



**User Manual SCE-AC1870B460V, SCE-AC1870B460VSS & SCE-AC1870B460VSS6**

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## 1. User Manual

This instruction manual contains information and instructions to enable the user to work safely, correctly and economically on the unit. Understanding and adhering to the manual can help one:

- Avoid any dangers
- Reduce repair costs and stoppages
- Extend and improve the reliability and working life of the unit

**PLEASE ENSURE TO USE THE RIGHT VERSION OF THE INSTRUCTION MANUAL SUITABLE FOR YOUR UNIT**

### Conditions of Use

The unit is to be used exclusively for the dissipation of heat from control cabinets and enclosures in order to protect temperature sensitive components in an industrial environment. To meet the conditions of use, all the information and instructions in the instruction manual must be adhered to.



#### General Danger

Indicates compulsory safety regulations which are not covered by a specific pictogram such as one of the following.



#### High Electric Voltage

Indicates electric shock danger.



#### Important Safety Instruction

Indicates instructions for safe maintenance and operation of the unit.



#### Attention

Indicates possible burns from hot components.



#### Attention

Indicates possible damage to the unit.



#### Instruction

Indicates possible danger to the environment.

## 2. Legal Regulations

### Liability

The information, data and instructions contained in this instruction manual are current at the time of going to press. We reserve the right to make technical changes to the unit in the course of its development. Therefore, no claims can be accepted for previously delivered units based on the information, diagrams or descriptions contained in this manual. No liability can be accepted for damage and production caused by:

- Disregarding the instruction manual
- Operation error
- Inappropriate work on or with the unit
- The use of non-specified spare parts and accessories
- Unauthorized modifications or changes to the unit by the user or his personnel

Saginaw Control & Engineering is only liable for errors and omissions as outlined in the guarantee conditions contained in the main contractual agreement. Claims for damages on any grounds are excluded.

### 3. Safety Instructions

Upon delivery the unit is already meeting current technical standards therefore it can be safely taken into operation. Only trained specialists are allowed to work on the unit. Unauthorized personnel must be prohibited from working on the unit. Operating personnel must inform their superiors immediately if any malfunction of the unit becomes apparent.

Please note that before starting to work on or with the unit, a procedure must be carried out inside the cabinet on which the unit is to be mounted.

Before commencing work inside the cabinet, the control cabinet manufacturer's instruction must be read with regards to:

- Safety instructions
- Instructions on taking the cabinet out of operation
- Instructions on the prevention of unauthorized cabinet reconnection

The electric equipment meets the valid safety regulations. One can find dangerous voltage (above 50V AC or above 100V DC):

- Behind the control cabinet doors
- On the power supply in the unit housing

The units have to be fused according to the type plate and the wiring diagram. Switch the unit **off** immediately if the electric power supply is interrupted.



#### **Danger Through Incorrect Work on the Unit**

Only specialized personnel are allowed to maintain and clean the unit. Regular maintenance and cleaning must be kept in order to ensure that the unit remains in perfect working condition and has a long working life.



#### **Danger from Electric Voltage**

Only specialized personnel are allowed to maintain and clean the unit. The personnel must ensure that for the duration of the maintenance and cleaning, the unit is disconnected from the electrical supply.



#### **Attention**

Damage to the unit through the use of inappropriate cleaning materials. Please do not use aggressive cleaning material.



