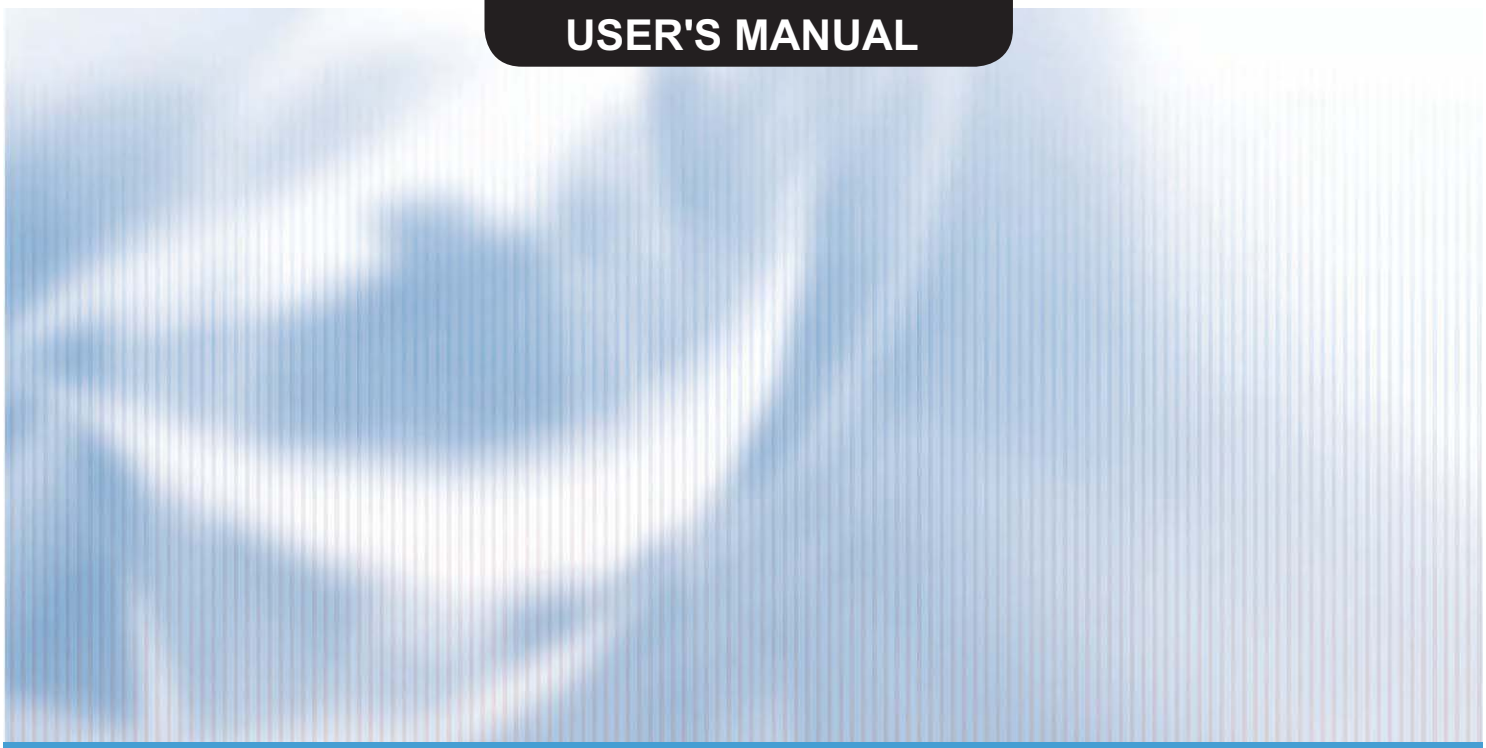
EN

USER'S MANUAL



BOAT SERIES

ASB-05A, ASB-09A, ASB-12A, ASB-16A, ASB-20A, ASB-24A

sinclair
AIR CONDITIONING

“Original instructions”

IMPORTANT NOTE:

Read this manual carefully before installing or operating your new air conditioning unit. Make sure to save this manual for future reference.

To Users

Thank you for selecting Sinclair's product. Please read this instruction manual carefully before installing and using the product, so as to master and correctly use the product. In order to guide you to correctly install and use our product and achieve expected operating effect, wehereby instruct as below:

(1) This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsibility for their safety. Children should be supervised to ensure that they do not play with the appliance.

(2) In order to ensure reliability of product, the product may consume some power under stand-by status for maintaining normal communication of system and preheating refrigerant and lubricant. If the product is not to be used for long, cut off the power supply; please energize and preheat the unit in advance before reusing it.

(3) Please properly select the model according to actual using environment, otherwise it may impact the using convenience.

(4) This product has gone through strict inspection and operational test before leaving the factory. In order to avoid damage due to improper disassembly and inspection, which may impact the normal operation of unit, please do not disassemble the unit by yourself. You can contact with the special maintenance center of our company if necessary.

(5) For personal injury or property loss and damage caused by improper operation such as improper installation and debugging, unnecessary maintenance, violation of related national laws and rules and industrial standard, and violation of this instruction manual, etc., we will bear no liability.

(6) When the product is faulted and cannot be operated, please contact with our maintenance center as soon as possible by providing the following information.

1) Contents of nameplate of product (model, cooling/heating capacity, product No., ex-factory date).

2) Malfunction status. (specify the situations before and after the error occurs)

(7) All the illustrations and information in the instruction manual are only for reference. In order to make the product better, we will continuously conduct improvement and innovation. We have the right to make necessary revision to the product from time to time due to the reason of sales or production, and reserve the right to revise the contents without further notice.

(8) The final right to interpret for this instruction manual belongs to Sinclair Ltd.

Contents

1 Safety Precautions


Warning: If not abide strictly, it may cause severe damage to the unit or the people.


Note: If not abide strictly, it may cause slight or medium damage to the unit or the people.


This sign indicates that the operation must be prohibited. Improper operation may cause severe damage or death to people.


This sign indicates that the items must be observed. Improper operation may cause damage to people or property.


WARNING!

This product can't be installed at corrosive, inflammable or explosive environment or the place with special requirements, such as kitchen. Otherwise, it will affect the normal operation or shorten the service life of the unit, or even cause fire hazard or serious injury. As for above special places, please adopt special air conditioner with anti-corrosive or anti-explosion function.

2 Introduction

Thank you for your purchase. No matter which of the following features was the reason for your purchase, we are sure it will meet your needs and give many years of efficient and trouble free use. Those marine air conditioners are designed for marine applications incorporating the following features:

(1) Compact design
(2) High efficiency rotary compressors (5-24K)
(3) Cupronickel condenser coil
(4) Raised lance fin designed evaporator coil
(5) Polyester coated 2″ (50mm) deep drain pan with fou condensate drain locations
(6) Anti-vibration base pan
(7) Pre-charged and pre-wired systems for easy connections
(8) 3-speed fan motor. This eliminates all harmonic sounds and rumbles
(9) Rotatable blower assembly

The controller offers the most technologically advanced design specifically made for the unique requirements of marine air conditioning. The controller has been designed with the following "user friendly" features:

(1) Non-volatile memory
(2) Low voltage display panel
(3) LED cabin temperature displayed in Fahrenheit or Celsius
(4) Multiple fan speed selections
(5) Compressor pressure fail safe protection
(6) Moisture mode cycle for humidity control

This manual is intended to provide the information necessary to ensure proper installation,

operation, and maintenance of the unit. Improper installation can result in unsatisfactory performance and/or premature failure of these units. Before proceeding, please read this manual completely. In the interest of product improvement, specifications and design are subject to change without prior notice.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

This product must not be disposed together with the domestic waste and other corrosive water. The water source in details is as below:

Influencing factor	Dissolution mg/L	Cl^- mg/L	Fioat/sand mg/L	Flow speed m/s	
				Min	Max
Allowable value	＜5000 Short period＜8000	＜600 Short period＜1000	＜100	1.4	3.0

This product has to be disposed at an authorized place for recycling of electrical and electronic appliances.

