



Service Manual

MARINE AIR CONDITIONNERS SERVICE MANUAL

Capacity: 1.35kW~5.85kW

Rated Frequency: 50Hz、60Hz

Operation Range : -10°C~43°C


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1 PRODUCT

1.1 MODELS LIST

Model	Product Code	Capacity		Refrigerant	Power Supply	Appearance
		Cooling (Btu/h)	Heating (Btu/h)			
CYR12/Na-A	EY10000222	11900	11900	R410A	115V~ 1Ph 60Hz	
CYR16/Na-A	EY10000232	13500	16900		115V~ 1Ph 60Hz	
CYR12/Na-T	EY10000421	10500	10900		220-240V~1Ph 50Hz	
		11900	12200		230V~1Ph 60Hz	
CYR16/Na-T	EY10000401	10900	13600		220-240V~1Ph 50Hz	
		11900	15000		230V~1Ph 60Hz	

1.2 NOMENCLATURE

C Y	—	R	12	/	Na	—	—	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	12=12000 Btu/h; 16=16000 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.

1.3 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.

1.4 PRODUCT DATA

Product Data at Rated Condition

Model		CYR12/N a-A	CYR16/N a-A	CYR12/Na-T		CYR16/Na-T		
Product Code		EY100002 22	EY100002 32	EY10000421		EY10000401		
Cooling	Nominal Capacity	W	3500	3950	3100	3500	3200	3500
	Running Current	A	10.00	12.00	6.10	5.30	6.00	6.20
	Power Input	W	1200	1360	1100	1200	1200	1450
Heating	Nominal Capacity	W	3500	4950	3200	3600	4000	4400
	Running Current	A	10.00	12.00	6.00	4.90	6.10	6.30
	Power Input	W	1100	1330	1100	1100	1300	1500
Power Supply		—	115V~ 60Hz		220-240V-50Hz- 1Ph	230V-60Hz- 1Ph	220-240V-50Hz- 1Ph	230V-60Hz- 1Ph
Compressor Type		—	Rotary					
Refrigerant Control		—	Capillary					
Refrigerant	Type	—	R410A					
	Charge	kg	0.55	0.54	0.53	0.53	0.46	0.46
Condens	Type	—	Coaxial heat exchanger					

er	Pipe Diameter	mm	22.2	25.4	22.2	22.2	25.4	25.4
Evaporator Type		—	Hydrophilic-louver					
Filter		—	PP					
Fan	Type	—	Centrifugal fan					
	Drive Type	—	Direct					
	Quantity	—	1					
	Diameter-Height	Inch	Φ7.48×3.0	Φ7.48×3.6	Φ7.48×3.0	Φ7.48×3.0	Φ7.48×3.6	Φ7.48×3.6
Sound Pressure Level		dB(A)	58	60	58	58	62	62
Unit Dimensions	width	mm	380	450	380	380	450	450
	depth	mm	420	465	420	420	465	465
	high	mm	330	330	330	330	330	330
Net weight		kg	33	37.5	33	33	37.5	37.5

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℃; Water-in temp: 32℃; Water-out temp: 36℃ and static pressure is 20Pa;
- 2) Test Condition of Nominal Heating Capacity: Indoor side-dry/wet bulb temp: 22/-℃; Water-in temp: 15℃; 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.

1.4.1 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	

1.4.2 Electrical Data

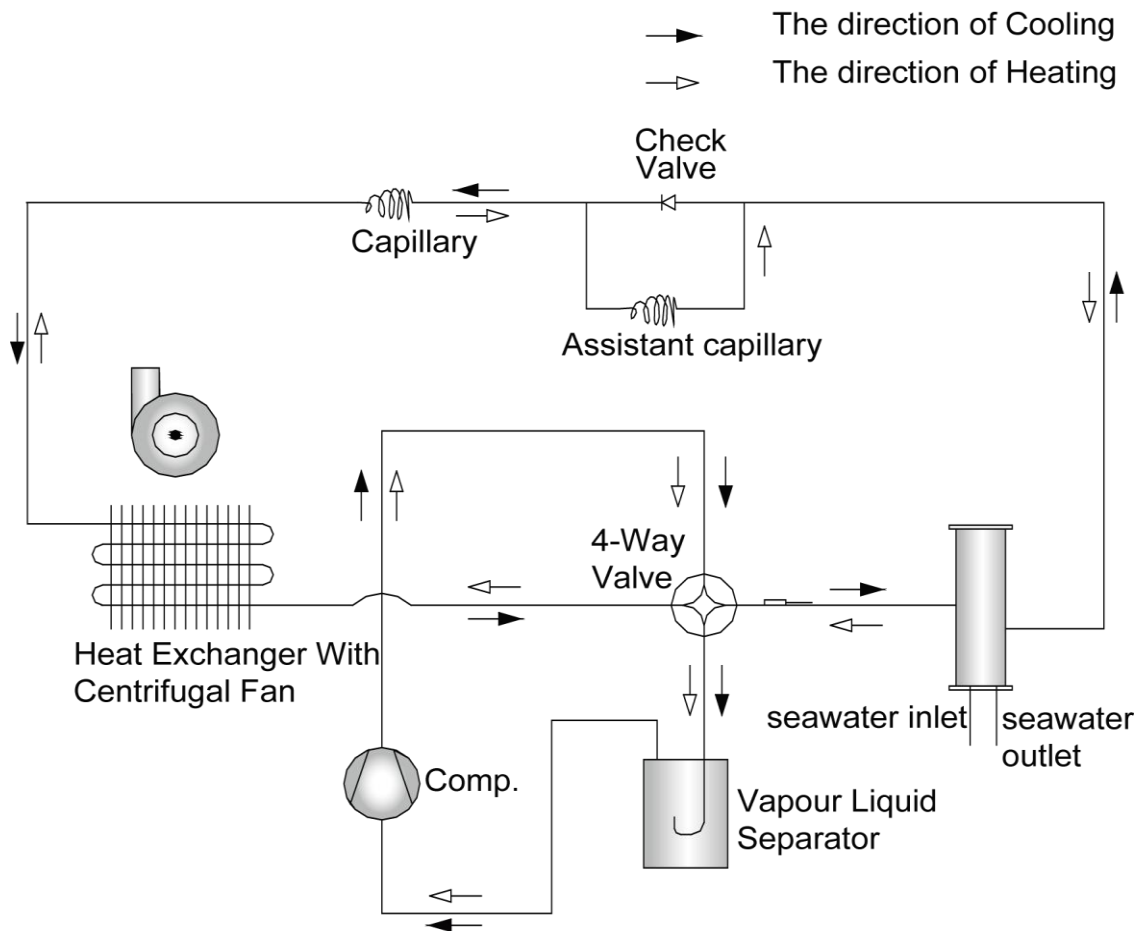
Model	Compressor				Supply Blower Motor		
	Power Supply	Qty.	RLA(A)	LRA(A)			
	V, Ph, Hz	—	Each	Each	Each RLA(A)		
CYR12/Na-A	115V~ 1Ph 60Hz	1	10.70		47.0	1.34	
CYR16/Na-A			11.70		60.0	2.1	
CYR12/Na-T	230V~ 1Ph 60Hz	1	5.5(60Hz)	5.8(50Hz)	27(60Hz)	29(50Hz)	0.7
CYR16/Na-T	220-240V~ 1Ph 50Hz		5.85(60Hz)	5.98(50Hz)	35(60Hz)	38(50Hz)	0.7

Notes:

RLA: Rated load amperes.

LRA: Locked rotor amperes.