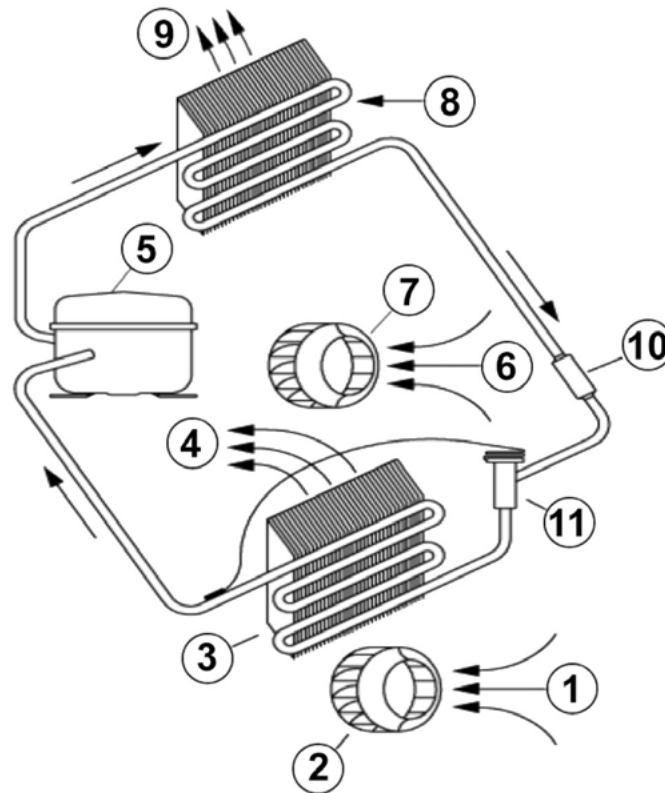
#### **Instruction**

Damage to the environment through unauthorized disposal. All spare parts and associated material must be disposed of according to the environmental laws.

## 4. Functional Principle

The unit functions on the principle of the compression refrigerator. The main components are: refrigerant compressor, condenser, choke and evaporator. These four components of the refrigerant plant are connected with each other by pipes to form a hermetically sealed system in which the refrigerant (R513a) circulates.

1. Air Intake, Cabinet Side
2. Radial Fan, Cabinet Side
3. Evaporator
4. Air Outlet, Cabinet Side
5. Compressor
6. Air Intake, Ambient Side
7. Radial Fan, Ambient Side
8. Condenser
9. Air Outlet, Ambient Side
10. Filter Dryer
11. Expansion Valve