3 Overview

3.1 Outline Drawing

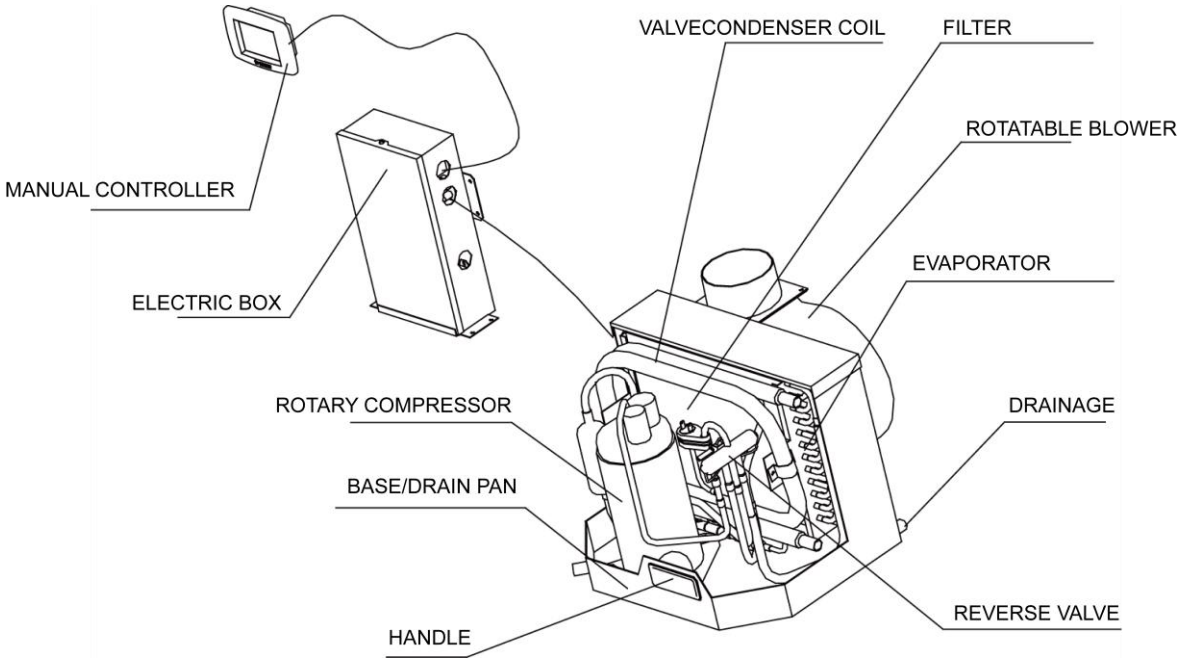


Fig.1

3.2 How It Works

Your self-contained air conditioner consists of four main components and a refrigerant gas circulating through the system. The blower draws warm cabin air across the fins on the evaporator where the heat from the air is transferred to the refrigerant in the evaporator coil. As the refrigerant evaporated from a liquid into a gas, it absorbs the heat from the cabin air. The compressor then compresses the refrigerant gas and pumps it through the outer tube in the condenser coil. The seawater pump circulates cool seawater through the inner tube in the condenser coil; this cools the refrigerant and condenses it into a liquid. The heat from the refrigerant is exchanged to the seawater and discharged overboard. The liquid refrigerant is then passed through the evaporator coil and the cycle repeats; removing heat from the cabin air lowering its temperature. The cooled air is blown through the ducting and out the supply air grille(s). For reverse cycle heating, the refrigerant flows in the opposite direction through the reversing valve. Heat is transferred from the seawater in the condenser coil to the refrigerant and then to the air blowing through the evaporator into the cabin. Seawater temperature will directly affect the a/c 's efficiency. This a/c can effectively cool your boat in water temperatures up to 95°F and heat in water temperatures as low as 40°F.

3.3 Outline Dimensions

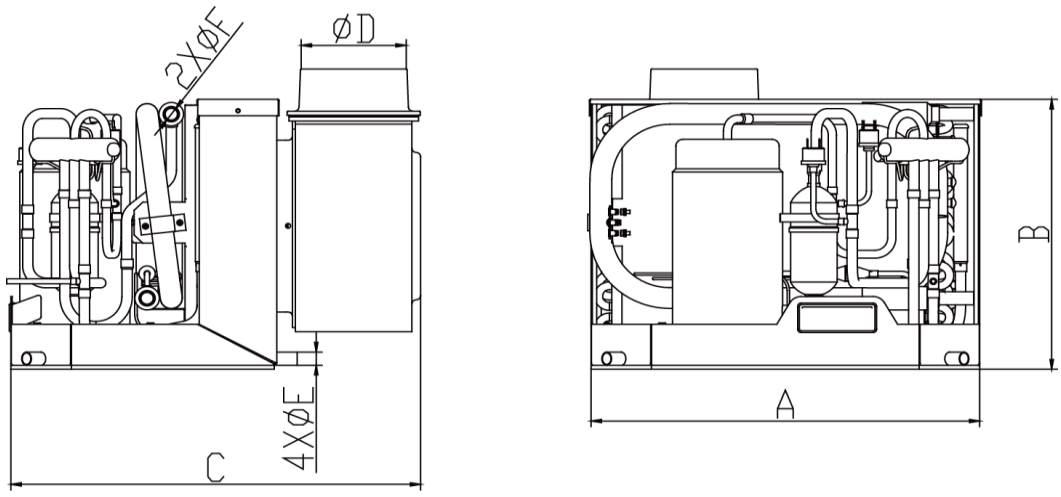


Fig.2

Units: mm

Model	A	B	C	D	E	F
ASB-05A	285	295	408	91.5	16	19
ASB-09A	380	310				
ASB-12A	380	330	420	119.4		
ASB-16A	450		454			
ASB-20A	595*	385	520			
ASB-24A						

4 Installation

4.1 Unpacking and Inspection

When the equipment is received, all items should be carefully checked according to the packing list to ensure all cartons have been received. Move units in the normal "up" orientation as indicated by the arrows on each carton. Examine cartons for shipping damage, removing the units from the cartons if necessary. If the unit is damaged, the carrier should make the proper notation on the delivery receipt acknowledging the damage.

Package includes: Remote Controller, Wired Controller, Communication Cable of Wired Controller.

It is necessary to purchase Power Supply Wire, Inlet / Outlet Water Pipe, Condensing Drain Pipe, Flexible Ducting, Air Diffuser, Air Return Grill, Water Pump and Filter individually for installation:

- Suction Basket 3/4", Brass (1 pcs)
- Connector 3/4", Female, Brass (1 pcs)
- Seawater Hose 20 x 27 mm (7,5 m)
- Ball Valve Chrome / Brass 3/4" (1 pcs)
- Connector 3/4", Male, Brass (2 pcs)
- Seawater Filter 150 l /min 20 mm (1 pcs)
- Seawater Pump 39 l /min (1 pcs)
- Water Outlet 90° 20 mm (1 pcs)
- Hose Clamp 16-27/12 A4 DIN 3017 (8 pcs)
- Air Inlet Grill 250 x 250 mm (1 pcs)
- Ducting 127 mm (10 m)
- Air Outlet 125 mm (2 pcs)
- T connector 125 mm (1 pcs)

4.2 Safety Considerations

(1) This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

(2) The appliance is intended to be permanently connected to the water mains and not connected by a hose-set.

(3) Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

(4) If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

(5) The appliance shall be installed in accordance with national wiring regulations.

(6) This appliance is not accessible to the general public.

