	When detect that AD value is greater than 250 (short circuit) or less than 5 (open circuit) for continuous 5s, it is believed that the temp sensor is error. If detect that the AD value is between 5 and 250 for continuous 5s, it is believed that the temp sensor recovers. When there is error of temp sensor, system is turned off (4-way valve is excluded when heating and indoor fan stops after the compressor has stopped for 30s) and F0 is displayed. It can resume running when the error is cleared. Under air supply mode, only error code is displayed and the fan works normally. The error code will disappear when the error is cleared.

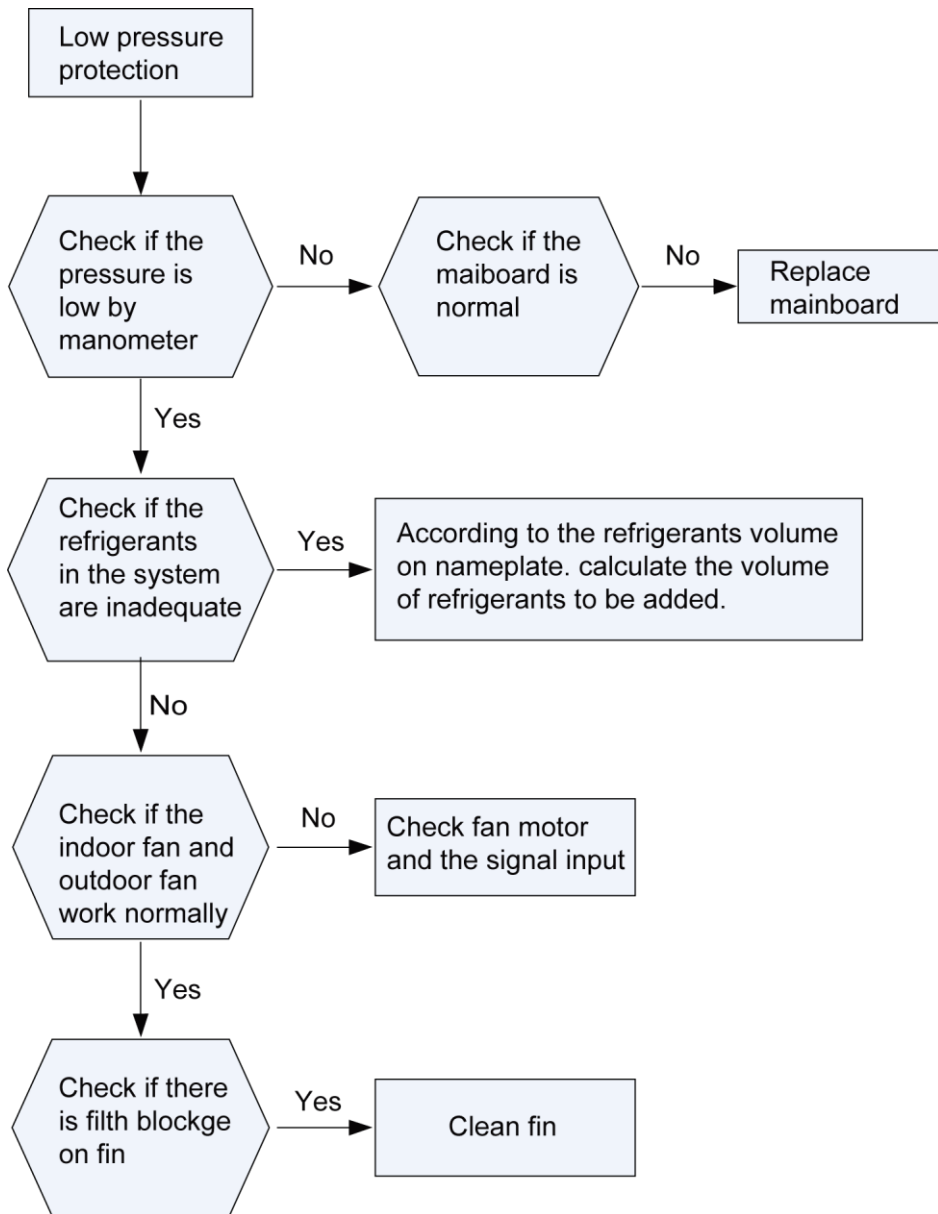
Trouble Code	Trouble Name	Origin of Trouble Signal	Control Description
F1	Evaporator Temp Sensor Error	Temp Sensor	<p>When detect that AD value is greater than 250 (short circuit) or less than 5 (open circuit) for continuous 5s, it is believed that the temp sensor is error. If detect that the AD value is between 5 and 250 for continuous 5s, it is believed that the temp sensor recovers</p> <p>When there is error of temp sensor, the system is turned off (4-way valve is excluded when heating and indoor fan stops after the compressor has stopped for 30s.) and F1 is displayed. After the error is cleared, it resumes running.</p> <p>Under air supply mode, only error code is displayed and fan works normally. When error is cleared, error code will disappear.</p>