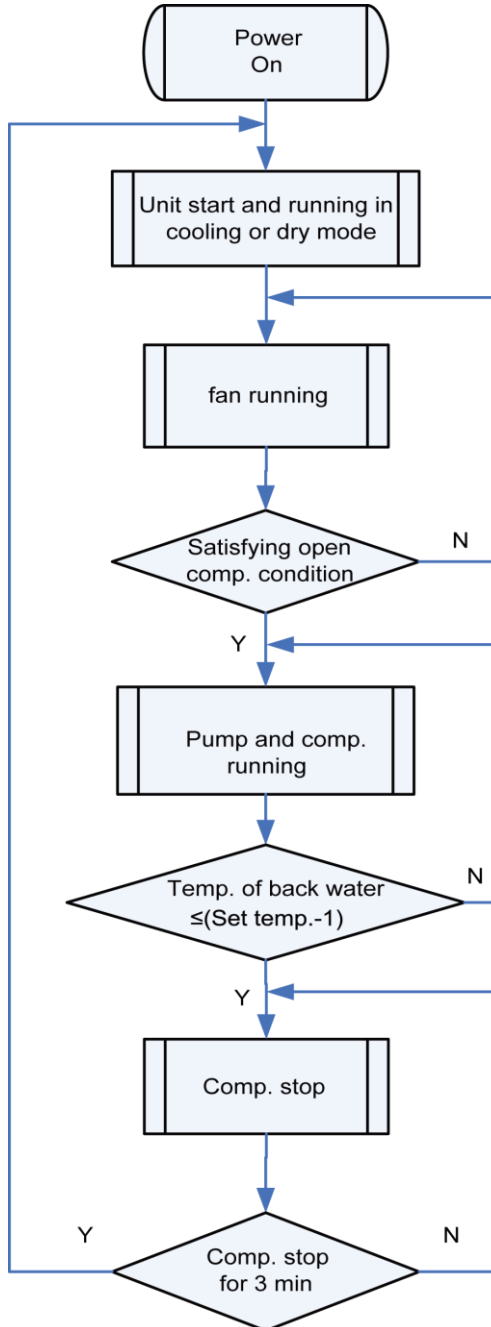
1.5 PIPING DIAGRAM



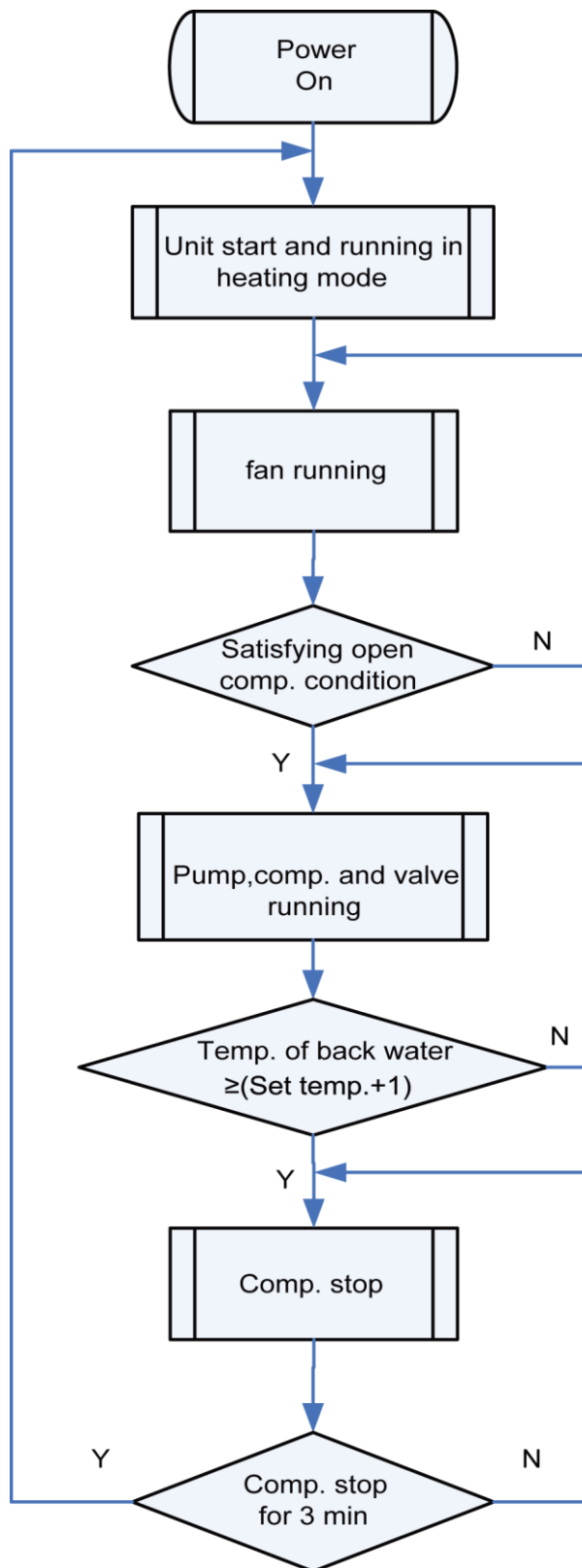
2 CONTROL

2.1 OPERATION FLOWCHART

2.1.1 Cooling/Dry Operation



2.1.2 Heating Operation



2.2 MAIN LOGIC

2.2.1 Cooling/Dry Mode

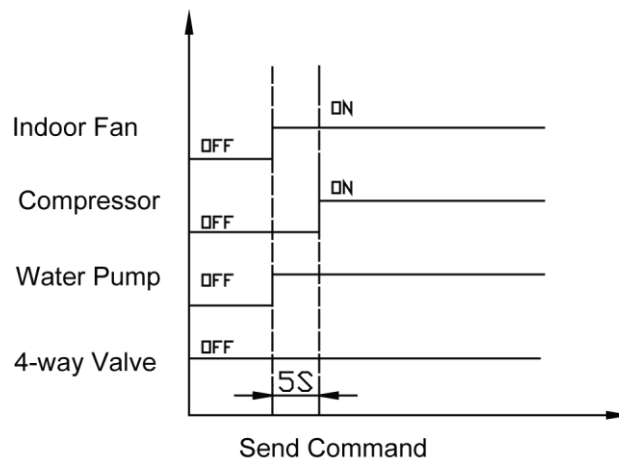
2.2.1.1 Cooling ON

Condition: Compressor ON: $T_{amb} \geq T_{set} + 1^{\circ}\text{C}$ and no error at the same time. When cooling is entered (they are just conditions for compressor ON, if they can't be met, only indoor fan is running when startup of the unit while water pump and compressor are not running).

Description:

- Water pump starts up after the cooling command is sent.
- After indoor fan has been running at high speed for 5s, it turns to low speed.
- Compressor is ON after water pump has started up for 5s
- 4-way valve closes.

Sequence Chart:



2.2.1.2 Betweenness of Cooling

Condition: $T_{set} - 1^{\circ}\text{C} < T_{amb} < T_{set} + 1^{\circ}\text{C}$

Description:

- Indoor fan keeps the original status.
- Water pump keeps the original status.
- Compressor keeps the original status.
- Other loads don't need to work,

2.2.1.3 Cooling OFF

There are two ways to make the unit cooling off.

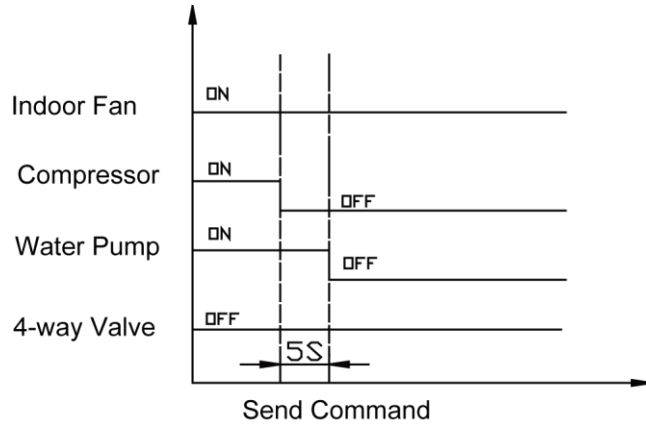
(1) The way depends on the temperature.

Condition:

$T_{amb} \leq T_{set} - 1^{\circ}\text{C}$ and no error at the same time (if there is error, handle it according to troubleshooting sequence).

Description:

- a. Indoor fan is running at setting speed.
- b. Compressor stops
- c. Water pump stops after the compressor has stopped for 5s.
- d. Sequence Chart

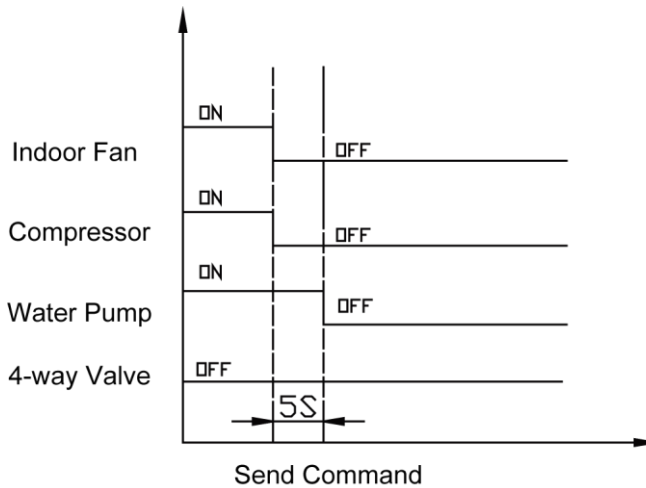


(2)The way depends on the command.

Description:

- a. After the command is sent, the compressor stops.
- b. Indoor unit and indoor fan stop at the same time.
- c. 5s later water pump stops.

Sequence Chart:



2.2.2 Heating Mode(Defrosting/ Auxiliary Electric Heater)

2.2.2.1 Heating ON

Condition:

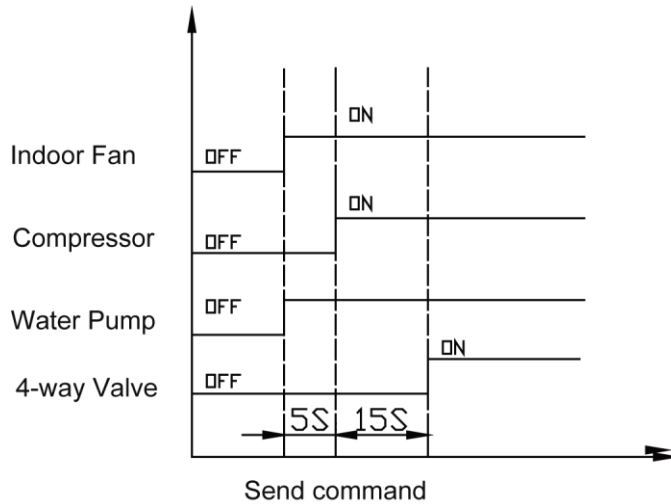
Compressor ON: if $T_{amb} \leq T_{set} - 1^{\circ}C$ and there is no error at the same time, the heating will be entered.

Description:

- a. The indoor unit starts up when the command has been sent.
- b. Water pump starts up at the same time.

- c. Compressor starts up when the water pump has started up for 5s.
- d. When compressor firstly starts up for 15s, 4-way valve is energized.

Sequence Chart:



2.2.2.2 Betweenness of Heating

Condition:

$T_{set} - 1^{\circ}C < T_{amb} < T_{set} + 1^{\circ}C$ and no error at the same time((if there is error, handle it according to troubleshooting sequence).

Description:

- a. Indoor fan keeps original status.
- b. Water pump keeps original status.
- c. Compressor keeps original status.
- d. 4-way valve keeps original status.

2.2.2.3 Heating OFF

There are two ways to make the unit heating off.

(1)The way depends on the temperature.

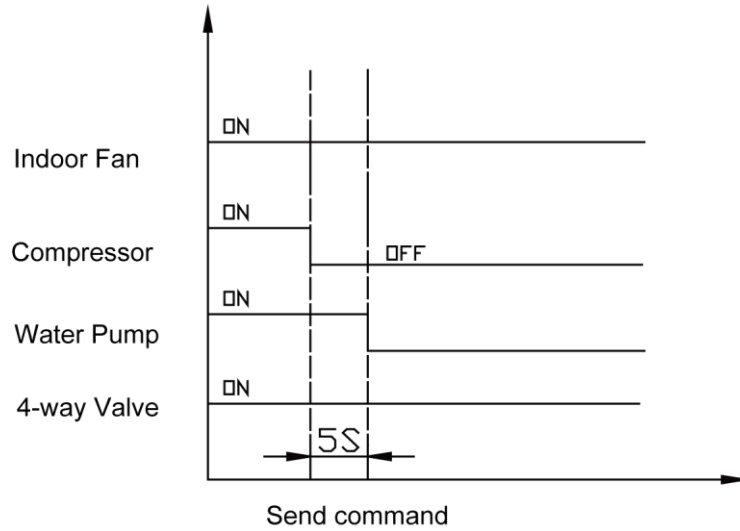
Condition:

$T_{amb} \geq T_{set} + 1^{\circ}C$ and and no error at the same time((if there is error, handle it according to troubleshooting sequence).

Description:

- a. Indoor fan is running at setting speed.
- b. Compressor stops.
- c. 5s later, water pump stops.
- d. 4-way valve keeps being energized.

Sequence Chart:

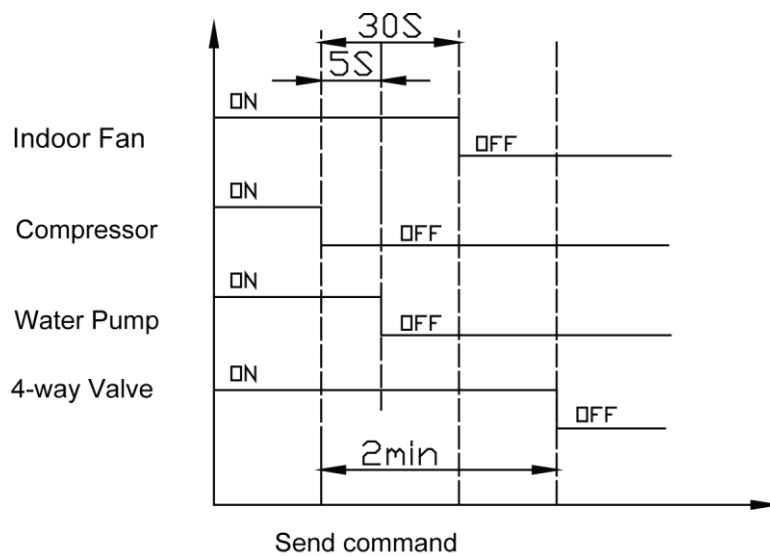


(2)The way depends on the command.