(7) Maintenance/service to be done by specialized personnel, mandated by the manufacturer or the authorized representative may be supplied.

(8) This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.

(9) Disconnect the appliance from its power source during service and when replacing parts.

4.2.1 Water flow and water pressure during operation

Make sure the water flow through the unit during operation is not lower than the value shown below:

Model	5K	9K	12K	16K	20K	24K
Gal/min	1.06	1.32	2.77	3.43	5.02	6.34
L/min	4	6	10.5	13	20	24

Note: The maximum bearable water pressure of the unit is 1.0MPa. If the water pressure is bigger than the maximum pressure, the unit may be damaged.

4.2.2 Nominal working condition and operation water temperature range

The parameters in the nameplate are tested according to the following working condition (nominal working condition):

units:℃

	Air side		Water side	
	Dry bulb temperature	Wet bulb temperature	Entering water temperature	Leaving water temperature
Cooling	27	19.5	32	36
Heating	22	-	15	- a*

a*：The water temperature acquired by heating tests which using water-carrying capacity under cooling condition.

units:℃

	Air side	Water side
Cooling	16~43	10~35
Heating	-10~30	4~25

DANGER:

Electrical shock hazard, disconnect voltage at main panel or power source before opening any cover. Failure to comply may result in injury or death.

WARNING!

This component does not meet federal requirements for ignition protection. Do not install in spaces containing gasoline engines, tanks, LPG/CPG cylinders, regulators, valves or fuel line fittings. Failure to comply may result in injury or death.

Notice:

This component is charged with Hydro fluorocarbon refrigerant R410A, and it is a kind of environment friendly refrigerant. Effective July 1, 1992, it shall be unlawful for any person to knowingly vent or otherwise knowingly release any class 1 (CFC) or class 2 (H CFC) substance as a refrigerant in a manner which permits such substance to enter the atmosphere per the clean air act of 1990. Public law 101-549 title IV section 608-c. Failure to comply may result in severe penalties, including fines and imprisonment.

CAUTION!

To minimize the hazard of electrical shock and personal injury, this component must be effectively grounded. Refer to the installation guidelines for further information. Caution! High compressor temperature is normal. Do not touch!

4.3 The Size of Sealed Room

The size of sealed room should not be too small, otherwise it will affect the unit normal running. See diagram below.

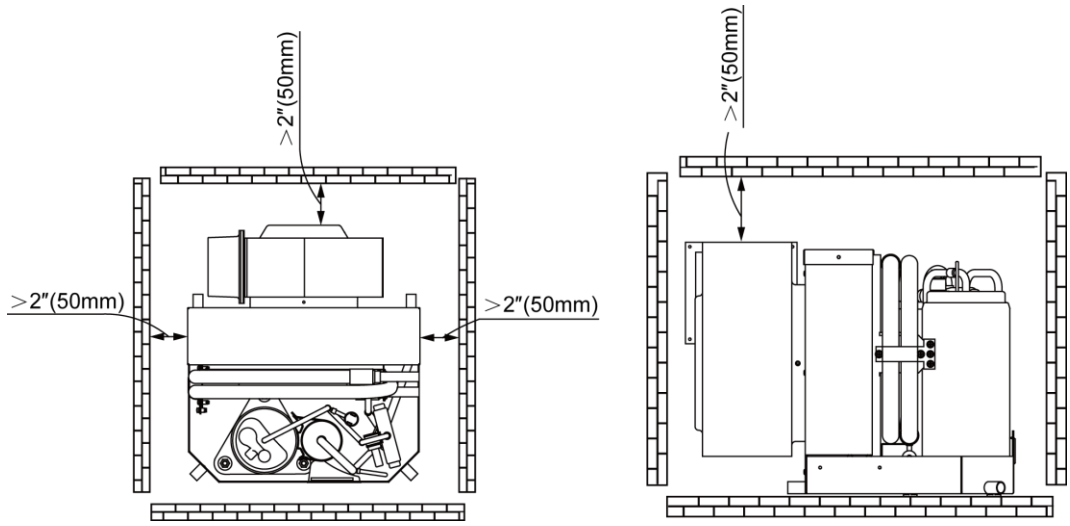


Fig.3

4.4 Placement of System

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. Don't leave the flexible ducting too long. Otherwise it will lower the efficiency of the unit. See diagram below.

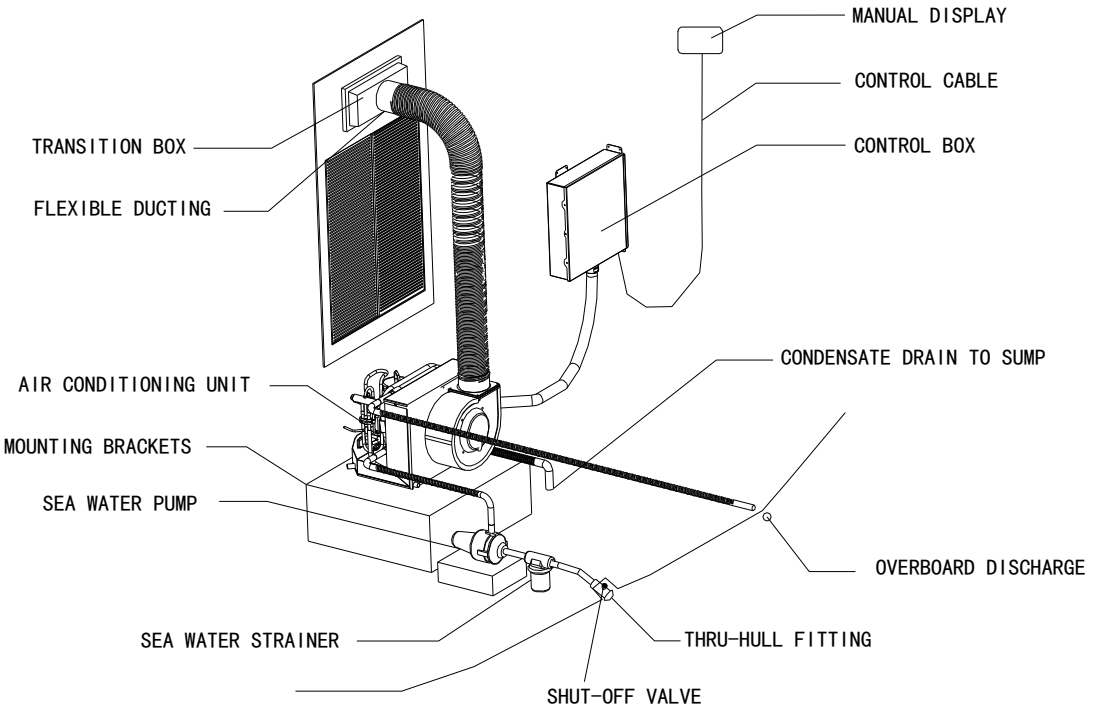


Fig.4

Tools required:

◆Screws drivers

◆Pliers

◆Pipe wrench

◆Wire cutters/crimpers

◆Drill & 7/8" bit

◆Jigsaw

◆Duct tape

◆Electrical tape

◆Teflon tape

◆Bedding compound to seal thru hull fittings

◆Hardware to secure unit, pump, strainer, grilles & control panel

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.

4.5 Condensate Drains

The condensate drain pan is 2″ (50mm) high with four 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.