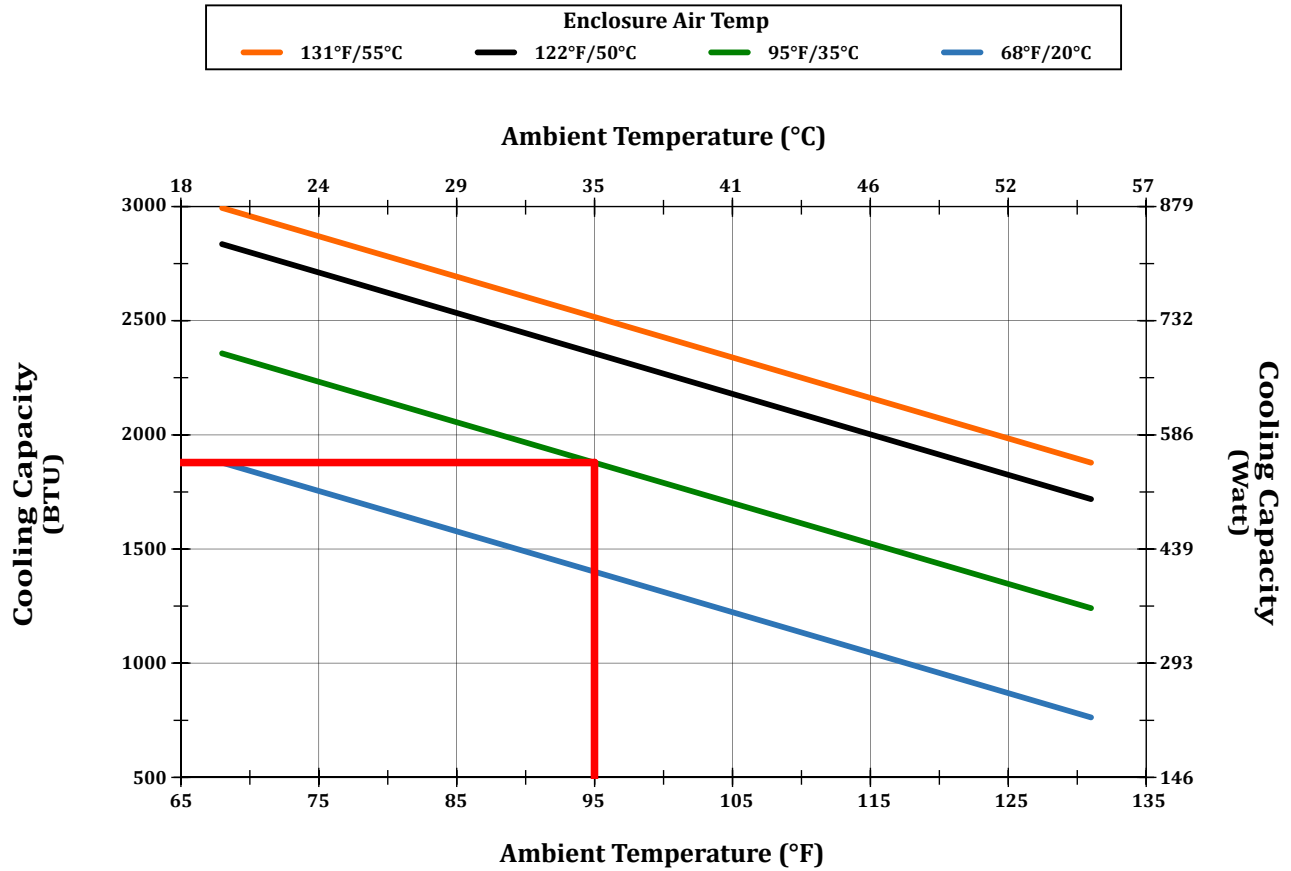
## 5. Technical Data

Part Numbers	SCE-AC1870B460V SCE-AC1870B460VSS SCE-AC1870B460VSS6
Cooling Capacity @ 95°F / 95°F	1870 BTU (548 Watts)
Cooling Capacity @ 131°F / 131°F	1877 BTU (550 Watts)
Heating Capacity	400 W
Compressor	Rotary piston compressor
Refrigerant	R513A / 630
Refrigerant Charge	226 g / 7.97 oz
High / Low Pressure	425 / 88 psig
Operating Temperature Range	-4°F - 131°F
Max. Air Volume Flow	Ambient Air Circuit: 185 cfm Cabinet Air Circuit: 97 cfm
Mounting	External
Housing Material	Mild Steel, Powder Coated SS: Stainless Steel AISI 304 SS6: Stainless Steel AISI 316
Dimensions (H x W x D)	32.68 x 12.00 x 10.63 inch
Weight	71.5 lbs
Cutout Dimensions	10.43 x 7.09 inch 10.43 x 6.30 inch
Rated Operating Voltage / Frequency	400/460 V - 50/60 Hz
Rated Current @ 95°F / 95°F	1.2 A @ 50 Hz 1.1 A @ 60 Hz
Starting Current	5 A
Max. Current	1.9 A
Power Consumption @ 95°F / 95°F	422 W @ 50 Hz 432 W @ 60 Hz
Max. Power Consumption	497 W @ 50 Hz 545 W @ 60 Hz
Fuse Rating	4A (T) - Time Delayed [Slow Acting]
SCCR	5kA
Transformer Inrush 120A 0.01 Sec. on 120V & 460V	Unit Class CC fuse / Class C Breaker Not Recommended
Circuit Breaker – MCB Type D or K Slow Acting	3A Slow Acting
Connection	4-pole terminal block for power 5-pole terminal block for signals 3-pole terminal block for RS 485
NEMA Protection Class	NEMA 3, 3R, 4 & 12 SS: NEMA 3, 3R, 4, 4X & 12
Approvals	CE / cURus / UL Listed
Industry Standards	IS19 SS: IS20
Sound Level at 1.5 meters	65 db(A)
Max Voltage at Door Switch	5 A DC

### 6. Performance Graph

## Enviro-Therm® Air Conditioners 1870 BTU/HR (548Watts) Performance Curve

SCE-AC1870B230V, SCE-AC1870B120V, SCE-AC1870B460V  
 SCE-AC1870B230VSS, SCE-AC1870B120VSS, SCE-AC1870B460VSS  
 SCE-AC1870B230VSS6, SCE-AC1870B120VSS6, SCE-AC1870B460VSS6





## 7. Mounting

***Always disconnect the power supply before opening the unit.***

Heat load to be dissipated from enclosure should not exceed specific cooling output of the unit at any condition. When selecting a cooling unit, always allow for a safety margin of at least 15% extra cooling output in the worst conditions. Air inlets and outlets must be completely free from obstruction.