Description:

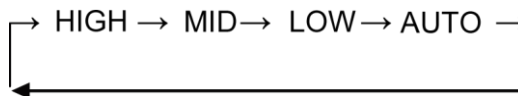
- a. Compressor stops after command is sent.
- b. 5s later, water pump stops.
- c. 30s later after the stop of compressor, indoor fan stops.
- d. 4-way valve is deenergized after the compressor has stopped for 2min.

Sequence Chart:



2.2.3 Fan Mode

Indoor fan is running at setting speed and there are three options for the speed.



Auto Air Speed:

Heating:

If $T_{amb} \geq T_{set}$, it is automatically set to be low speed.

If $T_{set} - 2^{\circ}\text{C} < T_{amb} < T_{set}$, it is automatically set to be mediate speed.

If $T_{amb} \leq T_{set} - 2^{\circ}\text{C}$, it is automatically set to be high speed.

During this course, there must be 30s delay at least.

Cooling:

If $T_{amb} \leq T_{set}^{\circ}\text{C}$, it is automatically set to be low speed.

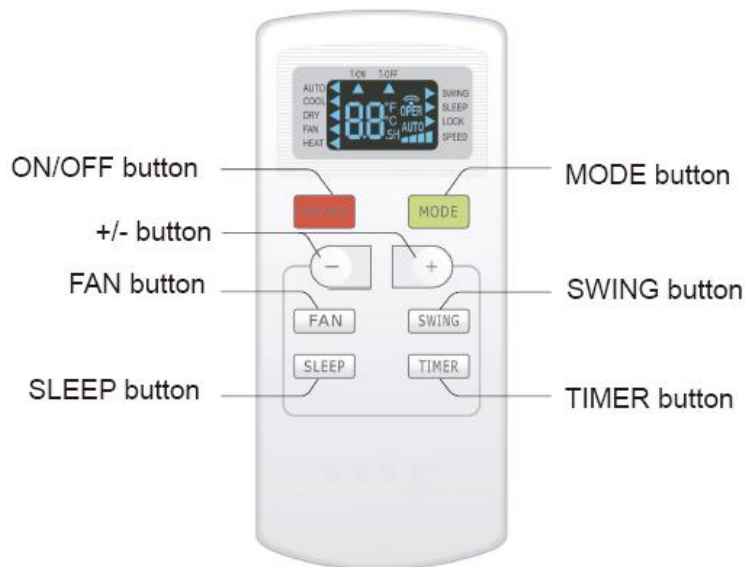
If $T_{set} < T_{amb} < T_{set} + 3^{\circ}\text{C}$ it is automatically set to be mediate speed.

If $T_{amb} \geq T_{set} + 3^{\circ}\text{C}$ it is automatically set to be high speed.

2.3 REMOTE CONTROLLER

2.3.1 Wireless Remote Controller

2.3.1.1 Operation View



2.3.1.2 ON/OFF button

Press this button to turn unit on/off.

2.3.1.3 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.

2.3.1.4 + / - 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)

2.3.1.5 FAN button

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



Note:

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

2.3.1.6 SWING button

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

2.3.1.7 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.

2.3.1.8 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:

- Range of time setting is: 0.5~24h
- The interval between two motions can't exceed 5s, otherwise the remote controller will exit setting status.
- Timer function is not available for this model.

2.3.1.9 Introduction for special function

2.3.1.9.1 Child lock function

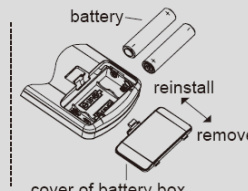
Press “+” and “-” buttons simultaneously can turn on or turn off child lock function. When child lock function is started up, LOCK indicator on remote controller is ON. If you operate the remote controller, remote controller won't send signal.

2.3.1.9.2 Temperature display switchover function

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

2.3.1.10 Replacement of batteries

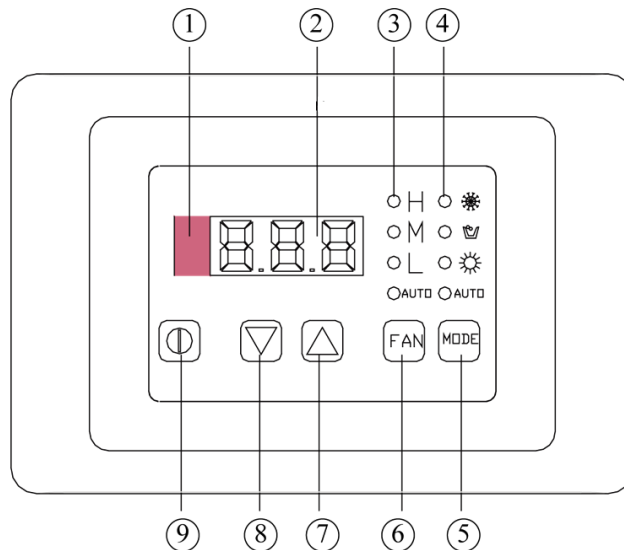
1. Press the back side of remote controller on the spot marked with "🔪", and then push out the cover of battery box along the arrow direction.
2. Replace two No.7 (AAA 1.5V) dry batteries and make sure the positions of + and - polar are correct.
3. Reinstall the cover of battery box.



- 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.

2.3.2 Wired Remote Controller

2.3.2.1 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

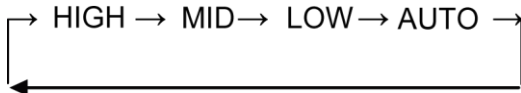
after 5 seconds delay of the compressor stopping

2.3.2.2 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

2.3.2.3 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.

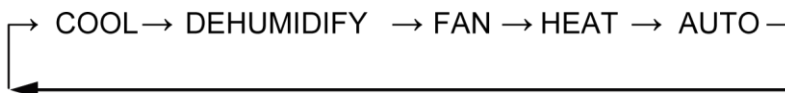
2.3.2.4 Temperature Setting


- 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 Note: Under auto mode, display board Z5A35 can't be adjusted.

2.3.2.5 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.**

2.3.2.6 Display Fahrenheit or Centigrade

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

2.3.2.7 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

2.3.2.8 Key Lock

1) Press ▼ and FAN key simultaneously, all keys are locked. Press ▼ and Fan key simultaneously again, unlock the keys.

2) When keys are locked, the controller is locked out of system operation. “EE” will be displayed.

2.3.2.9 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 ▲ 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 ▲ key or ▼ key to set up interval number. Next, pressing ▲ 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 128×20=2560s.

- When the value be displayed by flashing nixie tube, then to shield each signal of wireless remote controller, excepting to press the ▲ 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 ▲ 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 0-5100 second.(85min)

- If there is malfunction happen, cannot set up or display the time of starting interval.

2.3.2.10 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 units 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.

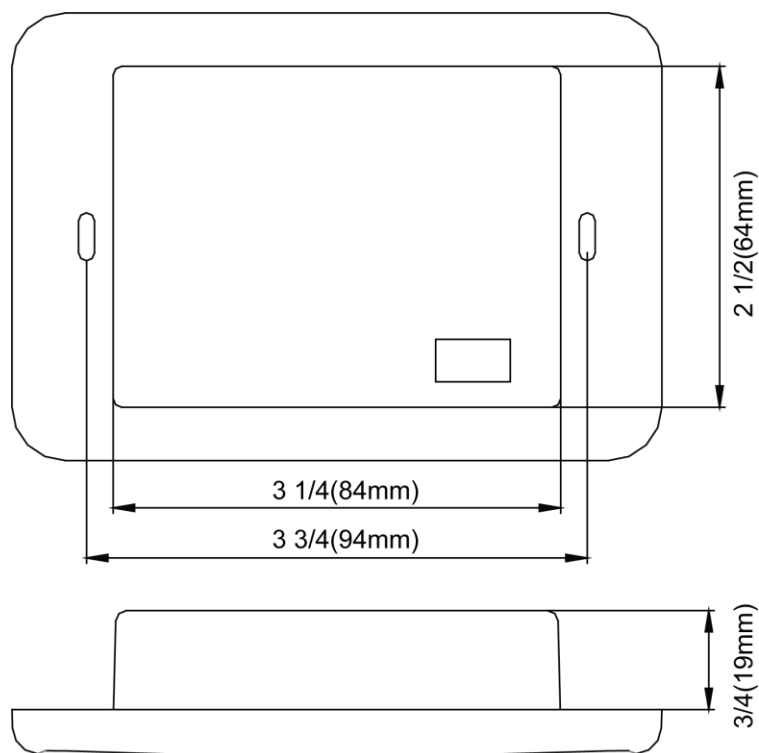
- Powered on again if the unit status is on before power off, temperature indicator and mode indicator of the manual controller will light on automatically.

- 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.

2.3.3 Dimension

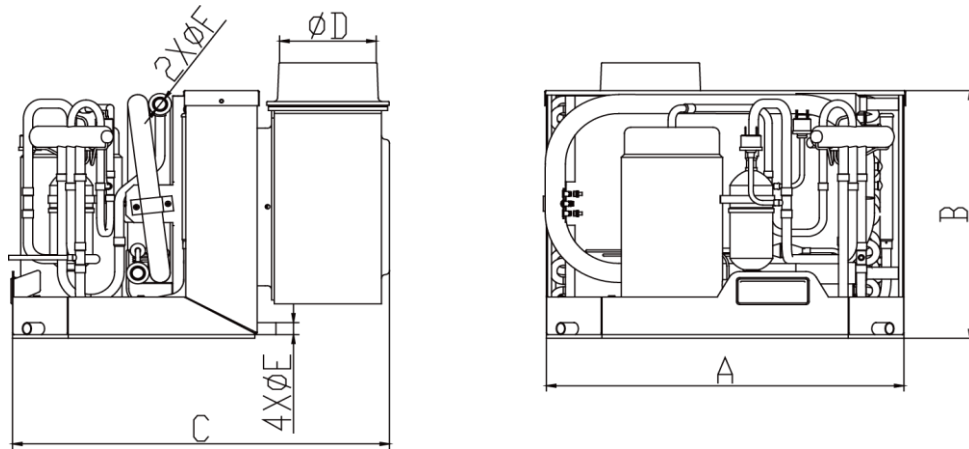


2.3.4 Installation

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 $2 \frac{1}{2}$ " (64mm) wide by $3 \frac{5}{16}$ " (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.