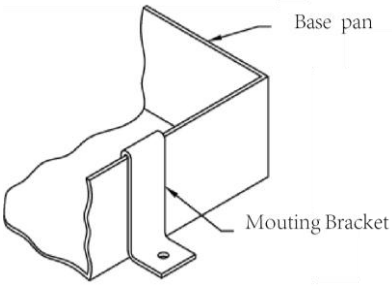
☞ **Do not terminate condensate drain line within 3″ (914mm) of any outlet of engine, generator exhaust systems, compartment housing an engine or generator, nor in a bilge, unless the drain is connected properly to a sealed condensate or shower sump pump. Seal all condensate hose penetrations.**

4.6 Blower Assembly

You can achieve multi-directional supply air discharge from a single unit by rotating the blower to the desired position. It is ideal for tight installations as 180° of rotation is available with which to position the blower. Its advanced design allows the blower to be easily removed for rotating or servicing by removing 4 screws. Rotate the blower to allow the most direct flow of air to the supply air grille.

4.7 Mounting Brackets

The a/c unit is supplied with a base pan that also serves as a condensate pan. Mounting clip brackets (4) are provided to secure the base pan to a flat, horizontal surface.



4.8 Supply & Return Air Grilles and Transition Boxes

Install the supply air grille as high as possible in a location that will provide uniform air distribution throughout the cabin. Grille louvers should be directed upward. The return air grille should be installed as low and close to the a/c as possible to insure direct uninterrupted airflow to the evaporator. The return air grille should have a minimum four inches (4″) of clearance in front of it, free from any furniture or other obstructions. In no instance should a supply air discharge be directed towards a return air grille, as this will cause the system to short cycle. Allow for adequate clearance behind the supply air grille(s) for the transition box and ducting connection. See the Maintenance section of this manual for return air filter cleaning instructions.

units : mm²

Model	5K(7K)	9K	12K	16K	20K	24K
Min. Return Air Grilles Size (re.)	48500	65680	76514	103584	153028	153028

4.9 Ducting

Good airflow is critical for the performance of the entire system. The static pressure should not exceed 100 Pa. It is highly dependent on the quality of the ducting installation. The ducting should be run as straight, smooth and taut as possible minimizing the number of 90 degree bends (two tight 90° bends can reduce airflow by 25%). If a transition box is used, the total area of supply air ducts going out of the box should at least equal the area of the supply duct feeding the box. To calculate the square inch area of a round duct, multiply the radius by itself (r^2) and multiply that number by 3.1416(π). The following is a summary of proper ducting connections:

(1) Pull back the fiberglass insulation exposing the inner Mylar duct hose.

(2) Slide the Mylar duct hose around the mount ring until it bottoms out.

(3) Screw 3 or 4 stainless steel sheet metal screws through the duct hose into the transition ring. Make sure to catch the wire in the duct hose with the heads of the screws. Use finish washers with the screws if necessary. Do not use band clamps, as

the hose will slide off.

(4) Wrap duct tape around the ducting and ring joint to prevent any air leaks.

(5) Pull the insulation back up over the Mylar to the ring and tape this joint.

(6) Remove excess ducting and use the same connection method at the supply air grille.

All ducting should:

◆Be appropriately sized for each application.

◆Run as smoothly and taut as possible.

◆Have as few bends or loops as possible.

◆Be securely fastened to prevent sagging or chafing during vessel operation.

◆Have all excess ducting lengths trimmed off.

◆Not be flattened or kinked.

◆Insulated when located in high heat load areas (hull side, mechanical compartments, etc.).

◆Be properly protected against potential damage when routed through open areas or bulkheads.

4.10 Seawater Pump and Plumbing

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:

(1) 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.

(2) Install a bronze, full flow seacock on the speed scoop thru-hull inlet.

(3) Install a seawater strainer below the level of the pump with access to filter.

(4) Mount the pump above the strainer and at least 1″ (305mm) below the waterline.

(5) Connect the seacock and strainer with an uphill run of 5/8" reinforced marine grade hose.

(6) Connect the discharge from the pump uphill to the bottom inlet of the a/c unit's condenser coil with 3/4" hose. Connect the discharge from the condenser coil to the overboard discharge thru-hull fitting with 3/4" hose.

(7) 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).

(8) Double clamp all hose connections with stainless steel clamps, reversing the clamps.

(9) Use Teflon tape on all threaded connections.

(10) 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.

Seawater Flow:

Model	5K(7K)	9K	12K	16K	20K	24K
Min. Seawater Flow	4.0L/min	6.0L/min	10.5L/min	13.0L/min	20 L/min	24.0L/min
Max. Seawater Flow	10.0L/min	15.0L/min	20.0L/min	25.0L/min	32 L/min	37.0L/min
Rated Seawater Flow	6.0L/min	9.0L/min	14.0L/min	16.0L/min	23 L/min	28.0L/min

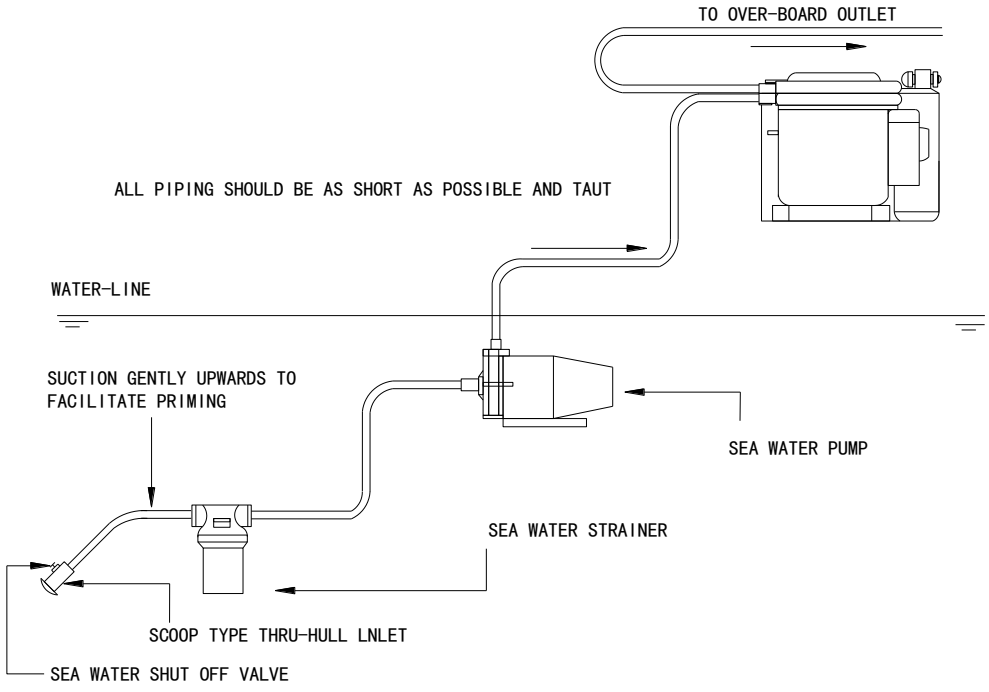


Fig.5

4.11 Electrical Connections

All a/c units have a terminal strip mounted inside the electric box. The terminal strip is labeled for proper connections of the electrical supply, ground wires and pump circuits. A wiring diagram is provided in the electrical box and later in this manual. The wiring diagram in the electrical box supersedes any found in this manual and ABYC standards. The correct size

circuit breaker should be used to protect the system as specified on the a/c unit's data plate label. A minimum of 12 AWG boat cable should be used to supply power to the a/c unit and the seawater pump. All connections shall be made with ring or fork terminals. Turn off a/c power supply circuit breaker before opening electric box.

Each a/c installed requires its own dedicated circuit breaker. If there is only one a/c installed, the seawater pump does not require a circuit breaker; the wiring from the seawater pump is connected to the terminal strip in the electric box. If two or more a/c use the same seawater pump, the pump wires will be connected to a pump relay, Please refer to the wiring diagram. Electrical connections in the bilge and/or below the waterline should use heat shrink type butt splices. Field wiring must comply with ABYC electrical codes. Power to the unit must be within the operating voltage range indicated on the data plate. Properly sized fuses or HACR circuit breakers must be installed for circuit protection. See data plate for maximum fuse/circuit breaker size (MFS) and minimum circuit amperage (MCA). All units must be effectively grounded to minimize the hazard of electrical shock and personal injury. The following can be observed: AC (alternating current) grounding (green wire) must be provided with the AC power conductors and connected to the ground terminal (marked "GRND") at the AC power input terminal block of the unit(s), per ABYC standard E-8, or equivalent.