## 1.2 FLOW CHART OF TROUBLESHOOTING

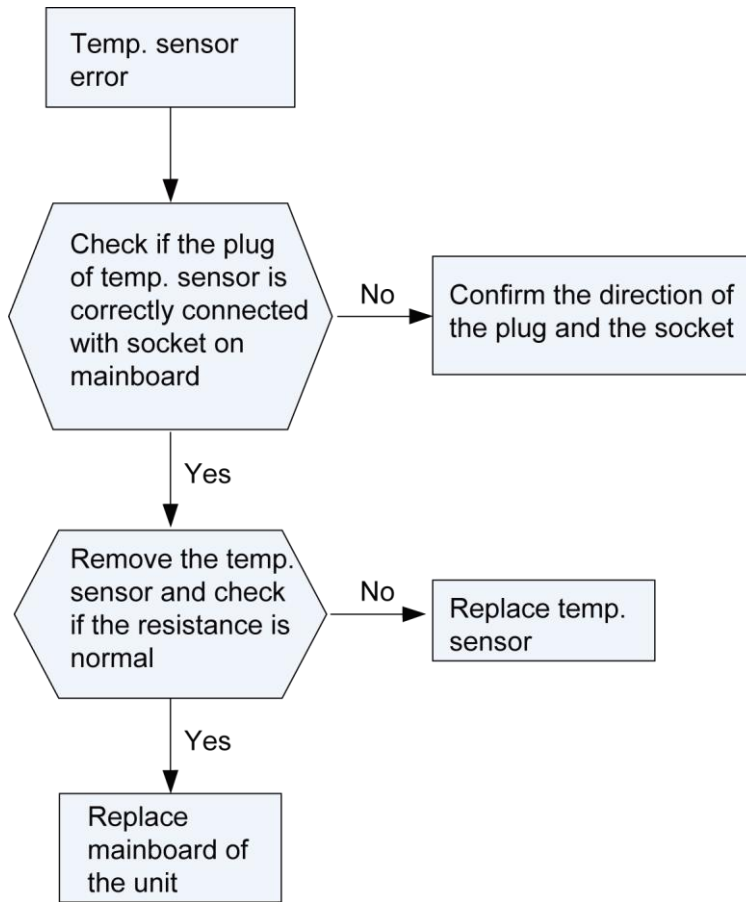
### 1.2.1 High Pressure Protection



## 1.2.2 Low Pressure Protection



### 1.2.3 Temp Sensor Error

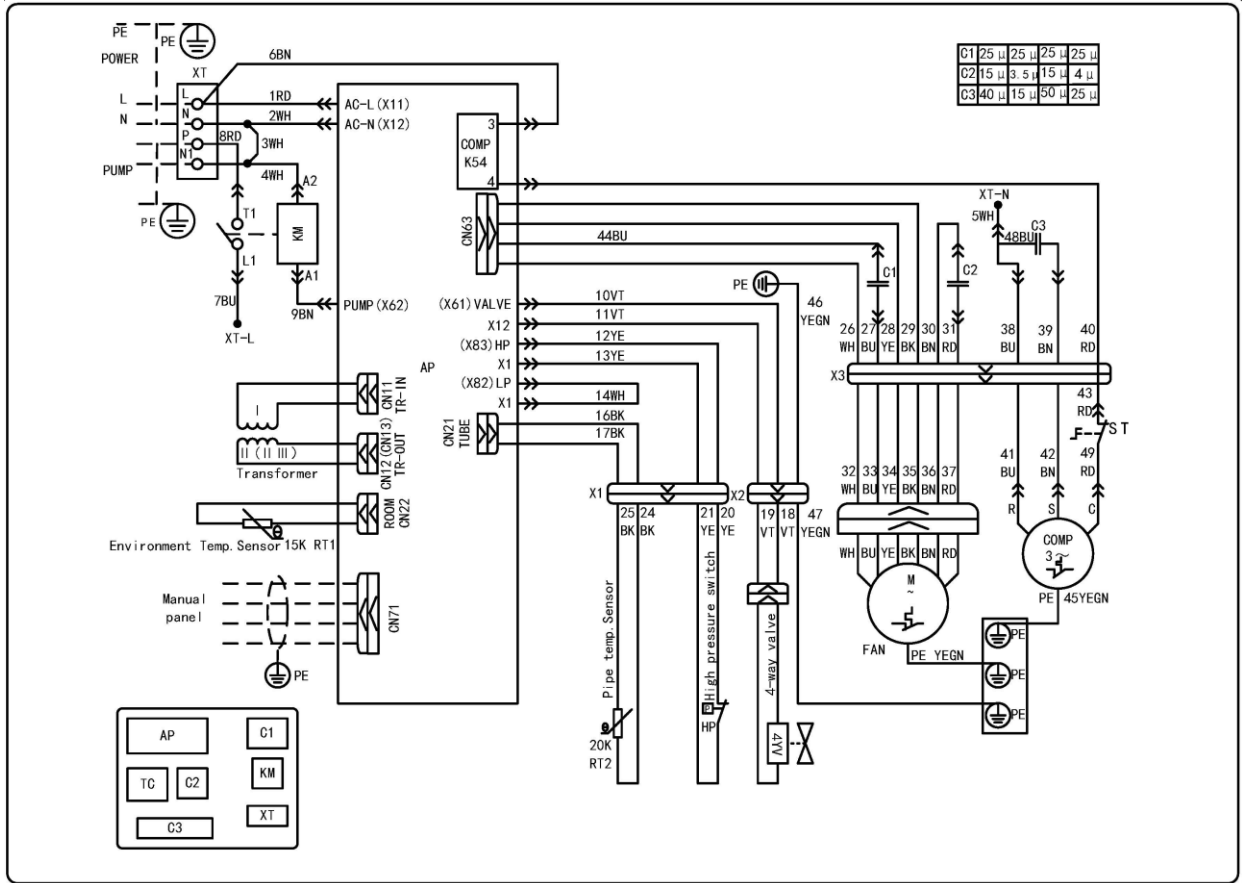


# 2 WIRING DIAGRAM

The following electric diagram is for reference only. Please refer to diagram stuck on the unit as the latest version.

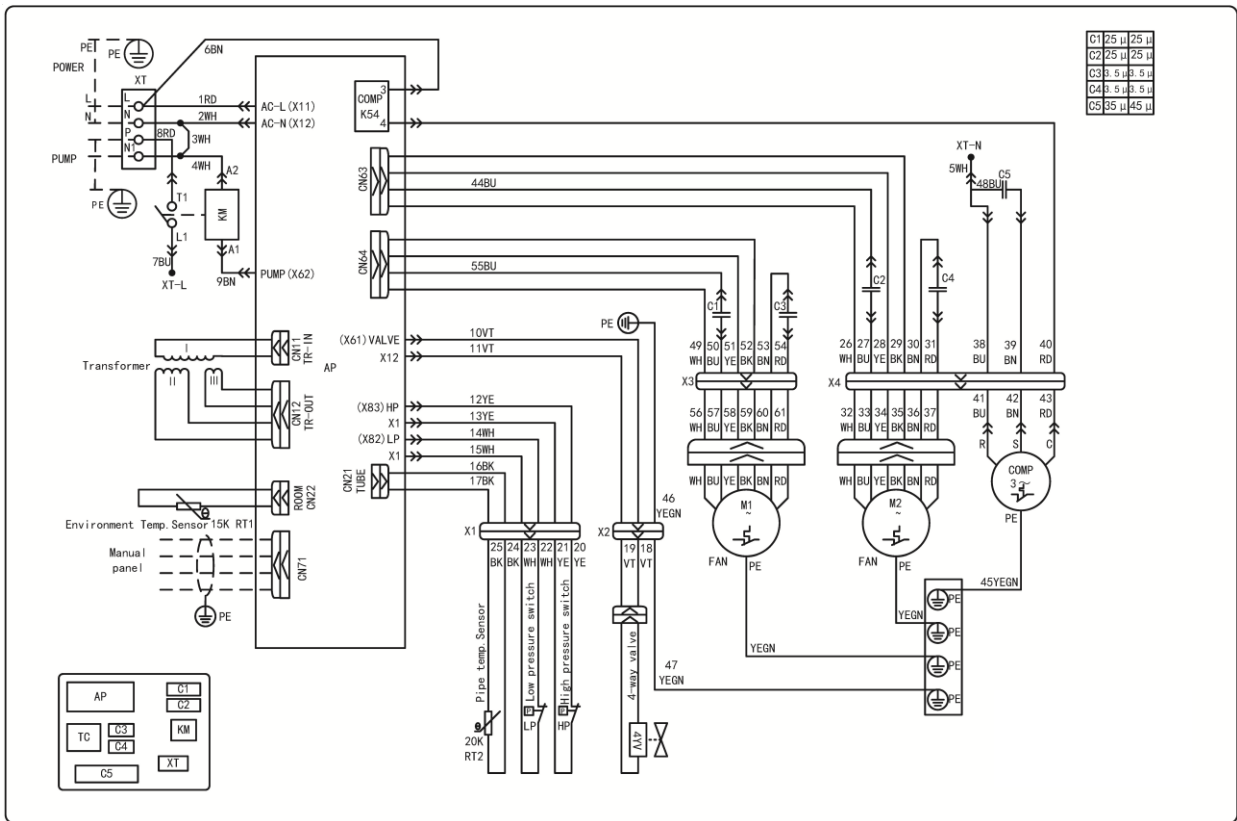
WIRING DIAGRAM: CYR5/NaC-A, CYR5/NaC-T, CYR9/NaC-A, CYR9/NaC-T

The specification of power cord is AWG14\*3(3\*1.5).