3 INSTALLATION

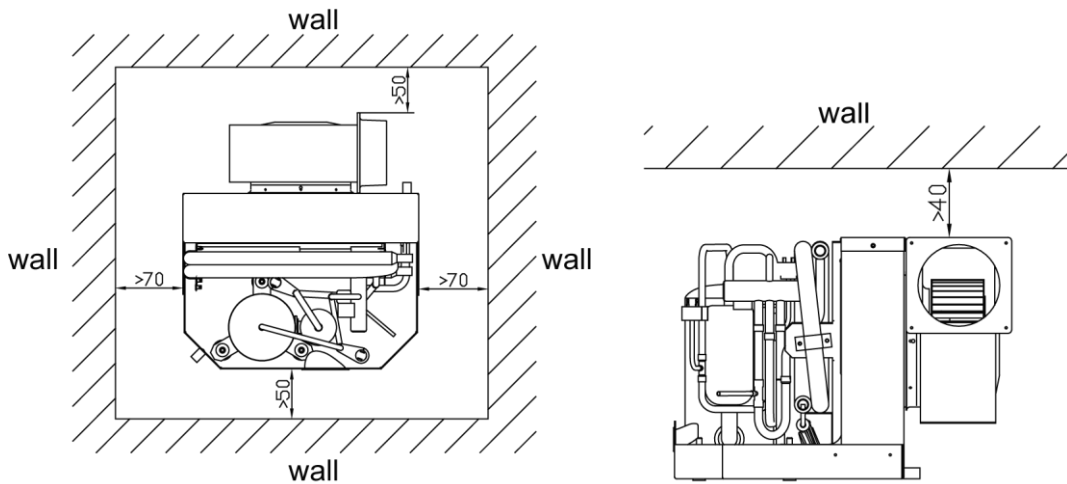
3.1 Dimension Data



Units: mm

	A	B	C	D	E	F
CYR12/Na-A	380	330	420	119.4	16	19
CYR12/Na-T						
CYR16/Na-A	450	330	465	119.4	16	19
CYR16/Na-T						

3.2 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.

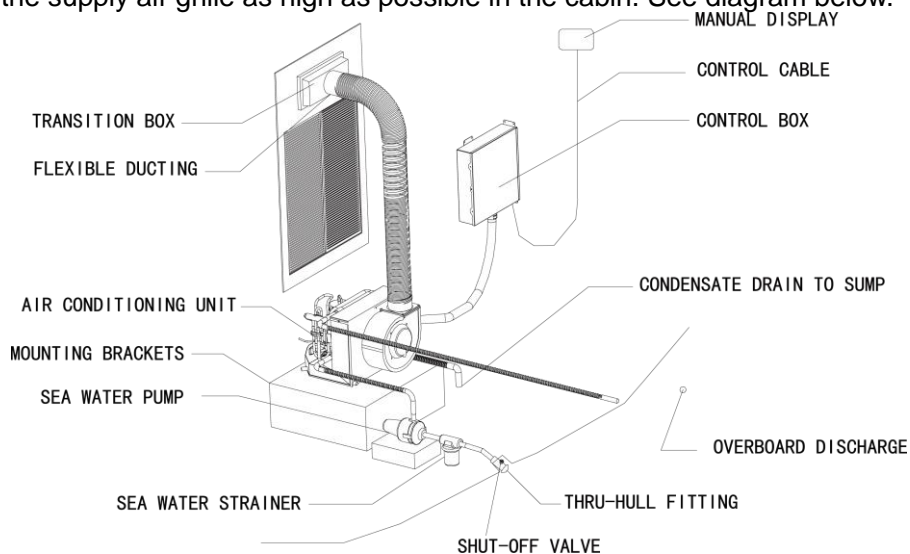
Two drain fittings may be used and the hoses (teed) together using a tee fitting provided there is a minimum

 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.

3.3 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.

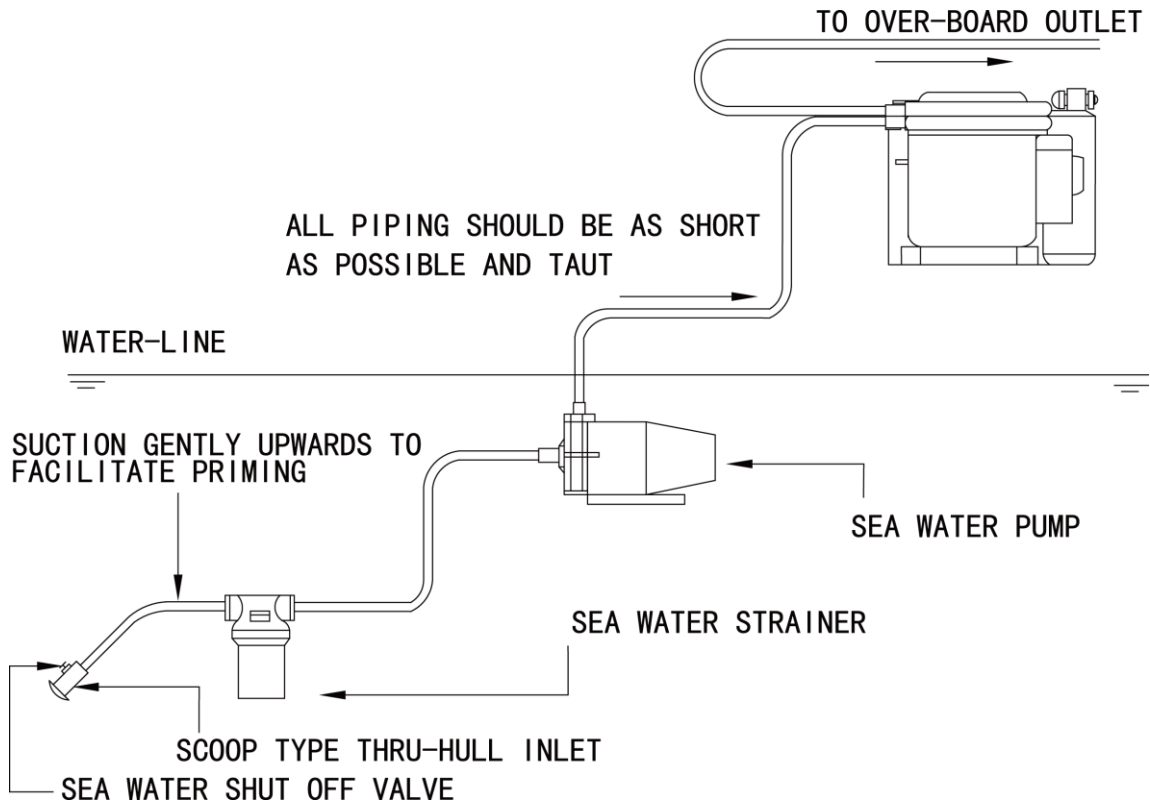
The unit should be positioned on a firm, level, horizontal surface and the condensate drain line should run downward from the unit to a suitable drain location. Plan all Connections, which must be made including ducting, condensate drain, and seawater in and out, electrical power connections, location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

3.4 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.

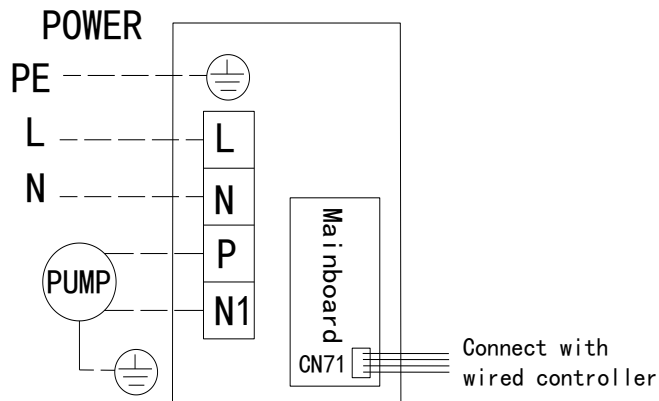
Summary of the seawater system installation:

- 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. 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 5/8" 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 5/8" 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.



3.5 ELECTRIC WIRING WORK

3.5.1 Electric Wiring Design



3.5.2 Specification of Power Supply Wire and Air Switch

Model	Power Supply	Capability of Air Swith	Minimum Sectional Area of Earth Wire	Minimum Sectional Area of Power Supply Wire
	V Ph Hz	(A)	(mm ²)	(mm ²)
CYR12/Na-A	1PH 115V~ 60Hz	16	2.5	2.5
CYR16/Na-A		25	6.0	6.0
CYR12/Na-T	1PH 230V~ 60Hz	10	1.5	1.5
CYR16/Na-T	1PH 220-240V~50Hz	10	1.5	1.5

4 MAINTENANCE

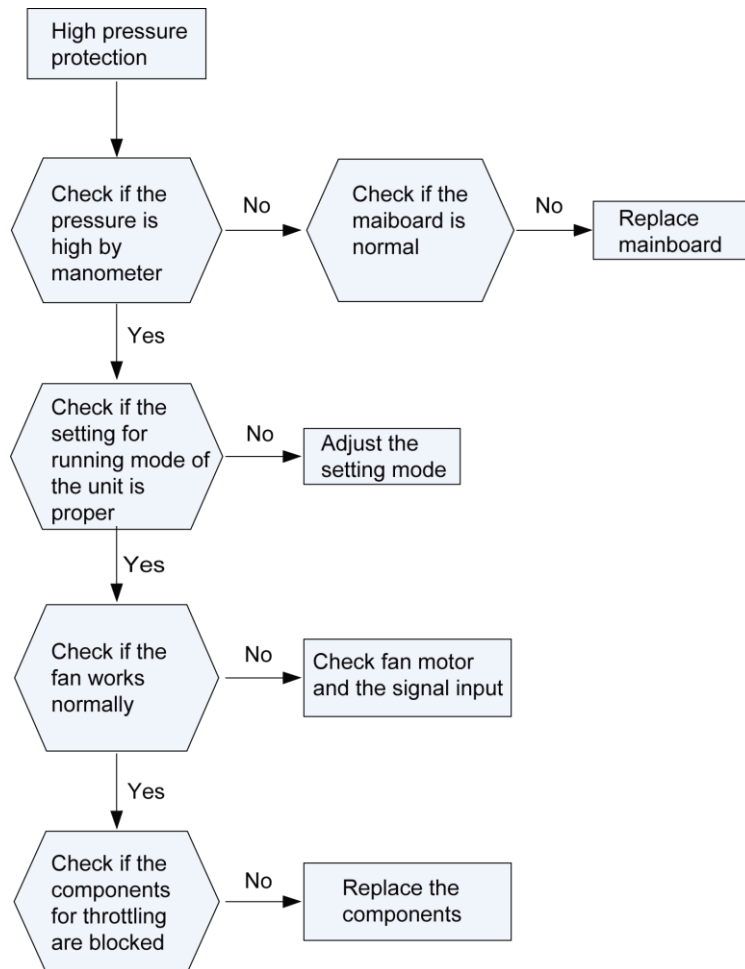
4.1 TROUBLE TABLE

Trouble Code	Trouble Name	Origin of Trouble Signal	Control Description
E1	High Pressure Protection of Compressor	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 $<-2^{\circ}\text{C}$ is detected for continuous 3min, compressor will stop, fan will keep original status, nixie display indicator will display "E2". When Teva $\geq 10^{\circ}\text{C}$ 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.