(1) Connections between the vessel's AC system grounding conductor (green wire) and the vessel’s DC (Direct Current) negative or bonding system should be made as part of the vessel's wiring, per ABYC standard E-9, or equivalent.

(2) When servicing or replacing existing equipment that contains a chassis-mounted ground stud, the installer must check the vessel's wiring for the existence of the connection required in item 1 above.

☞ The a/c unit must be connected to the ship’s bonding system to prevent corrosion due to stray electrical current or voltage. All pumps, metallic valves and fittings in the seawater circuit that are isolated from the a/c unit by PVC or rubber hoses must be individually bonded to the vessels bonding system also. This will help eliminate any possibility of corrosion due to stray current or voltage.

(3) Phase notice.It is extremely important to ensure that wiring and phase sequencing of a three-phase power source is correct. Marine wiring standards call for power source phases L1, L2, and L3 to be color-coded BLACK, WHITE, and RED, respectively. These must be connected to the unit with the proper sequence; otherwise, it will not operate properly. If the wiring sequence is incorrect, the unit's compressor (Scroll type only) and pump (if applicable) will run in the reverse direction at a significantly increased noise level.

(4) Users should avoid putting objects which not reaching v-1 flame retarded rating within an area of 50mm radius from the waterproof connector.

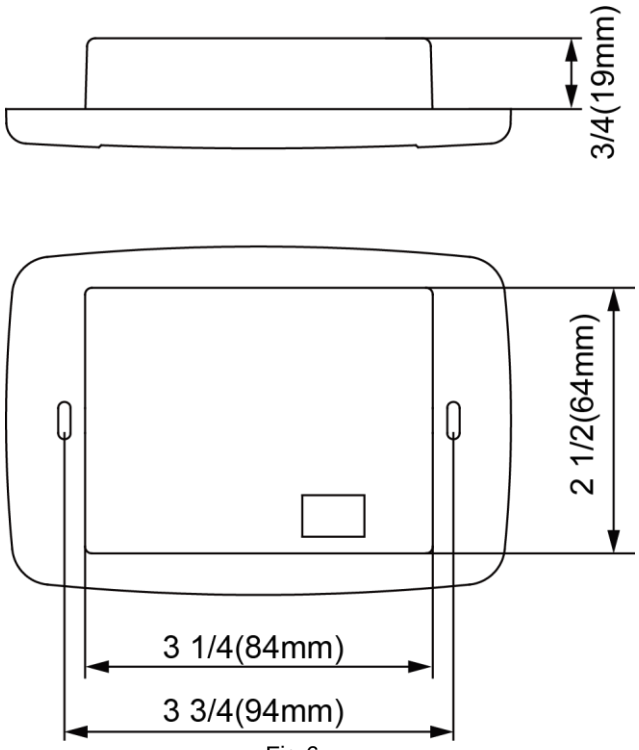


Fig.6

4.12 Manual Controller Installation

DO NOT turn the unit off and immediately turn it back on. Wait at least 30 seconds for refrigerant pressures to stabilize.

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.

4.13 Electric Box Installation

Mount the electric box using four M5 screws.

Mount the electric box in a cool dry location and leave plenty of room for maintenance.