WIRING DIAGRAM: CYR20/NaC-T

The specification of power cord is AWG12\*3(3\*2.5).

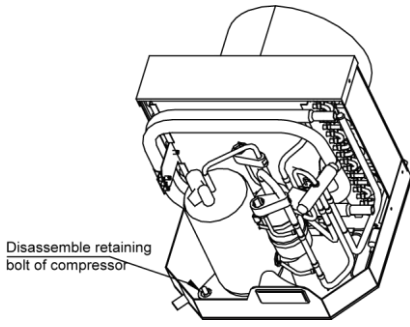
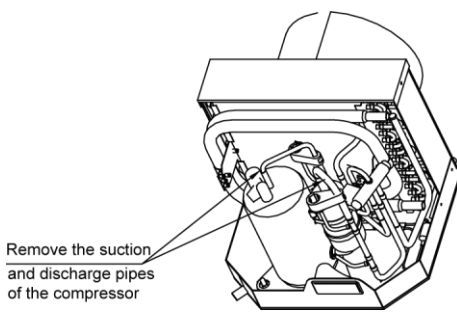
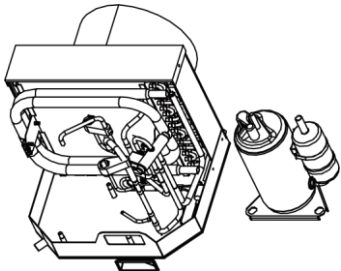
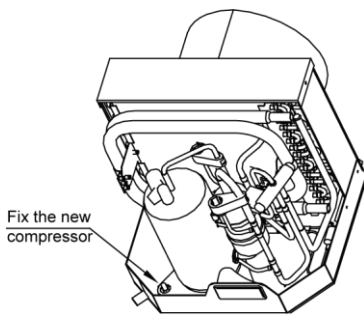


# 3 DISASSEMBLY AND ASSEMBLY PROCEDURE OF MAIN PARTS

## 3.1 Compressor

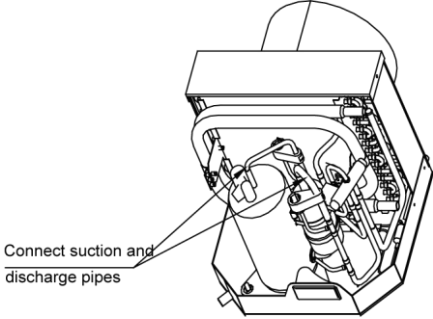
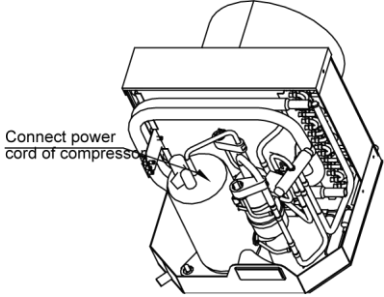
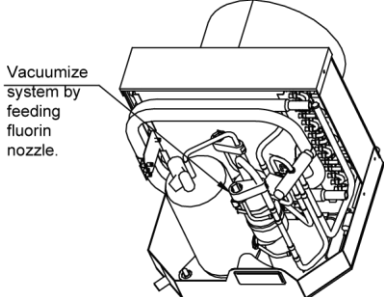
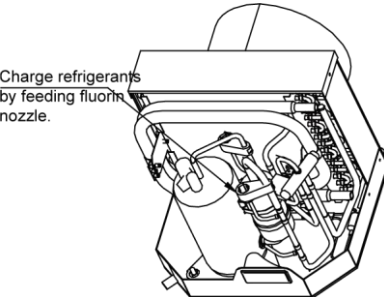
Disassembly and Assembly of Compressor		
Remark: Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the compressor.		
Process	Pictorial View	Handling Description
1. Disconnect the power cord		<ul style="list-style-type: none"> <li>• Unscrew the retaining screw of power cord with screwdriver.</li> <li>• Unplug the power cord.</li> </ul>



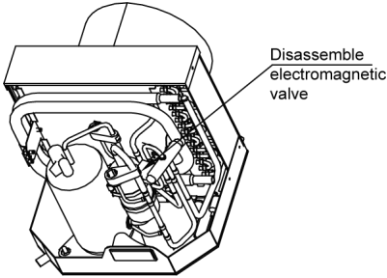
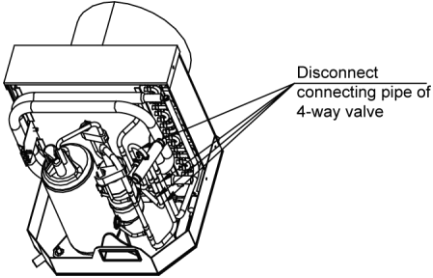
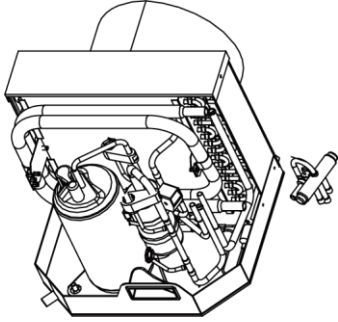
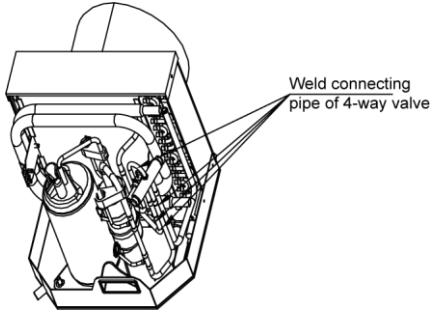
Disassembly and Assembly of Compressor		
Remark: Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the compressor.		
Process	Pictorial View	Handling Description
2. Disassemble retaining nut		<ul style="list-style-type: none"> <li>• Unscrew retaining nut by screwdriver.</li> </ul>
3. Disassemble the discharge pipe and the suction and discharge pipe of compressor.		<ul style="list-style-type: none"> <li>• Heating suction and discharge pipe by acetylene welding and then unplug them from compressor.</li> <li>• Conduct nitrogen-fill protection on process pipe and the pressure of nitrogen is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> (relative pressure).</li> <li>• Heat it with caution in case the surroundings get burnt due to high temperature</li> </ul>
4. Remove compressor		<ul style="list-style-type: none"> <li>• Remove the compressor from chassis.</li> </ul>
5. Fix the new compressor on chassis.		<ul style="list-style-type: none"> <li>• Place the new compressor on the accurate position</li> <li>• Screw up retaining bolts of compressor</li> <li>• Don't inversely place the compressor</li> </ul>