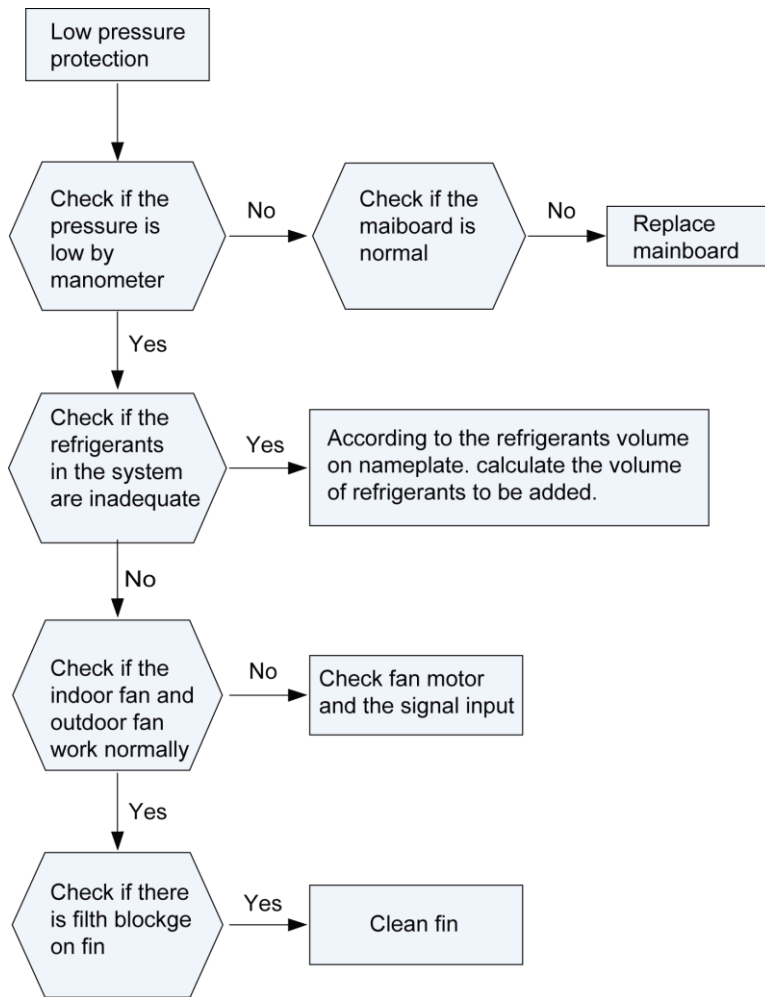
Trouble Code	Trouble Name	Origin of Trouble Signal	Control Description
E6	Communication Error Protection	Communication malfunction	<p>When communication error has been detected for 1min, system is turned off (4-way valve is excluded when heating and indoor fan stops after the compressor has stopped for 30s.) and E6 is displayed. After the communication turns to normal, system resumes running and error code is cleared.</p>
F0	Indoor Ambient 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, 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.</p>
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. Under air supply mode, only error code is displayed and fan works normally. When error is cleared, error code will disappear.</p>