ASB-05A, ASB-09A

Units: mm

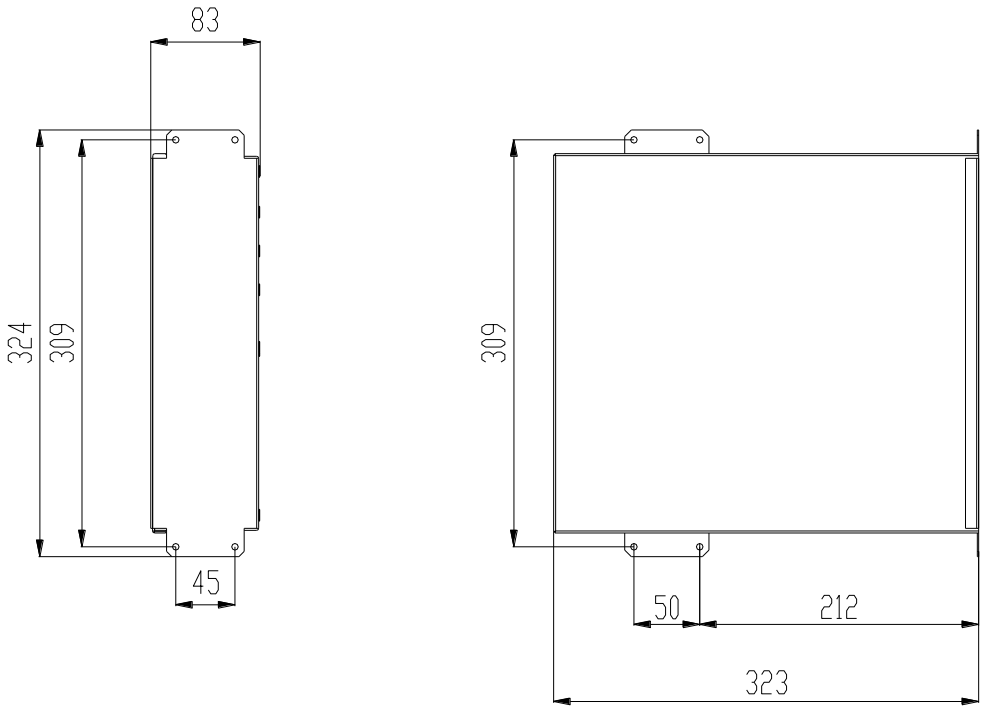


Fig.7

ASB-12A, ASB-16A

Units: mm

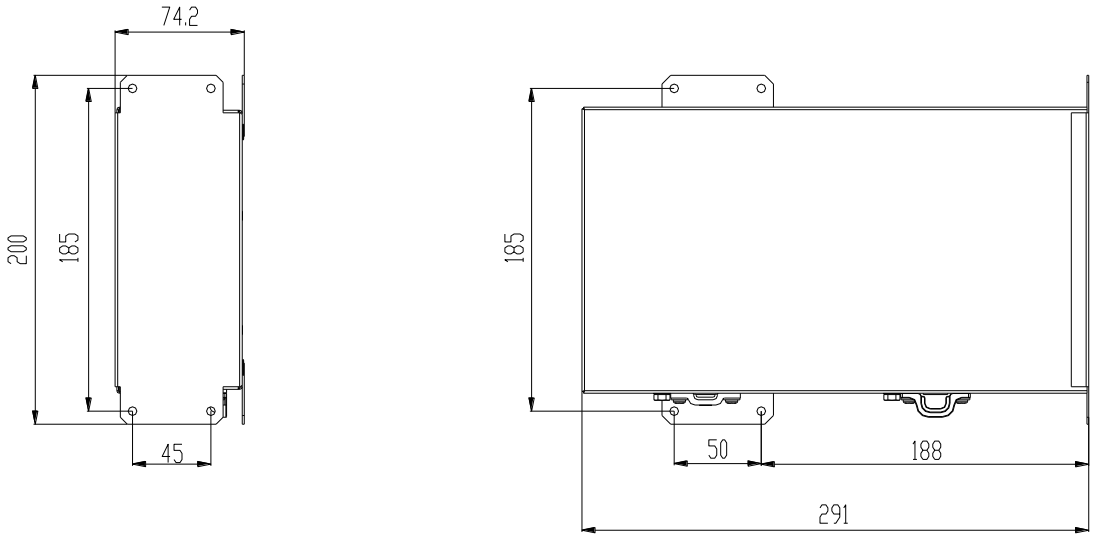


Fig.8

ASB-20A, ASB-24A

Units: mm

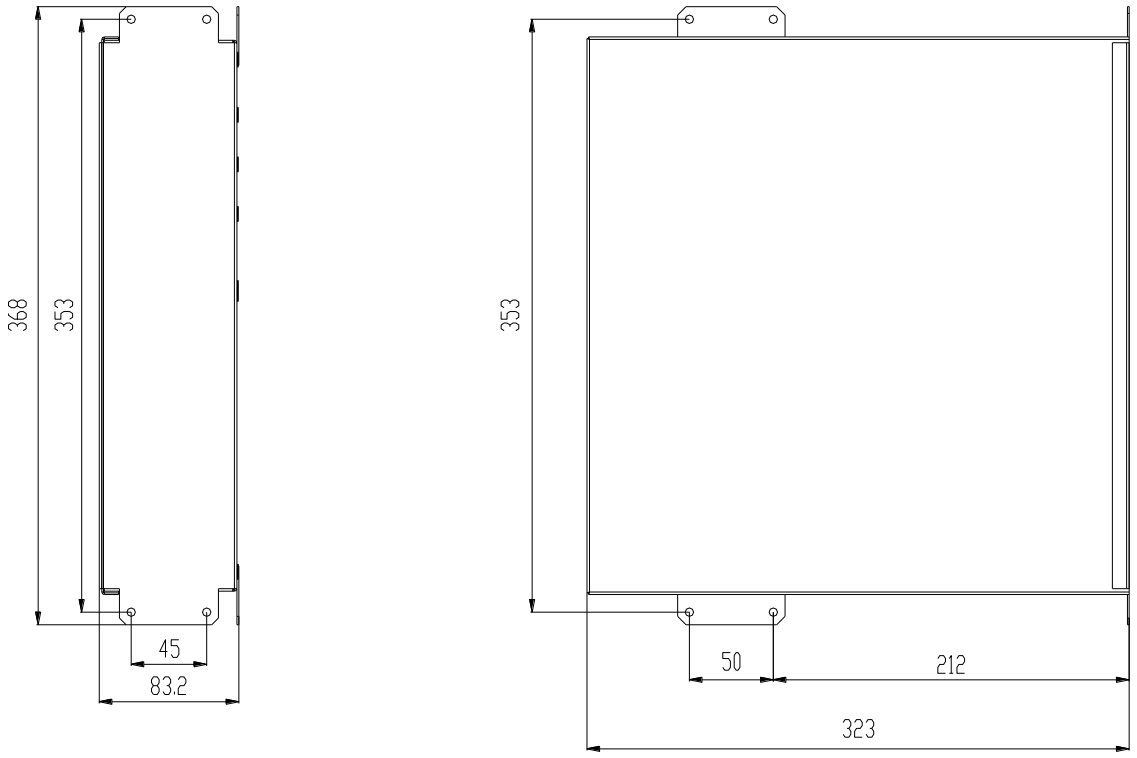


Fig.9

4.14 Installation Checklist (Review Prior To Installation)

4.14.1 Seawater cooling system:

◆Speed scoop located as far below the water line and as close to the keel as possible.

◆Shut off valve (sea cock) and speed scoop properly sealed and tightened.

◆Seawater pump is at least 1’ (305mm) below water line and securely mounted.

◆Strainer mounted below pump with access to filter.

◆Double/reversed stainless steel hose clamps on all hose connections.

◆Teflon tape on all threaded connections.

◆Hose runs uphill from speed scoop and sea cock to strainer, pump and a/c unit, then downhill (if possible) from a/c unit to overboard discharge.

◆Water flowing freely from overboard discharge while pump is running.

◆Pump relay panel, if used, must have its own circuit breaker sized for the pump. (20 amp max)

◆All metal fittings should be bonded.

4.14.2 Mounting

◆Not in engine room or bilge area, must be sealed away from exhaust or fumes.

◆Proper spacing allowed around unit.

◆Attached to solid level platform with hold down brackets provided.

◆Condensate drain routed aft and downhill to a sealed sump (not bilge).

◆All penetrations to bilge area sealed.

◆Blower rotated toward supply air grille.

4.14.3 Electrical

◆All butt connections on pumps are tightly crimped and covered with heat shrink.

◆AC power source installed and grounded/bonded in accordance with ABYC standards.

◆Control wires connected to terminal strip with fork or ring terminals.

◆Circuit breakers sized according to specifications on the data plate label.

◆Pump Relay Panel (if used) has a dedicated circuit breaker sized for the pump but not to exceed 20 amps maximum.

4.14.4 Grilles and Ducting

◆Supply air grille mounted as high as possible.

◆Return air grille mounted as low and as close to the a/c unit as possible.

◆Return air grille mounted away from bilge vapors or exhaust fumes.

◆Ducting is pulled taut, straight, smooth and properly connected with no excess.

4.14.5 Quick Start Operations Checklist

◆Ensure seawater intake ball valve (sea cock) is open.

◆Turn on the a/c circuit breaker. If the seawater pump has its own circuit breaker, make sure to turn it on.

◆Turn the system on. Set the desired cabin temperature (set point).

◆Check for a steady solid stream of water from the overboard discharge.

◆Verify that there is steady airflow out of the supply air grille

◆If the unit does not appear to be operating properly, refer to troubleshooting guidelines.

NOTES!

Do not turn the unit off and immediately turn it back on. Allow at least 30 seconds for refrigerant pressure equalization.

4.15 Wiring Requirements

The specification of power cord

Model	Minimum Sectional Area of Ground Wire (AWG/mm^2)	Minimum Sectional Area of Power Cord (AWG/mm^2)
ASB-05A ASB-09A	AWG14/1.5	AWG14/1.5
ASB-12A ASB-16A ASB-20A ASB-24A	AWG12/2.5	AWG12/2.5

The diagram of power supply is below.

Power Supply:

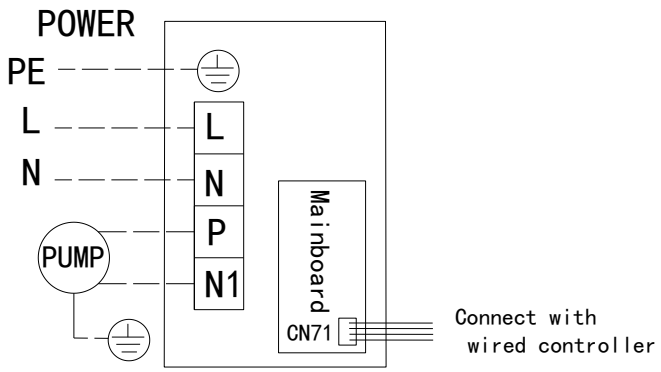


Fig.12

5 Operation

5.1 Manual Controller Operation

CAUTION!

① Don't install the manual controller in a location where it can get wet.

② Don’t knock, throw or open the manual controller frequently.