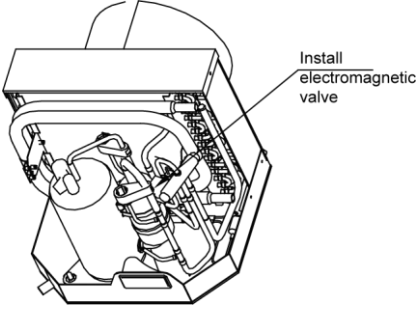
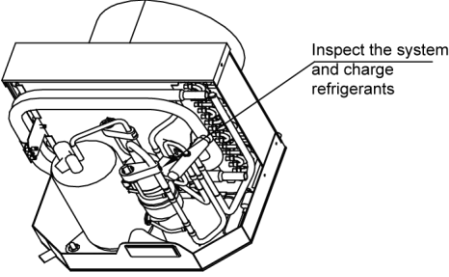
Disassembly and Assembly of Compressor

Remark: Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the compressor.

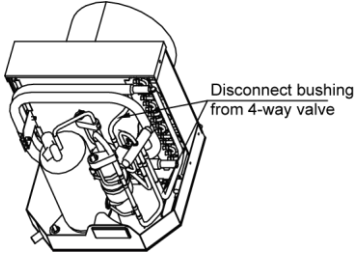
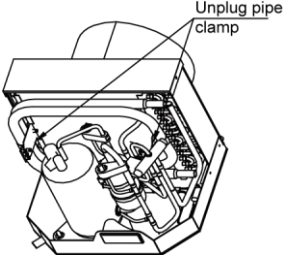
Process	Pictorial View	Handling Description
<p>6. Connect the inlet and outlet of compressor with pipeline of system.</p>	 <p>Connect suction and discharge pipes</p>	<ul style="list-style-type: none"> <li>Weld suction and discharge pipe by acetylene welding</li> <li>Conduct nitrogen-fill protection on process pipe and the pressure of nitrogen is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> ( relative pressure).</li> <li>Heat it with caution in case the surroundings get burnt due to high temperature</li> </ul>
<p>7. Connect power cord of compressor</p>	 <p>Connect power cord of compressor</p>	<ul style="list-style-type: none"> <li>Connect the power cord to retaining bolts according to disassembly sequence.</li> <li>Screw the bolts tightly.</li> </ul>
<p>8. Vacuumize system by feeding fluorin nozzle.</p>	 <p>Vacuumize system by feeding fluorin nozzle.</p>	<ul style="list-style-type: none"> <li>Vacuumize system by feeding fluorin nozzle.</li> </ul>
<p>9. Charge refrigerants again by feeding fluorin nozzle.</p>	 <p>Charge refrigerants by feeding fluorin nozzle.</p>	<ul style="list-style-type: none"> <li>Charge refrigerants again by feeding fluorin nozzle.</li> <li>Charge volume must comply with the nameplate.</li> </ul>

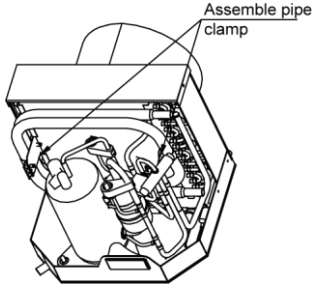
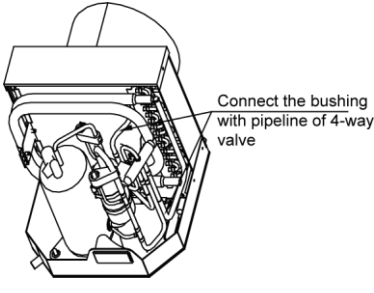
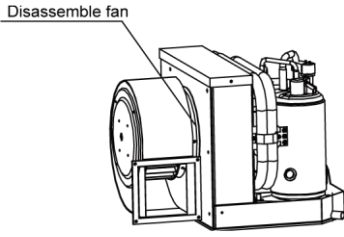
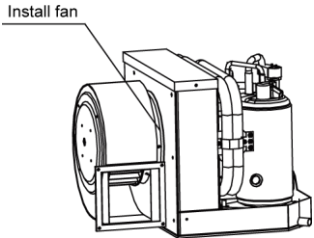
### 3.2 The 4-way valve

Disassembly and Assembly of the 4-way valve		
Remark: Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the thermal expansion valve.		
Process	Pictorial View	Handling Description
1. Disassemble electromagnetic valve.	 <p>Disassemble electromagnetic valve</p>	<ul style="list-style-type: none"> <li>• Dismantle electromagnetic valve with spanner.</li> <li>• Remove electromagnetic valve from 4-way valve.</li> </ul>
2. Dismantle 4-way valve.	 <p>Disconnect connecting pipe of 4-way valve</p>	<ul style="list-style-type: none"> <li>• Heat connecting pipe of 4 vents of 4-way valve by gas welding and then unplug 4-way valve.</li> <li>• nitrogen-fill protection shall be conducted on welding joint and the pressure of nitrogen is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> ( relative pressure)</li> <li>• Record the direction of 4-way valve and the position of each vent before remove 4-way valve.</li> </ul>
3. Remove 4-way valve		<ul style="list-style-type: none"> <li>• Remove old 4-way valve from pipeline.</li> </ul>
4. Install new 4-way valve.	 <p>Weld connecting pipe of 4-way valve</p>	<ul style="list-style-type: none"> <li>• Install the new 4-way valve in correct position and connect it with pipeline correctly.</li> <li>• Wrap the valve with wet cloth when welding to prevent the slide block inside the valve from burning and prevent water from piping.</li> <li>• Charge nitrogen to weld and the nitrogen pressure is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> ( relative pressure)</li> </ul>

Disassembly and Assembly of the 4-way valve		
Remark: Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the thermal expansion valve.		
Process	Pictorial View	Handling Description
5. Install electromagnetic valve.		<ul style="list-style-type: none"> <li>• Install the electromagnetic valve in new 4-way valve.</li> </ul>
6. Inspect the system and charge refrigerants.		<ul style="list-style-type: none"> <li>• Vacuumize and charge refrigerants after confirmation that there is no leakage of the system.</li> </ul>