4.2 FLOW CHART OF TROUBLESHOOTING

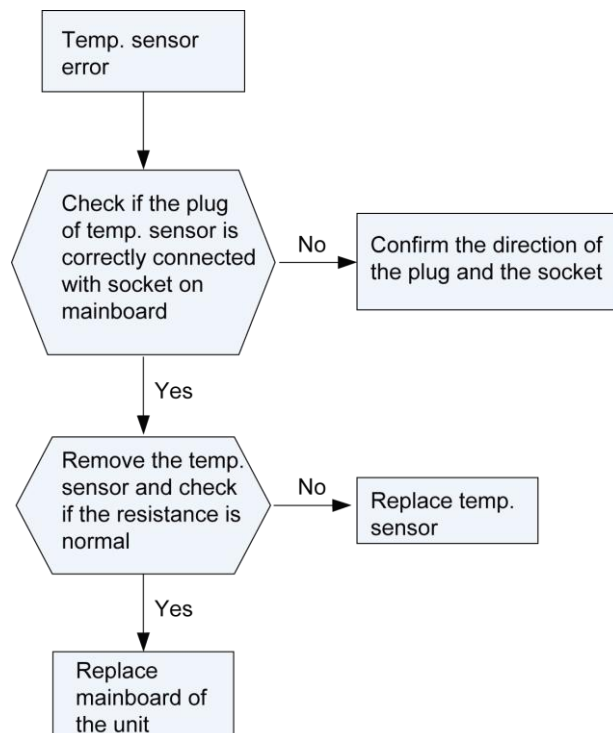
4.2.1 High Pressure Protection



4.2.2 Low Pressure Protection



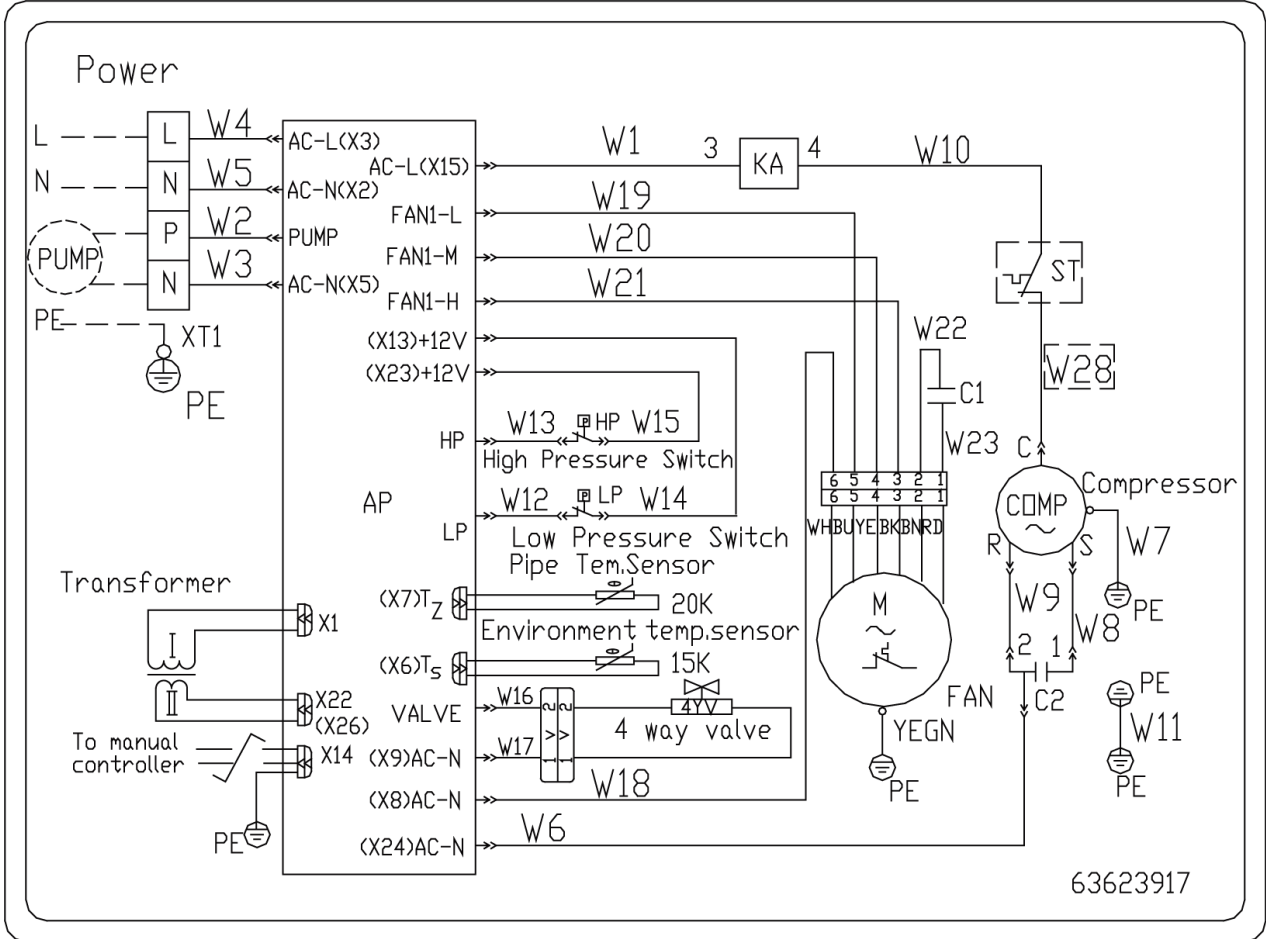
4.2.3 Temp Sensor Error



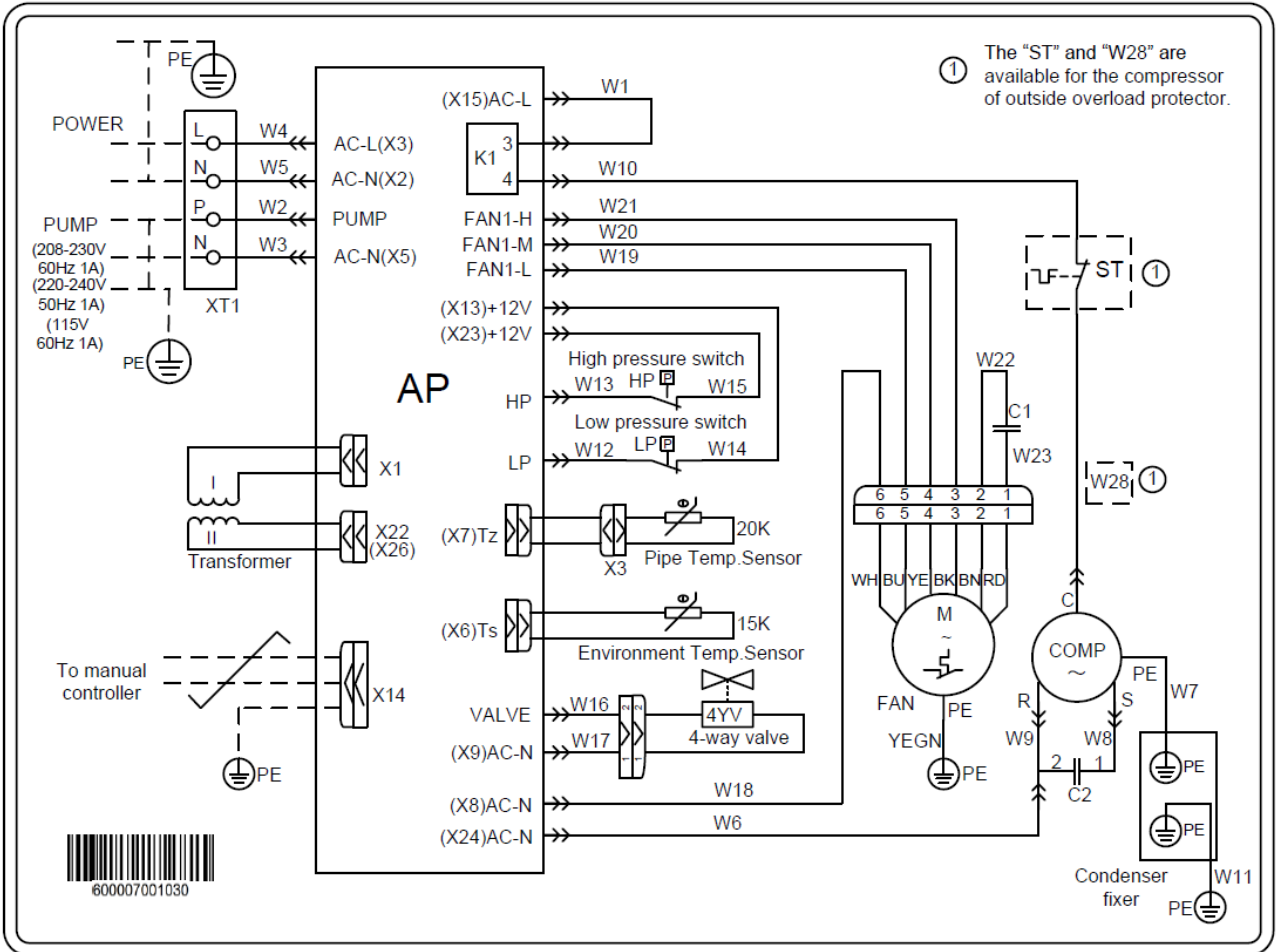
4.3 WIRING DIAGRAM

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

CYR12/Na-A, CYR12/Na-T



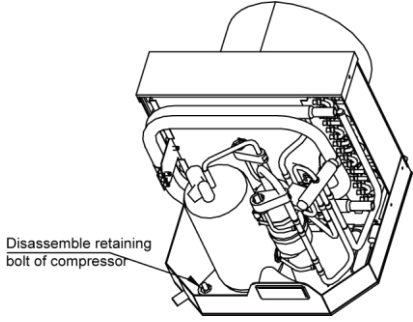
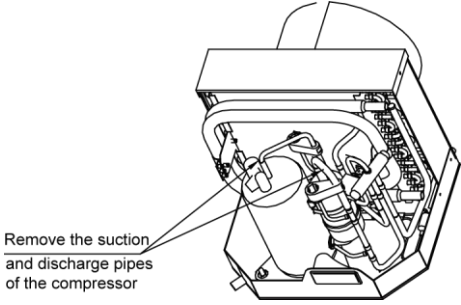
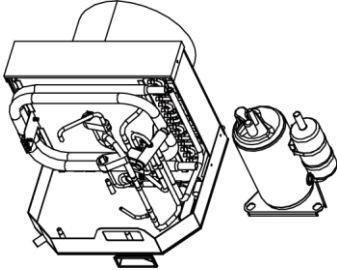
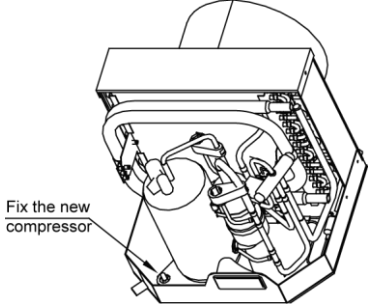
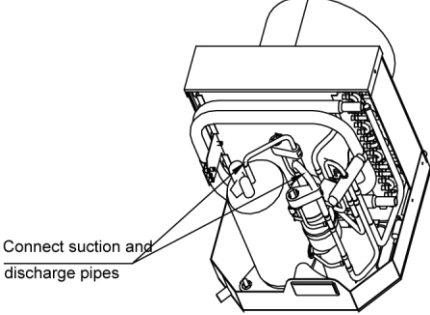
CYR16/Na-A, CYR16/Na-T

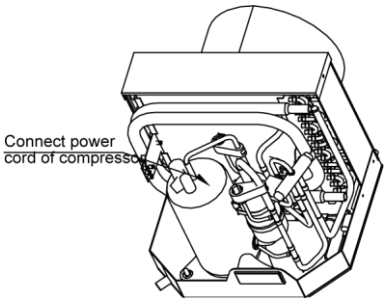
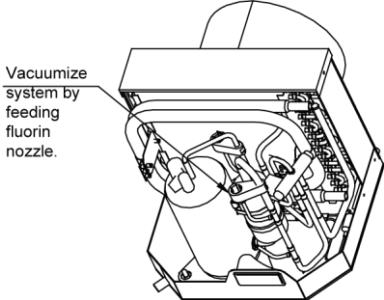
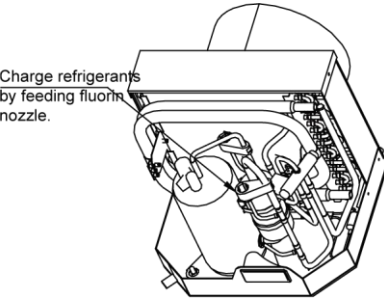


4.4 DISASSEMBLY AND ASSEMBLY PROCEDURE OF MAIN PARTS

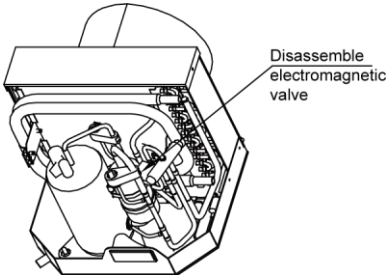
4.4.1 Compressor

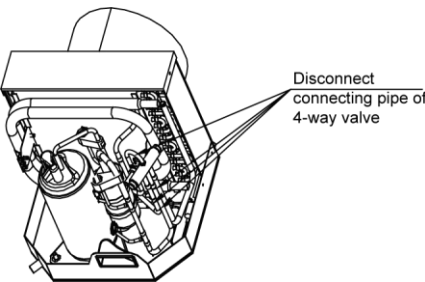
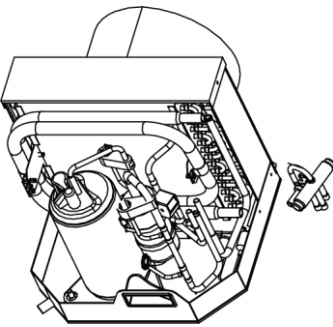
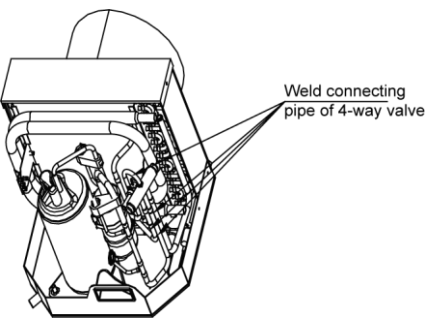
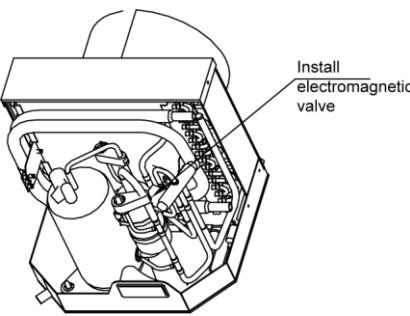
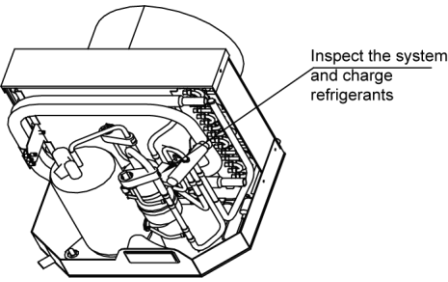
Disassembly and Assembly of Compressor		
Remark : Make sure that there isn't any refrigerant in pipe system and the power supply is cut off before removal of the compressor.		
Process	Pictorial View	Handling Description
1. Disconnect the power cord		<ul style="list-style-type: none"> • Unscrew the retaining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

<p>2. Disassemble retaining nut</p>		<ul style="list-style-type: none"> • Unscrew retaining nut by screwdriver.
<p>3. Disassemble the discharge pipe and the suction and discharge pipe of compressor.</p>		<ul style="list-style-type: none"> • Heating action and discharge pipe by acetylene welding and then unplug them from compressor. • Conduct nitrogen-fill protection on process pipe and the pressure of nitrogen is $0.5 \pm 0.1 \text{ kgf/cm}^2$ (relative pressure). • Heat it with caution in case the surroundings get burnt due to high temperature
<p>4. Remove compressor</p>		<ul style="list-style-type: none"> • Remove the compressor from chassis.
<p>5. Fix the new compressor on chassis.</p>		<ul style="list-style-type: none"> • Place the new compressor on the accurate position • Screw up retaining bolts of compressor • Don't inversely place the compressor
<p>6. Connect the inlet and outlet of compressor with pipeline of system.</p>		<ul style="list-style-type: none"> • Weld suction and discharge pipe by acetylene welding • Conduct nitrogen-fill protection on process pipe and the pressure of nitrogen is $0.5 \pm 0.1 \text{ kgf/cm}^2$ (relative pressure). • Heat it with caution in case the surroundings get burnt due to high temperature

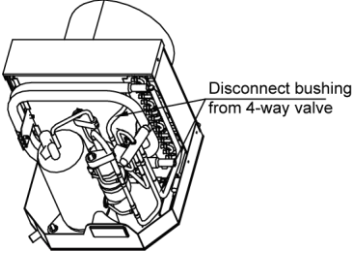
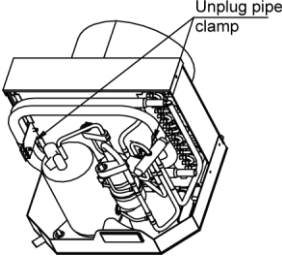
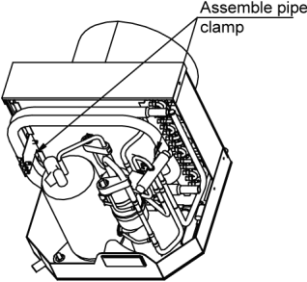
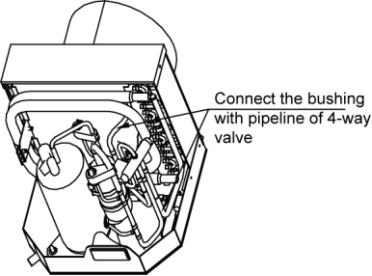
<p>7. Connect power cord of compressor</p>	 <p>Connect power cord of compressor</p>	<ul style="list-style-type: none"> • Connect the power cord to retaining bolts according to disassembly sequence. • Screw the bolts tightly.
<p>8. Vacuumize system by feeding fluorin nozzle.</p>	 <p>Vacuumize system by feeding fluorin nozzle.</p>	<ul style="list-style-type: none"> • Vacuumize system by feeding fluorin nozzle.
<p>9. Charge refrigerants again by feeding fluorin nozzle.</p>	 <p>Charge refrigerants by feeding fluorin nozzle.</p>	<ul style="list-style-type: none"> • Charge refrigerants again by feeding fluorin nozzle. • Charge volume must comply with the nameplate.