Display Board Z5A35B: ASB-05A, ASB-09A, ASB-20A, ASB-24A

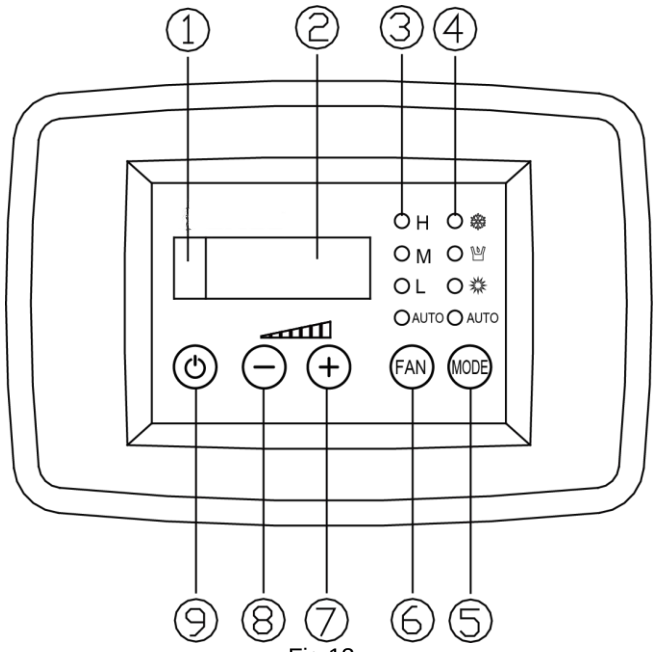


Fig.13

Display Board Z5A35: ASB-12A, ASB-16A

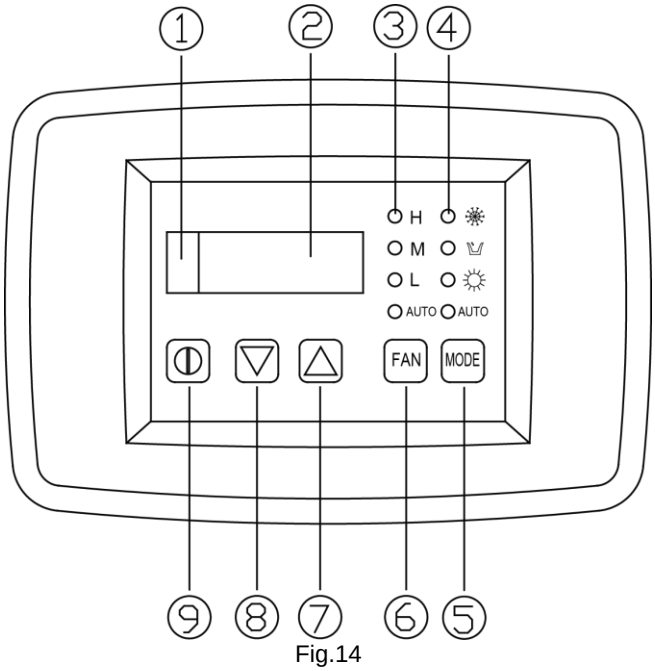


Fig.14

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**

5.2 Power ON/OFF

(1) Press ON/OFF button to turn the unit on.

(2) Pressing the ON/OFF button a second time will turn the unit off.

5.3 FAN Control

(1) Press the FAN button, the fan speed will change in the following order:

→ HIGH → MID→ LOW→ AUTO →

(2) In “DEHUMIDIFY” mode, the fan will work at low speed automatically.

5.4 Temperature Setting

(1) Press temperature setting key:

⊕ or ▲ To increase in 1°C increments;

⊖ or ▼ To decrease in 1°C increments;

(2) 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 Z5A35B can be adjusted, while display board Z5A35 can’t be adjusted.

5.5 Mode Setting

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

→ COOL→ DEHUMIDIFY → FAN → HEAT → AUTO →

◆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.**

5.6 Display Fahrenheit or Centigrade

Display Board Z5A35B: Pressing MODE and ⊖ key simultaneously for 5 seconds, the temperature can switch between Fahrenheit and Centigrade modes.

Display Board Z5A35: Pressing ▲ and ▼ key simultaneously for 5 seconds, the temperature can switch between Fahrenheit and Centigrade modes.

5.7 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 or Anoxic protection
E6	Communication error
F0	Ambient temperature sensor error
F1	Evaporator temperature sensor error

5.8 Key Lock

Display Board Z5A35B:

1) Pressing ⊖ and ⊕ key simultaneously for 5 seconds, all keys will be locked. Then pressing ⊖ and ⊕ key simultaneously for 5 seconds again, all keys will be unlocked.

2) When 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.

Display Board Z5A35:

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.

5.9 Checking Voltage Function

Display Board Z5A35B: When numerical value displayed on the Nixie tube does not flicker, pressing ⊖ 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.

Display Board Z5A35 doesn't have Checking Voltage Function.

5.10 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 ⊕ (▲) 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 0-5100s. (85min)

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

5.11 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 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.

NOTES!

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.

6 Accessories

ACCESSORIES

	ITEM	QUANTITY
1	Mounting Bracket	4
2	Fuse	2
3	Remote controller	1
4	Battery	2

6.1 Remote Controller Operation

CAUTION!

Make sure there is no blockage between the remote controller and signal receiver.

◆The remote controller signal can be received up to a distance of 33′ (10m).

◆Don't drop or throw the remote controller.

◆Don't place the remote controller in a location exposed to direct sunlight or high temperature.

This remote controller is universal. Some functions / buttons and display options may not apply to this AC unit.

6.2 Control Panel of The Wireless Remote Controller

◆After putting through the power, press "ON/OFF" button on remote controller to turn on the air conditioner.

◆Press "MODE" button to select your required mode: AUTO, COOL, DRY, FAN, HEAT.

◆Press "+" or "-" button to set your required temperature. (Temperature can’t be adjusted under auto mode).

◆Press "FAN" button to set your required fan speed: auto, low, medium and high speed.

◆Press "SWING" button to select fan blowing angle.

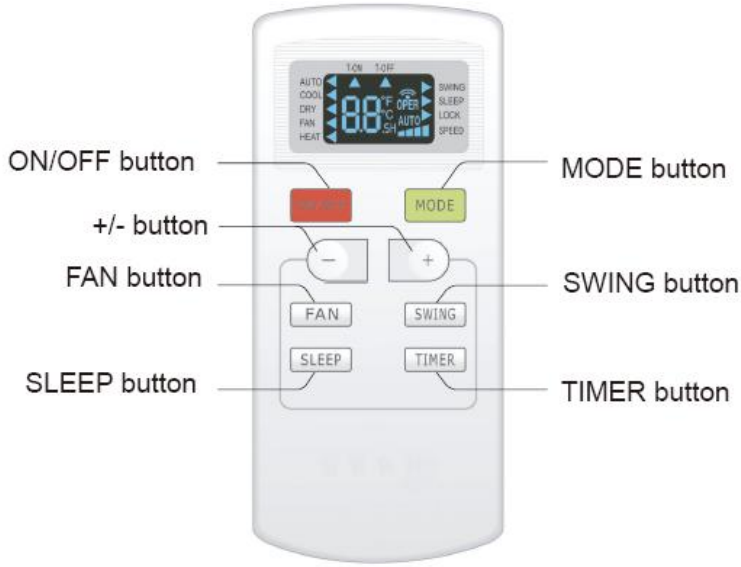


Fig.15

6.2.1 ON/OFF button

Press this button to turn unit on/off.

6.2.2 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):

AUTO ► COOL ► DRY ► FAN ► HEAT(Only for models with heating function.)

◆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.

6.2.3 + / - 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)

6.2.4 FAN button

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

NOTES!

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.

6.2.5 SWING button

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

6.2.6 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.

6.2.7 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:

◆Range of time setting is: 0.5~24h

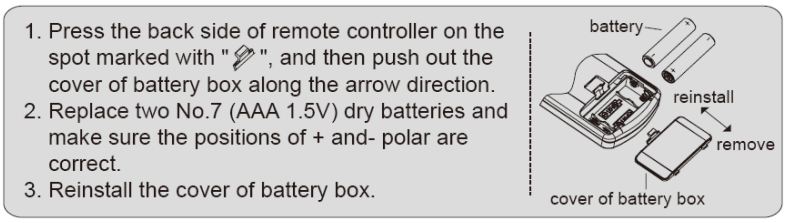
◆The interval between two motions can't exceed 5s, otherwise the remote controller will exit setting status.