### 3.3 Tube in tube heat exchanger

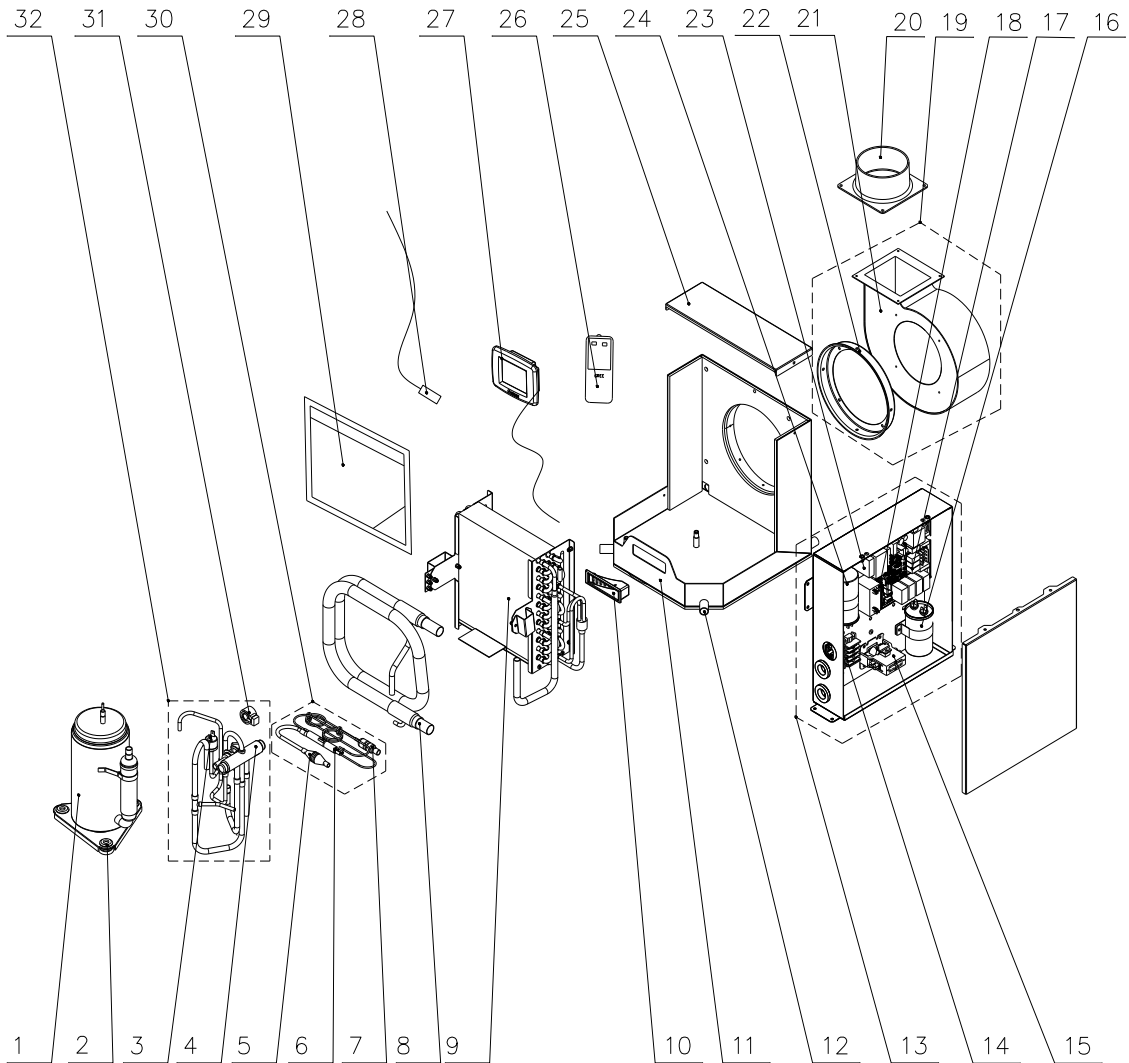
Disassembly and Assembly of tube in tube heat exchanger		
Process	Pictorial View	Handling Description
1. Disconnect bushing from 4-way valve		<ul style="list-style-type: none"> <li>• Heat connecting pipe of bushing and 4-way valve by gas welding and then unplug bushing.</li> <li>• nitrogen-fill protection shall be conducted on welding joint and the pressure of nitrogen is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> ( relative pressure)</li> <li>• Heat it with caution in case the surroundings get burnt due to high temperature</li> </ul>
2. Unplug pipe clamp		<ul style="list-style-type: none"> <li>• Unscrew the pipe clamp to disconnect the bushing from side plate of evaporator.</li> </ul>

Disassembly and Assembly of tube in tube heat exchanger		
Process	Pictorial View	Handling Description
3. Assemble pipe clamp		<ul style="list-style-type: none"> <li>• Fix the bushing and side plate of evaporator by pipe clamp.</li> </ul>
4. Connect the bushing with pipeline of 4-way valve		<ul style="list-style-type: none"> <li>• Weld bushing by gas welding.</li> <li>• nitrogen-fill protection shall be conducted on welding joint and the pressure of nitrogen is <math>0.5 \pm 0.1 \text{ kgf/cm}^2</math> ( relative pressure)</li> <li>• Heat it with caution in case the surroundings get burnt due to high temperature</li> </ul>
Disassembly and Assembly of Fan and Fan Motor		
Process	Pictorial View	Handling Description
1. Disassemble fan		<ul style="list-style-type: none"> <li>• Disassemble fan by screwdriver.</li> </ul>
2. Install fan		<ul style="list-style-type: none"> <li>• Fix the fan by screwdriver.</li> </ul>

# 4 EXPLODED VIEWS AND PART LIST

1) Model: CYR5/NaC-A

Exploded View:

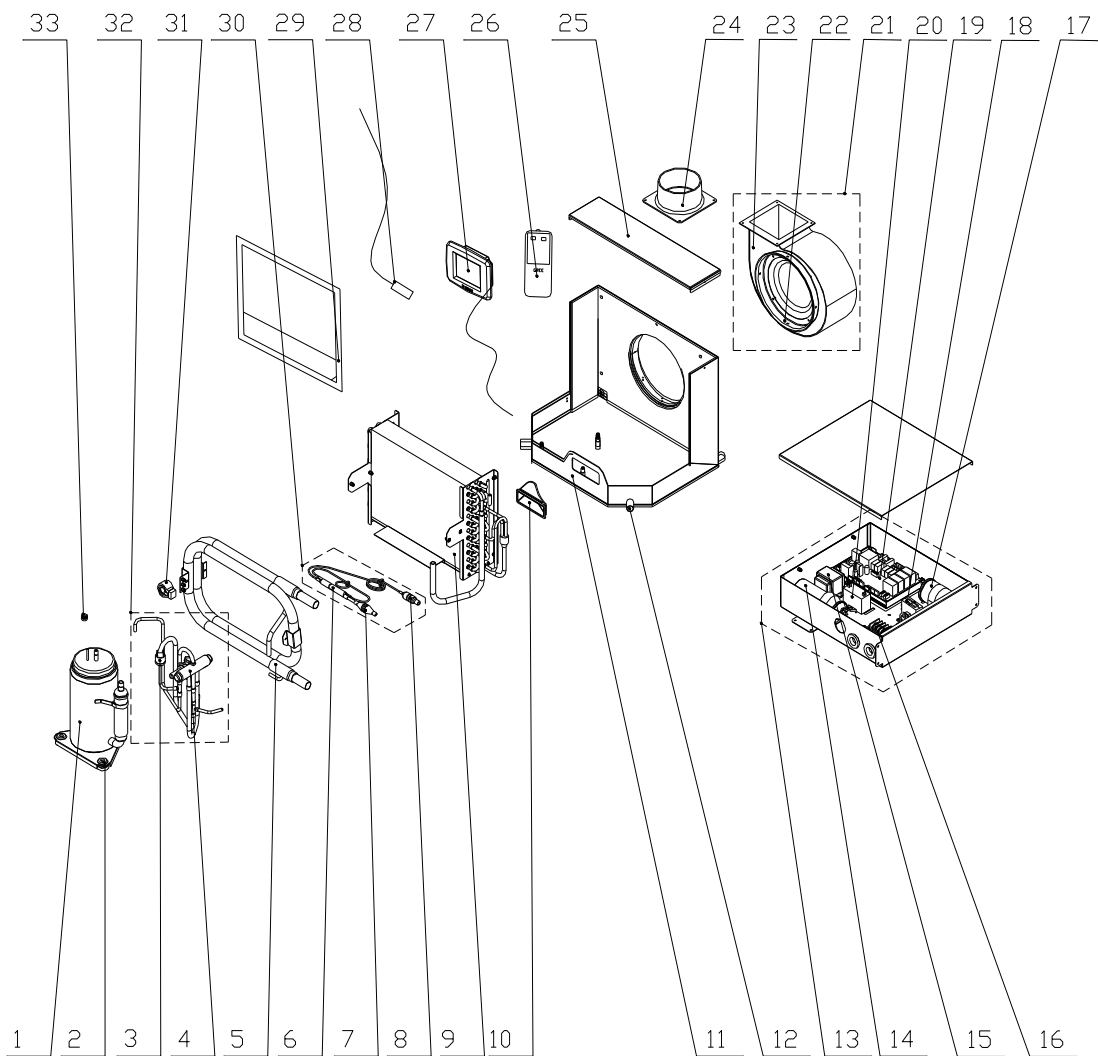


Parts List: (Product Code: EY10000561)

NO.	Name of part	Part code	Quantity
1	Compressor and Fittings	00203905	1
2	Compressor Gasket	76711040	3
3	Pressure Protect Switch	46020006	1
4	4-Way Valve	430004022	1
5	Strainer A	07210022	1
6	One Way Valve	0713010301	1
7	Filter	0721302601	1
8	Double Pipe Condenser	01139402	1
9	Evaporator Assy	01023912	1
10	Small Handle	26233100	1
11	Base Frame Assy	01283932	1
12	Drainage Hose	04363901	4
13	Electric Box Assy	01393900127	1
14	Terminal Board	42010254	1
15	AC Contactor	44010264	1
16	Capacitor	33000081	1
17	Main Board	30225000010	1
18	Capacitor	33010069	1
19	Centrifugal Fan Assy	15009408	1
20	Duct Connector	06329401	1
21	Centrifugal Fan Sub-Assy	150194011	1
22	Diversion Circle	01523903P	1
23	Transformer	43110192	1
24	Capacitor	33000045	1
25	Cover Plate Assy	01263929	1
26	Remote Controller	30510065	1
27	Display Board	30295000009	1
28	Ambient Temperature Sensor	39000285	1
29	Filter	11129405	1
30	Capillary Sub-Assy	04103918	1
31	Magnet Coil	4300040027	1
32	4-Way Valve Assy	04143911	1

2) Model: CYR9/NaC-A

Exploded View:



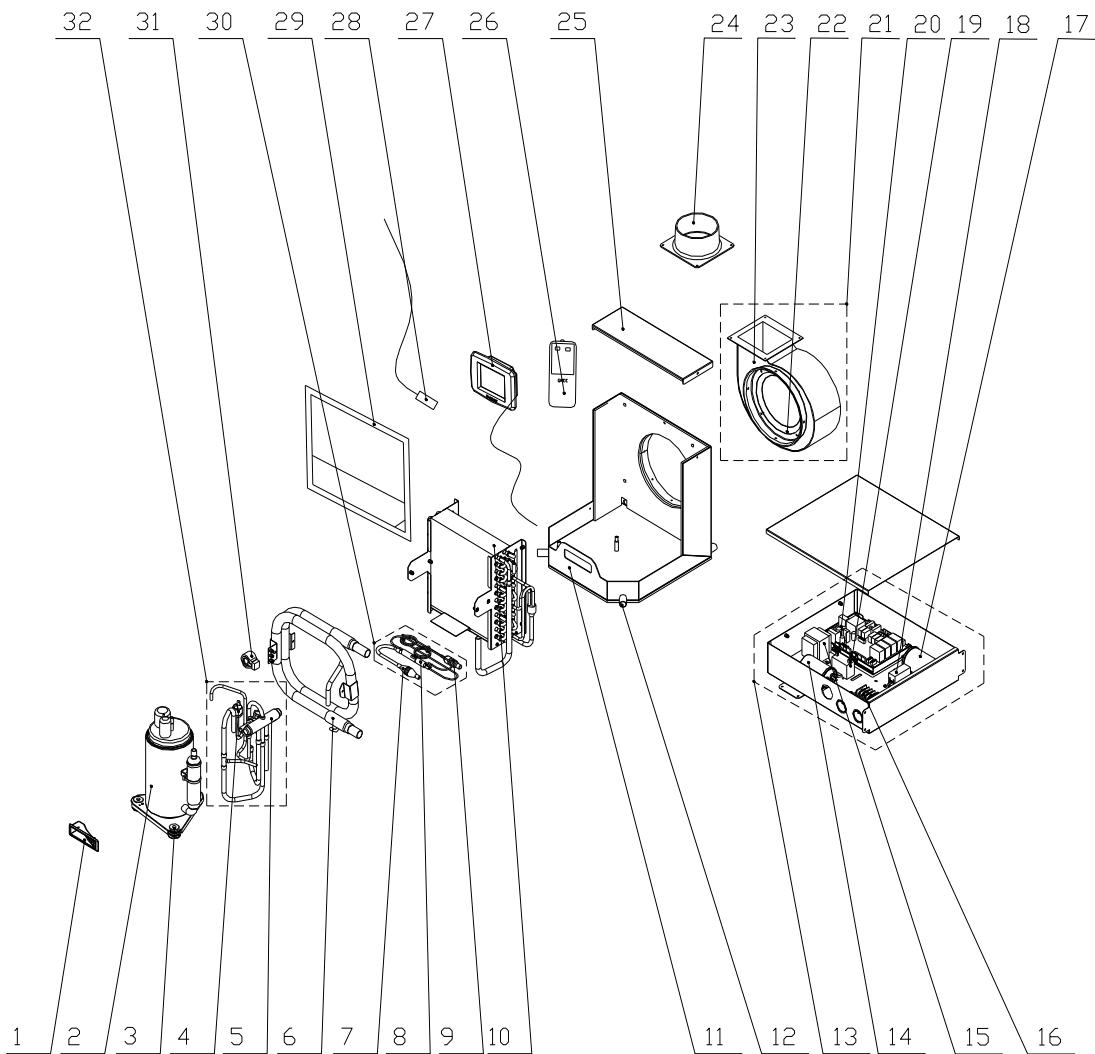


Parts List: (Product Code: EY10000581)