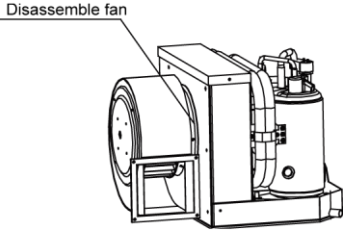
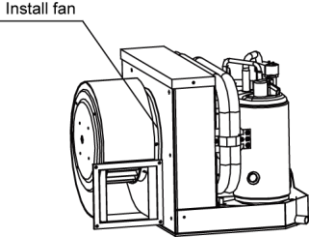
4.4.2 The 4-way valve

<p>Disassembly and Assembly of the 4-way valve</p>		
<p>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.</p>		
Process	Pictorial View	Handling Description
<p>1. Disassemble electromagnetic valve.</p>	 <p>Disassemble electromagnetic valve</p>	<ul style="list-style-type: none"> • Dismantle electromagnetic valve with spanner. • Remove electromagnetic valve from 4-way valve.

<p>2. Dismantle 4-way valve.</p>		<ul style="list-style-type: none"> • Heat connecting pipe of 4 vents of 4-way valve by gas welding and then unplug 4-way valve. • nitrogen-fill protection shall be conducted on welding joint and the pressure of nitrogen is $0.5 \pm 0.1 \text{ kgf/cm}^2$ (relative pressure) • Record the direction of 4-way valve and the position of each vent before remove 4-way valve.
<p>3. Remove 4-way valve</p>		<ul style="list-style-type: none"> • Remove old 4-way valve from pipeline.
<p>4. Install new 4-way valve.</p>		<ul style="list-style-type: none"> • Install the new 4-way valve in correct position and connect it with pipeline correctly. • Wrap the valve with wet cloth when welding to prevent the slide block inside the valve from burning and prevent water from piping. • Charge nitrogen to weld and the nitrogen pressure is $0.5 \pm 0.1 \text{ kgf/cm}^2$ (relative pressure)
<p>5. Install electromagnetic valve.</p>		<ul style="list-style-type: none"> • Install the electromagnetic valve in new 4-way valve.
<p>6. Inspect the system and charge refrigerants.</p>		<ul style="list-style-type: none"> • Vacuumize and charge refrigerants after confirmation that there is no leakage of the system.

4.4.3 Tube in tube heat exchanger

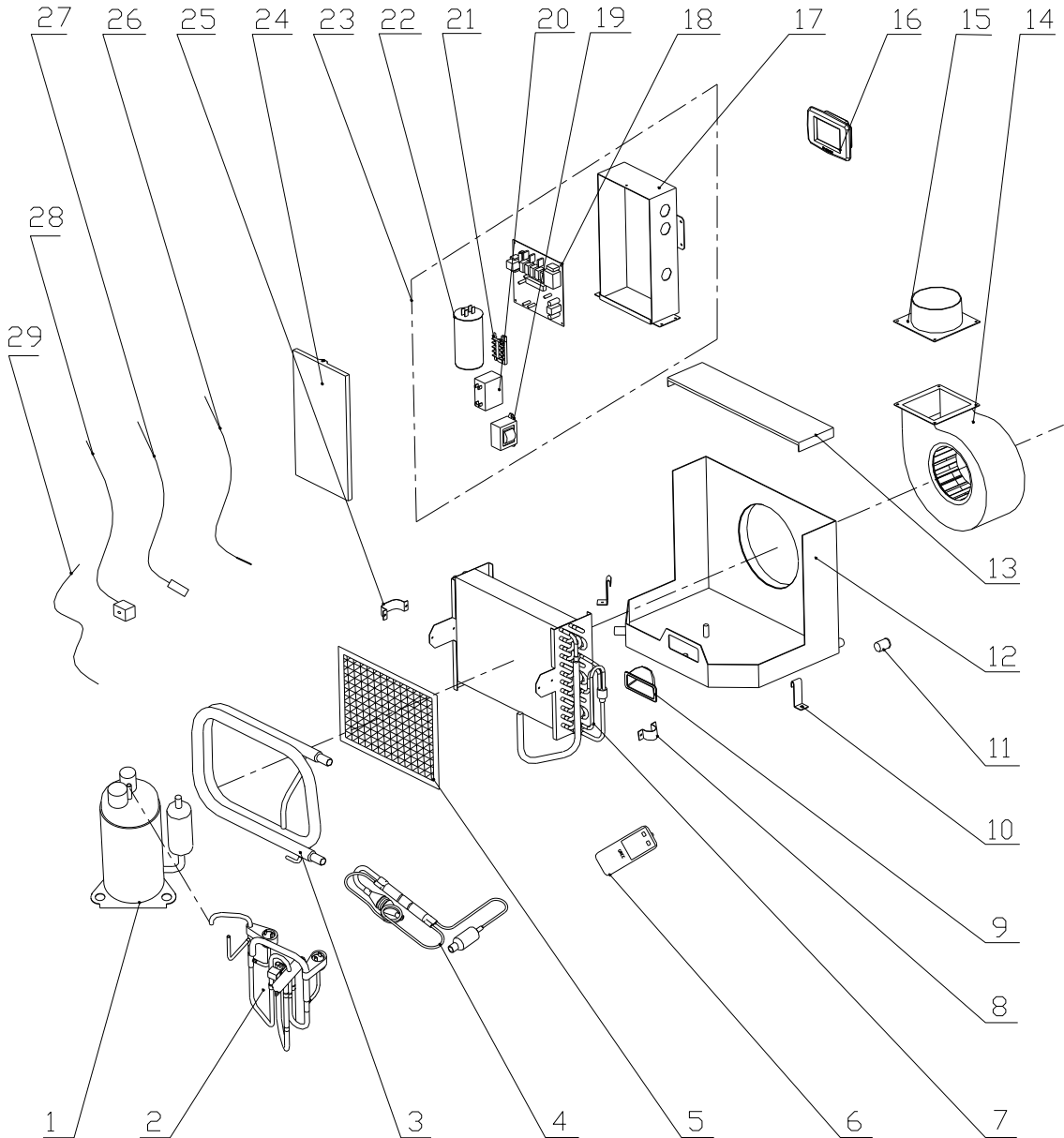
Disassembly and Assembly of tube in tube heat exchanger		
Process	Pictorial View	Handling Description
1. Disconnect bushing from 4-way valve		<ul style="list-style-type: none"> Heat connecting pipe of bushing and 4-way valve by gas welding and then unplug bushing. nitrogen-fill protection shall be conducted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

Disassembly and Assembly of Fan and Fan Motor		
Process	Pictorial View	Handling Description
1. Disassemble fan		<ul style="list-style-type: none"> Disassemble fan by screwdriver.
2. Install fan		<ul style="list-style-type: none"> Fix the fan by screwdriver.

4.5 EXPLODED VIEWS AND PART LIST

1) Model: CYR12/Na-A

Exploded View:

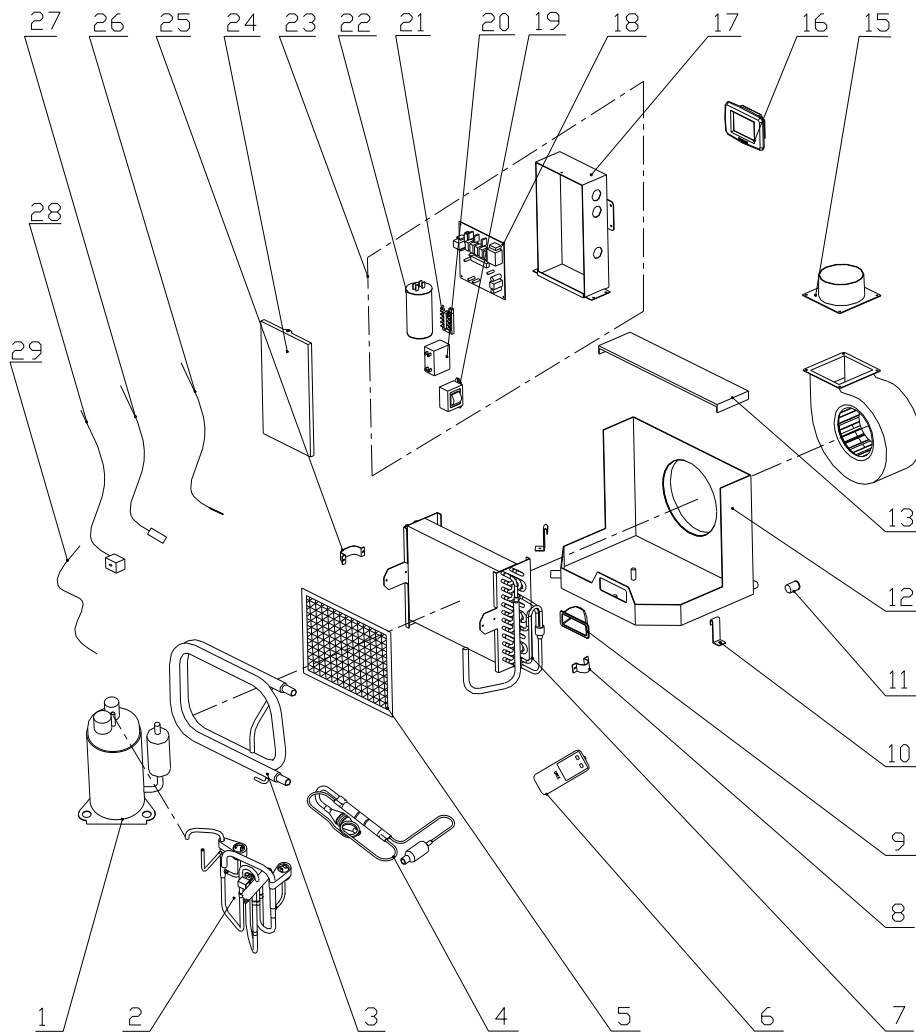


Parts List: (Product Code: EY10000222)

NO.	Name of part	Part code	Quantity
1	Compressor	00203916	1
2	Reverse valve assy	04143918	1
3	Condenser coil	01139404	1
4	Capillary assy	030006000408	1
5	Filter	11129403	1
6	Remote controller	30510065	1
7	Evaporator assy	01023910	1
8	Condenser fixer	02260005	1
9	Handle	26235401	1
10	Clamp	01729602	4
11	Drain pipe	04363901	2
12	Base/pan	01283938	1
13	Cover assy	01263930	1
14	Blower assy	000052000103	1
15	Duct connector	06329402	1
16	Display panel	30295002	1
17	Electric box	01423914	1
18	Main PCB	30225313	1
19	Transformer	43110192	1
20	Capacitor	3301074731	1
21	Terminal	42010254	1
22	Capacitor	3300008113	1
23	Electric Controller Box Assy	01393923	1
24	Electric box cover	01423915P	1
25	Condenser fixer	01343909	1
26	Temperature sensor	3900020720	1
27	Temperature sensor	3900020721	1
28	solenoid coil	4300040027	1
29	Signal Wire	400300412	1