◆Timer function is not available for this model.

6.3 Introduction for Special Function

6.3.1Child 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.



6.3.2Temperature display switchover function

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

6.4 Replacement of Batteries

1） Replace new batteries of the same model when replacement is required.

2） When you don’t use remote controller for a long time, please take out the batteries.

3） If the display on remote controller is fuzzy or there’s no display, please replace batteries.

7 Troubleshooting

FAULT	POSSIBLE REASON	CORRECTION
Will not start	A/C circuit breaker is off	Turn circuit breaker on at ship's panel, See control operation section in this manual.
	Display control is not turned on.	Check wiring Diagram and correct if necessary.
	Fuse is broken	Replaced with a new fuse.
	Incorrect wiring at terminal strip.	Disconnect power supply and open electric box, check wiring diagram, correct if necessary,
	Push-on butt connectors pulled apart during installation.	Check power source (shore/generator) for proper voltage.
	Input line voltage is insufficient,	Check wiring and terminals for proper sizes and connections.
Fan not running.	Check your specific control Troubleshooting section	

FAULT	POSSIBLE REASON	CORRECTION
No cooling or heating	Temperature set point is above (in cooling) or below (in heating) ambient temperature	Lower or raise set point.
	Obstructed seawater flow.	Clean seawater strainer. Check for obstructions at speed scoop thru-hull inlet. Check for a good steady flow from the overboard discharge.
	Seawater pump maybe air-locked,	Remove hose from pump discharge to purge air from line
	Refrigerant gas leaked.	Check a/c unit for refrigerant oil leakage, call service technician.
	Seawater temperature too high for cooling or too low for heating.	Seawater temperature will directly affect a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperature up to 95℉ and heat (if reverse cycle option is installed) in water as low as 40℉.
	Coil is iced (in cooling)	See below
	Fan is not running.	See below
	Pressure switch or thermal overload opened.	Check your specific control troubleshooting section.
No Heating	Reversing valve may be stuck.	Tap reversing valve lightly with rubber mallet while unit is in heat mode, call for service if the problem cannot be solved.
Low air flow	Air flow is blocked	Remove any obstructions in return air stream, Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
	Coil is iced	See below.
Coil is iced	Thermostat set point is too low	Raise set point.
	Improper air flow	Remove any obstructions in return air stream. Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
	Supply air is short-cycling,	Redirect supply air so that is not blowing into the return air stream. Seal any air leaks on duct.
	Seawater temperature is below 40℉	Shut down system to prevent damage to condenser. Allow coil to defrost (see below).
	Humidity level too high.	Close hatches and doors.
	When all else fails.	Switch a/c to heat until ice melts or use hair dryer to melt.
	Check your specific control troubleshooting section,	

FAULT	POSSIBLE REASON	CORRECTION
System runs continuously	Set point temperature is improperly set: too low for cooling or too high for heating.	Raise or lower set point.
	Porthole or hatches open.	Close all port holes and hatches.
	Seawater temperature too high for cooling or to low for heating.	Seawater temperature will directly affect the a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperatures up to 95°F and heat (if reverse cycle option is installed) in water as low as 40℉.
	Improper air sensor location.	Check your specific control troubleshooting section,
Manual controller is not lit.	4-pin display cable plugs are not making contact (unplugged, dirty, bent, or broken pins).	With POWER OFF at the circuit breaker, remove connector and inspect. If damaged, replace connector or entire display cable.

8 Maintenance

8.1 Reversing Valves

Reverse cycle units have a reversing valve; the valve must be energized periodically to keep the internal parts moving freely. To do this, switch the a/c unit into heat for a few seconds once a month.

8.2 Seawater Strainer

Ensure that your pump receives adequate seawater flow by regularly cleaning the strainer basket. Periodically check the overboard discharge for a steady stream of water. Check seawater intake speed scoop for obstructions. Make sure hoses are not looped, kinked or crushed.

8.3 Blowers

Oil blowers every six months with SAE20 or equivalent, his does not apply to high velocity blowers with the motor encased in the blower housing.

8.4 Condenser Coil Cleaning

The unit has operated in seawater area and stopped operation for 48h, please use clean fresh water to wash the bushing to prevent corrosion. When the unit operates for 3 months，do please clean it as the following:

1） With the system turned off at the circuit breaker on the ship's panel, disconnect the inlet and outlet connections of the condenser coil.

2） Use chemical resistant hoses (PVC 3/4" I.D., etc.) to connect the inlet of the condenser coil to the outlet of a chemical resistant, submersible pump and let the hose connected to the Coil outlet flow freely into the container mentioned below.

3） Place a strainer or piece of screen over the inlet of the pump and submerse the pump into a container filled with a 5% solution of muriatic or hydrochloric acid and fresh water or use

a premixed over-the-counter solution. Use a large container as possible to hold the solution (5-25 gallons). CAUTION: avoid spilling or splashing the solution. Remember to wear all necessary protective gear, i.e. approved safety goggles and chemical resistant gloves. Follow all warnings and recommendations given by the manufacturer of any acids or premixed solutions.

4） Power the pump and circulate the solution through the condenser coil for 15-45 minutes depending upon the size of the coils and the extent of the contamination. Visual inspection of the solution in the container should indicate when the contamination has been removed.

5） Circulate fresh water through the coil to flush any residual acid from the system.

6） Restart the system and check operational parameters to ensure thorough cleaning has taken place. Additional cleaning may be necessary with extreme contamination.

WARNING!

For the purpose of protecting the environment, dispose of any contaminated acid solutions in accordance with federal, state and/or local regulations.

8.5 Return Air Filters

Check the return air filter about once a month and clean as necessary. To clean the filter, remove it from the unit, rinse with water, air dry and reinstall. (Do not used compressed air)

8.6 Winterization

There are several methods of winterization, some of which work better than others. There are various methods employed using a 50/50 non-polluting biodegradable anti-freeze/water solution. Any method that causes the anti-freeze solution to flow downward is the method of choice. By this, the anti-freeze solution will displace any water trapped and eliminate the possibility of freezing in hidden areas. In addition, since the seawater pump utilizes a magnetically driven impeller, the impeller should be removed from the wet end assembly, Wiped with a solution, and stored in a warm, dry area until commissioning takes place.

Collect all discharged liquids and recycle or dispose of in a proper manner.

8.7 Limited Warranty

This product comes with a 24 month limited warranty from the date of purchase.

8.8 Technical Assistance

For quick service, please have the following information available:

◆Full Name;

◆Phone number including the area code;

◆Unit Model Information;

◆The type of assistance that you are requesting.

NOTE CONCERNING PROTECTION OF ENVIRONMENT

This product must not be disposed of via normal household waste after its service life, but must be taken to a collection station for the recycling of electrical and electronic devices. The symbol on the product, the operating instructions or the packaging indicate such disposal procedures. The materials are recyclable in accordance with their respective symbols. By means of re-use, material recycling or any other form of recycling old appliances you are making an important contribution to the protection of our environment. Please ask your local council where your nearest disposal station is located.

INFORMATION CONCERNING USED REFRIGERANT MEDIUM

This unit is containing fluorinated gases included in the Kyoto protocol. The maintenance and the liquidation must be carried out by qualified personnel.
Type of refrigerant: R410A
The composition of the cooling medium R410A: (50% HFC-32, 50% HFC-125)
The quantity of the refrigerant: please see the unit label.
The value GWP: 2088 (1 kg R410A = 2,088 t CO_2 eq)
GWP = Global Warming Potential

In case of quality problem or other please contact your local supplier or authorized service center.
Emergency number: 112

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