NO.	Name of part	Part code	Quantity
1	Compressor and Fittings	00203906	1
2	Compressor Gasket	76711040	3
3	Pressure Protect Switch	46020006	1
4	4-Way Valve	430004022	1
5	Double Pipe Condenser	01139401	1
6	One Way Valve	0713010301	1
7	Strainer A	07210022	1
8	Filter	0721302601	1
9	Evaporator Assy	01023911	1
10	Left Handle	26235401	1
11	Base Frame Assy	01283935	1
12	Drainage Hose	04363901	4
13	Electric Box Assy	01393900129	1
14	Capacitor	3300008104	1
15	Terminal Board	42010254	1
16	Capacitor	33000081	1
17	AC Contactor	'44010264	1
18	Main Board	30225000010	1
19	Capacitor	33010069	1
20	Transformer	43110192	1
21	Centrifugal Fan Assy	15403937	1
22	Diversion Circle	01523903P	1
23	Centrifugal Fan Sub-Assy	15019401	1
24	Duct Connector	06329401	1
25	Cover Plate Assy	01263930	1
26	Remote Controller	30510065	1
27	Display Board	30295000009	1
28	Ambient Temperature Sensor	39000285	1
29	Filter	11129404	1
30	Capillary Sub-Assy	04103917	1
31	Magnet Coil	4300040027	1
32	4-way Valve Assy	04143910	1
33	Compressor Overload Protector(External)	00180304	1

3) Model: CYR5/NaC-T

Exploded View:

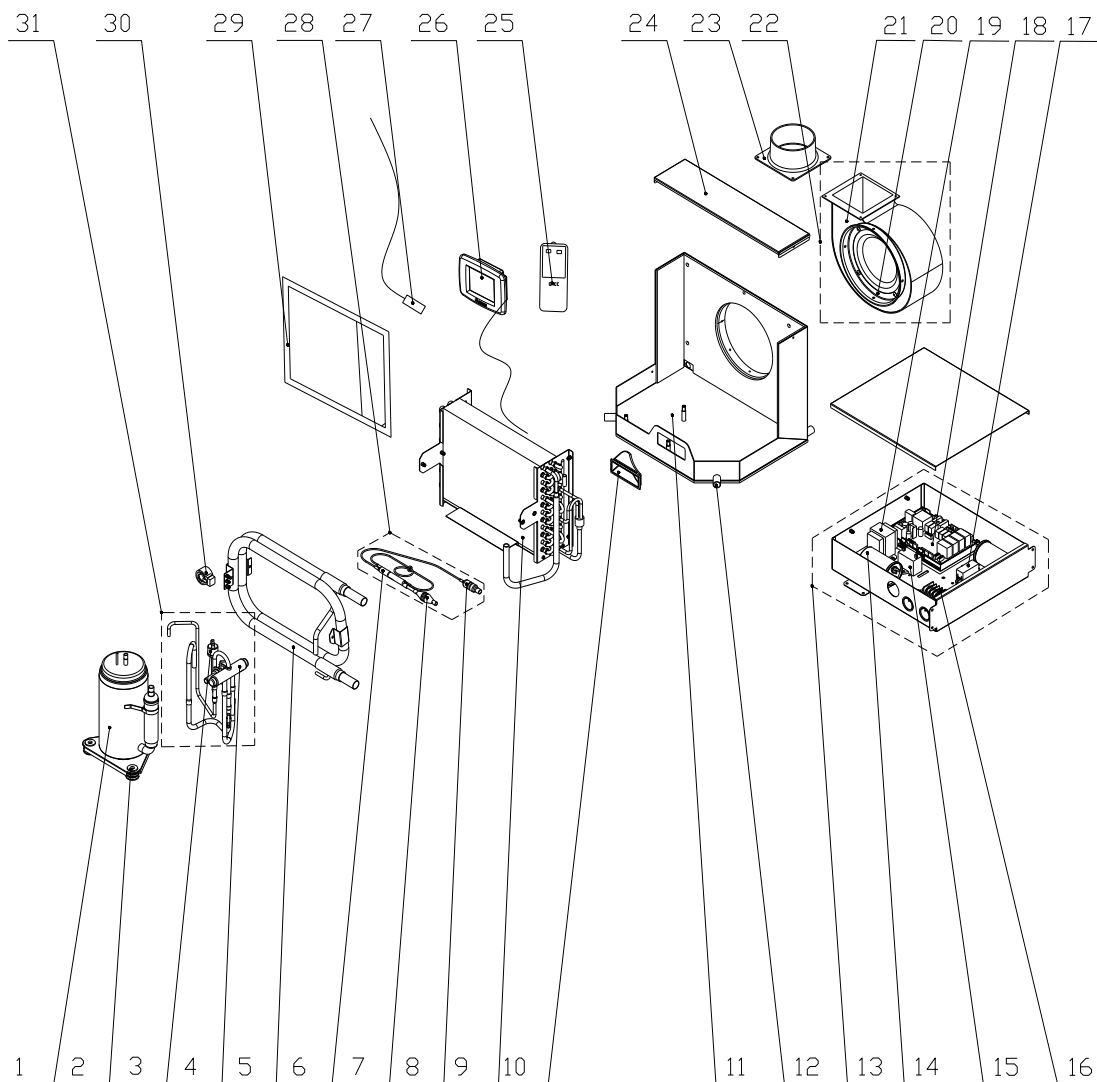


Parts List: (Product Code: EY10000571)

NO.	Name of part	Part code	Quantity
1	Small Handle	26233100	1
2	Compressor and Fittings	00203920	1
3	Compressor Gasket	76710302	3
4	Pressure Protect Switch	46020006	1
5	4-Way Valve	430004022	1
6	Double Pipe Condenser	01139402	1
7	Strainer A	07210022	1
8	One Way Valve	0713010301	1
9	Filter	0721302601	1
10	Evaporator Assy	01023912	1
11	Base Frame Assy	01284050	1
12	Drainage Hose	04363901	4
13	Electric Box Assy	01393900128	1
14	Capacitor	3300008111	1
15	Transformer	43110239	1
16	Terminal Board	42010254	1
17	Capacitor	33000081	1
18	AC Contactor	44010245	1
19	Capacitor	33010010	1
20	Main Board	30225000010	1
21	Centrifugal Fan Assy	15009412	1
22	Diversion Circle	01523903P	1
23	Centrifugal Fan Sub-Assy	150194015	1
24	Duct Connector	06329401	1
25	Cover Plate Assy	01263929	1
26	Remote Controller	30510065	1
27	Display Board	30295000009	1
28	Ambient Temperature Sensor	39000285	1
29	Filter	11129405	1
30	Capillary Sub-Assy	04103918	1
31	Magnet Coil	430004005	1
32	4-Way Valve Assy	04143911	1