2) Model: CYR16/Na-A

Exploded View:

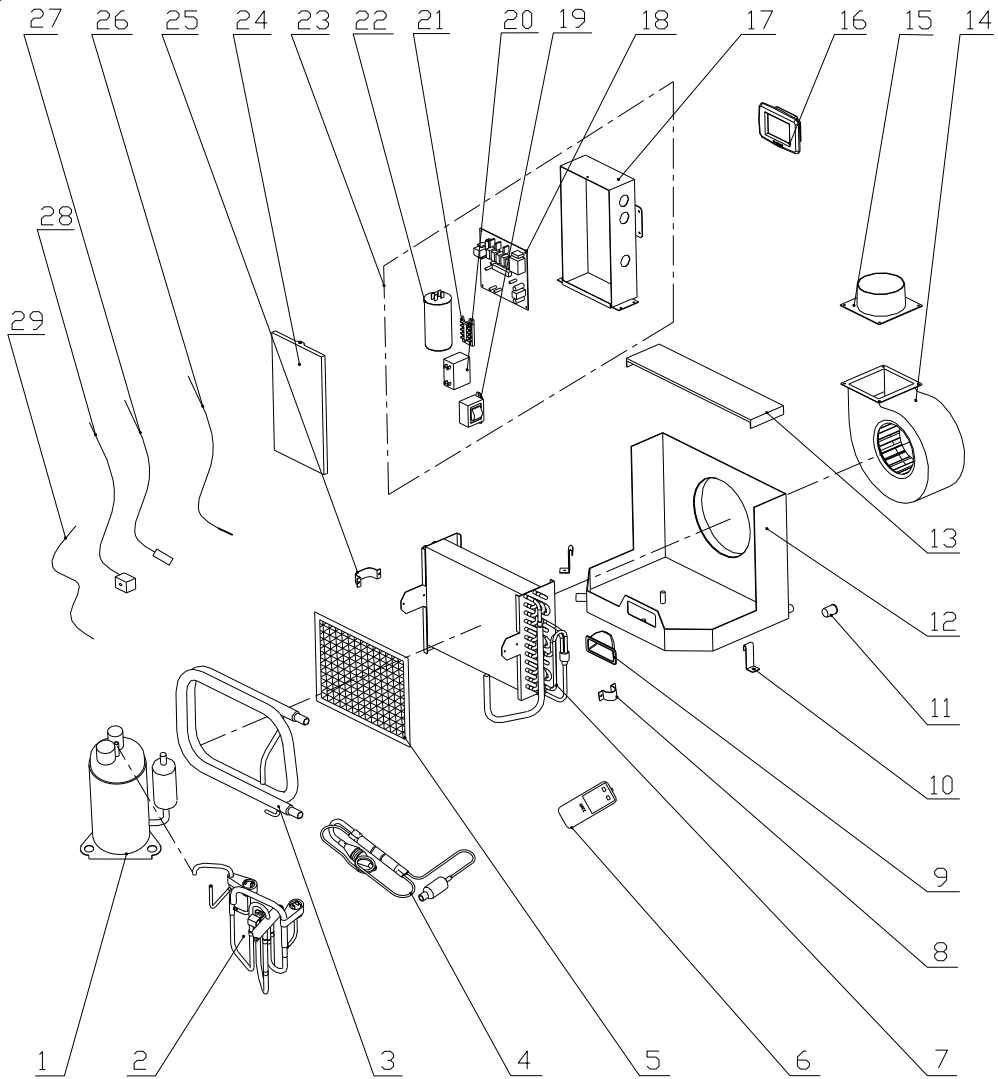


Parts List: (Product Code: EY10000232)

NO.	Name of part	Part code	Quantity
1	Compressor	00203917	1
2	Reverse valve assy	430004032	1
3	Condenser coil	01153913	1
4	Capillary assy	01153913	1
5	Filter	11129402	1
6	Remote controller	30510065	1
7	Evaporator assy	011001000382	1
8	Condenser fixer	02263901	1
9	Handle	26235401	1
10	Clamp	01729602	4
11	Drain pipe	04363901	2
12	Base/pan	01283941	1
13	Cover assy	01263931	1
14	Blower assy	15009406	1
15	Duct connecter	06329402	1
16	Display panel	30295002	1
17	Electric box	01423914	1
18	Main PCB	30225313	1
19	Transformer	43110192	1
20	Capacitor	3301074731	1
21	Terminal	42010254	1
22	Capacitor	42010254	1
23	Electric Controller Box Assy	01393926	1
24	Electric box cover	01423915P	1
25	Condenser fixer	01343911	1
26	Temperature sensor	3900020720	1
27	Temperature sensor	3900020721	1
28	solenoid coil	4300040027	1
29	Signal Wire	400300412	1

3) Model: CYR12/Na-T

Exploded View:

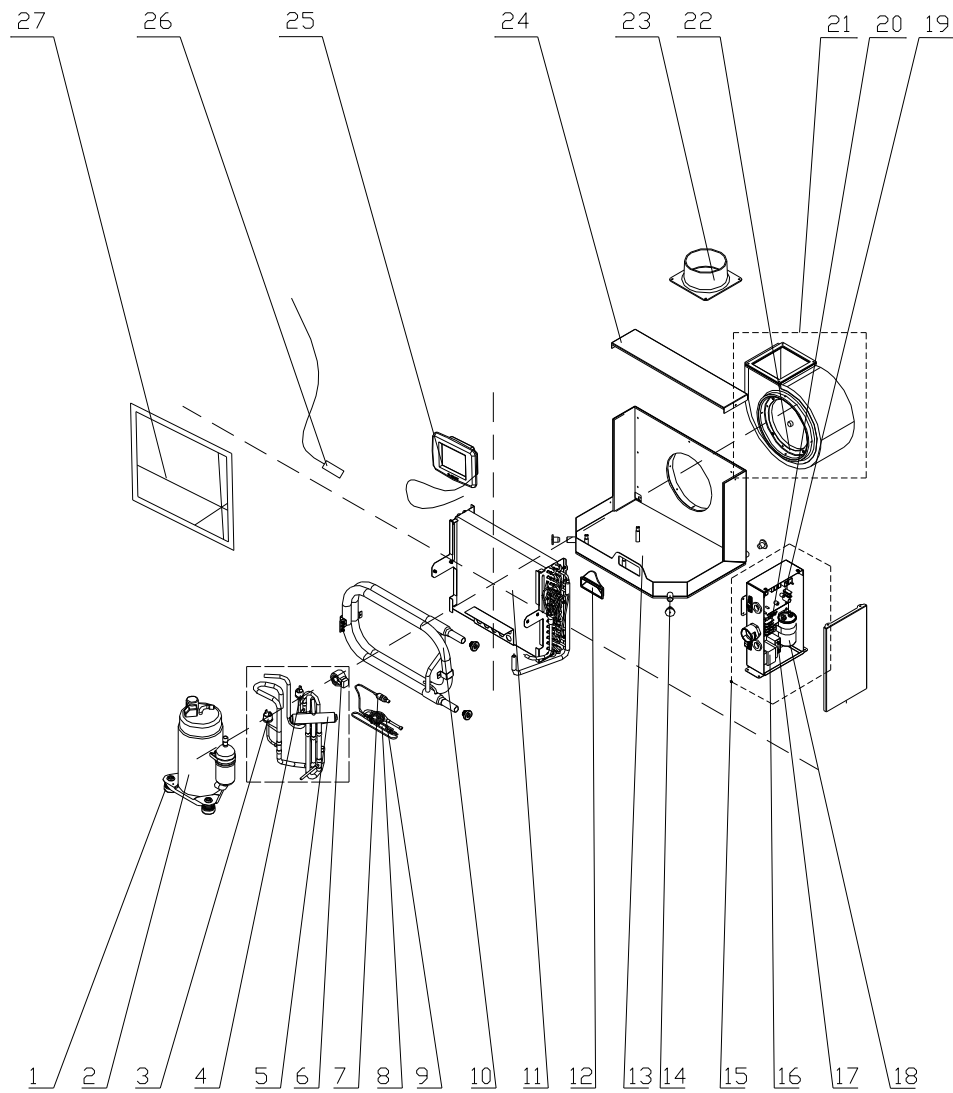


Parts List: (Product Code: EY10000421)

NO.	Name of part	Part code	Quantity
1	Compressor	00203918	1
2	Reverse valve assy	04143918	1
3	Condenser coil	01139404	1
4	Capillary assy	030006000455	1
5	Filter	11129403	1
6	Remote controller	30510065	1
7	Evaporator assy	01023910	1
8	Condenser fixer	02260005	1
9	Handle	26235401	1
10	Clamp	01729602	4
11	Drain pipe	04363901	4
12	Base/pan	01283938	1
13	Cover assy	01263930	1
14	Blower assy	150094065	1
15	Duct connecter	06329402	1
16	Display panel	30295002	1
17	Electric box	01423914	1
18	Main PCB	30225314	1
19	Transformer	43110239	1
20	Capacitor	3301074705	1
21	Terminal	42010254	1
22	Capacitor	3300008109	1
23	Electric Controller Box Assy	01393925	1
24	Electric box cover	01423915P	1
25	Condenser fixer	01343909	1
26	Temperature sensor	3900020720	1
27	Temperature sensor	3900020721	1
28	solenoid coil	430004005	1

4) Model: CYR16/Na-T

Exploded View:



Parts List: (Product Code: EY10000401)

NO.	Name of part	Part code	Quantity
1	Compressor Gasket	76710247	3
2	Compressor and Fittings	00203919	1
3	Pressure Protect Switch	46020007	1
4	Pressure Protect Switch	46020006	1
5	4-Way Valve	430004032	1
6	Magnet Coil	430004005	1
7	Strainer	0721302603	1
8	One Way Valve	07130103	1
9	Strainer A	07210022	1
10	Double Pipe Condenser	01153913	1
11	Evaporator Assy	011001000382	1
12	Left Handle	26235401	1
13	Base Frame Assy	01283941	1
14	Drainage Hose	04363901	4
15	Electric Controller Box Assy	01393990	1
16	Transformer	43110239	1
17	Capacitor	3301074714	1
18	Capacitor	3300008101	1
19	Main Board	30225314	1
20	Terminal Board	42010254	1
21	Centrifugal Blower Sub-Assy	150094062	1
22	Diversion Circle	01523902P	1
23	Duct connecter	06329402	1
24	Cover Plate Assy	01263931	1
25	Display Board	30295002	1
26	Ambient Temperature Sensor	3900020721	1
27	Filter	11129402	1



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