4) Model: CYR9/NaC-T

Exploded View:

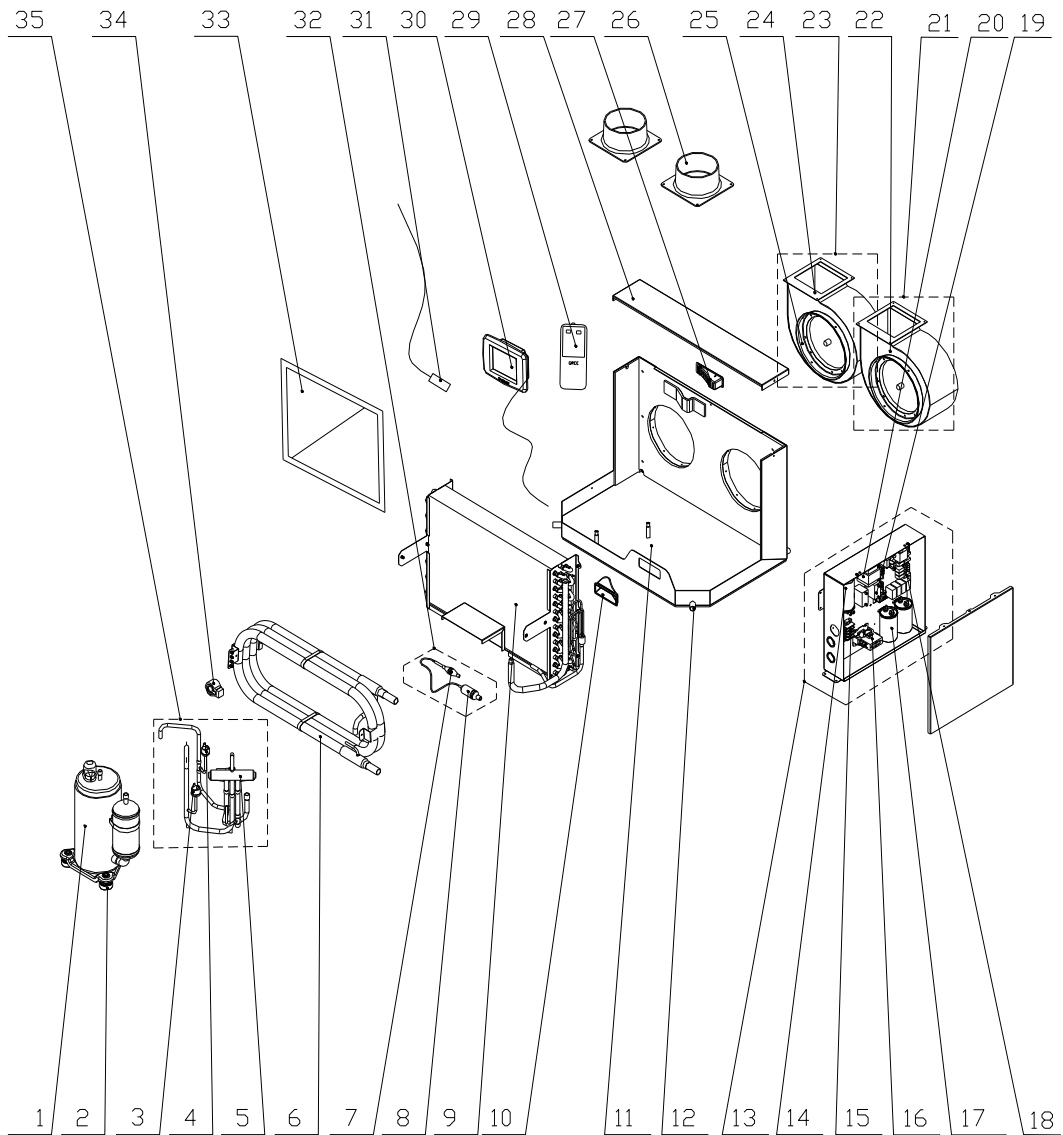


Parts List: (Product Code: EY10000591)

NO.	Name of part	Part code	Quantity
1	Compressor and Fittings	009001000048P	1
2	Compressor Gasket	00901200013	3
3	Pressure Protect Switch	46020006	1
4	4-Way Valve	430004022	1
5	Double Pipe Condenser	01139401	1
6	One Way Valve	0713010301	1
7	Strainer A	07210022	1
8	Filter	0721302601	1
9	Evaporator Assy	01023911	1
10	Left Handle	26235401	1
11	Base Frame Assy	01283945	1
12	Drainage hose	04363901	4
13	Electric Box Assy	01393900130	1
14	Capacitor	33000081	2
15	Capacitor	33010013	1
16	Terminal Board	42010254	1
17	AC Contactor	44010245	1
18	Main Board	30225000010	1
19	Transformer	43110239	1
20	Diversion Circle	01523903P	1
21	Centrifugal Fan Sub-Assy	150194014	1
22	Centrifugal Fan Assy	15009411	1
23	Duct Connector	06329401	1
24	Cover Plate Assy	01263930	1
25	Remote Controller	30510065	1
26	Display Board	30295000009	1
27	Ambient Temperature Sensor	39000285	1
28	Capillary Sub-Assy	04103929	1
29	Filter	11129404	1
30	Magnet Coil	430004005	1
31	4-way Valve Assy	04143906	1

5) Model: CYR20/NaC-T

Exploded View:



Parts List: (Product Code: EY1000601)

NO.	Name of part	Part code	Quantity
1	Compressor and Fittings	009001000141P	1
2	Compressor Gasket	0000022037	3
3	Pressure Protect Switch	46020007	1
4	Pressure Protect Switch	46020006	1
5	4-Way Valve	430004032	1
6	Double Pipe Heat Exchanger	010011000018	1
7	Strainer A	0721302603	1
8	Strainer	07213026	1
9	Evaporator Assy	011001000366	1
10	Left Handle	26235401	1
11	Base Frame Assy	01283900003	1
12	Drainage Hose	04363901	4
13	Electric Box Assy	01393900125	1
14	Capacitor	3300008102	1
15	Terminal Board	42010254	1
16	AC Contactor	44010245	1
17	Capacitor	33000081	2
18	Main Board	30225000010	1
19	Capacitor	33010010	2
20	Transformer	43110239	1
21	Centrifugal Fan Assy	15403950	1
22	Centrifugal Blower Sub-Assy	150094065	1
23	Centrifugal Fan Assy	15403943	1
24	Centrifugal Fan Sub-Assy	150094067	1
25	Diversion Circle	01523902P	2
26	Duct Connector	06329402	2
27	Small Handle	26233100	1
28	Cover Plate Assy	01263972	1
29	Remote Controller	30510065	1
30	Display Board	30295000009	1
31	Ambient Temperature Sensor	39000285	1
32	Capillary Sub-Assy	030006000517	1
33	Filter	11723905	1
34	Magnet Coil	430004005	1
35	4-Way Valve Assy	04043900001	1



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