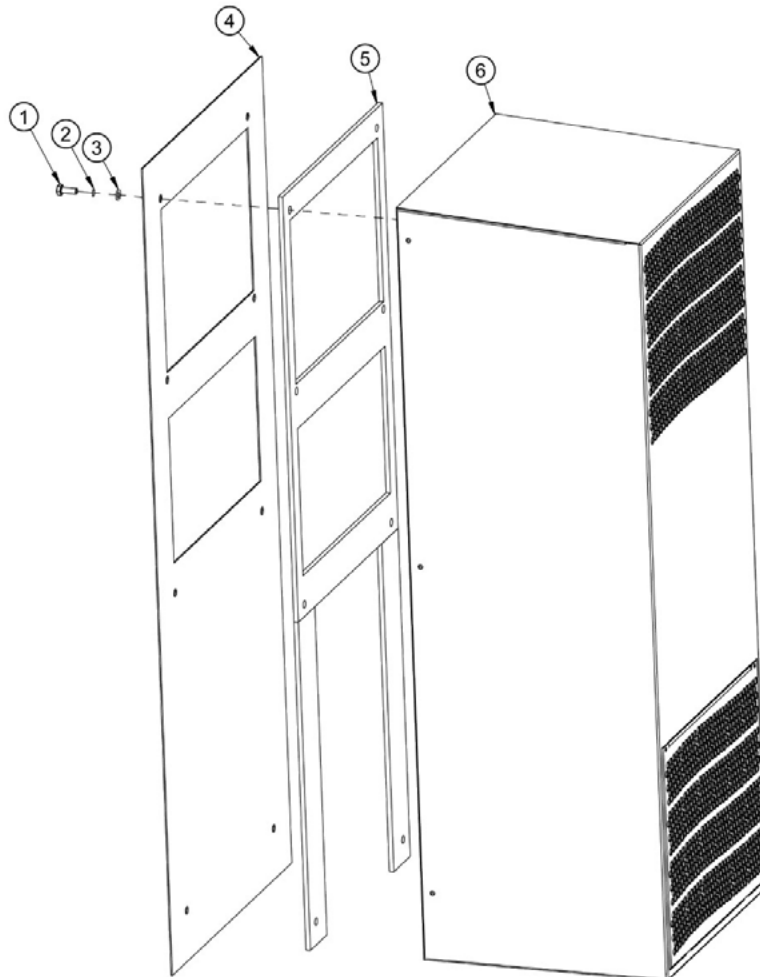
Ensure that flows of air leaving and entering the cooling unit, internal and external, are not obstructed. Cooling unit enclosure air suction hole must be installed at the highest possible point. When installing the unit on a door ensure it can take the weight.

Before drilling the enclosure, ensure the fixing elements and couplings will not interfere with the equipment inside the enclosure itself. Disconnect power before starting any work inside the enclosure. Following this 1:1 Scale Drilling Template, drill the holes and make the required cuts on the enclosure. This template may have been affected by storage conditions, please check this template by verifying values of the largest dimensions before drilling. Fit the sealing strip to the cooling unit on the side connected to the enclosure and follow the installation diagram.

## 8. Mounting Principle

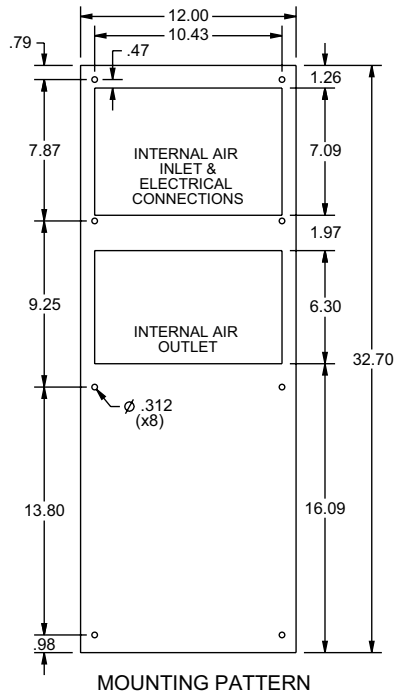


- **Do not use within the first 15 minutes after installation!**
- **Use only the supplied mounting hardware.**
- **Tighten fasteners to 40 inch lb.**
- **Ensure the mounting surface does not warp after assembly and reinforce it if necessary.**

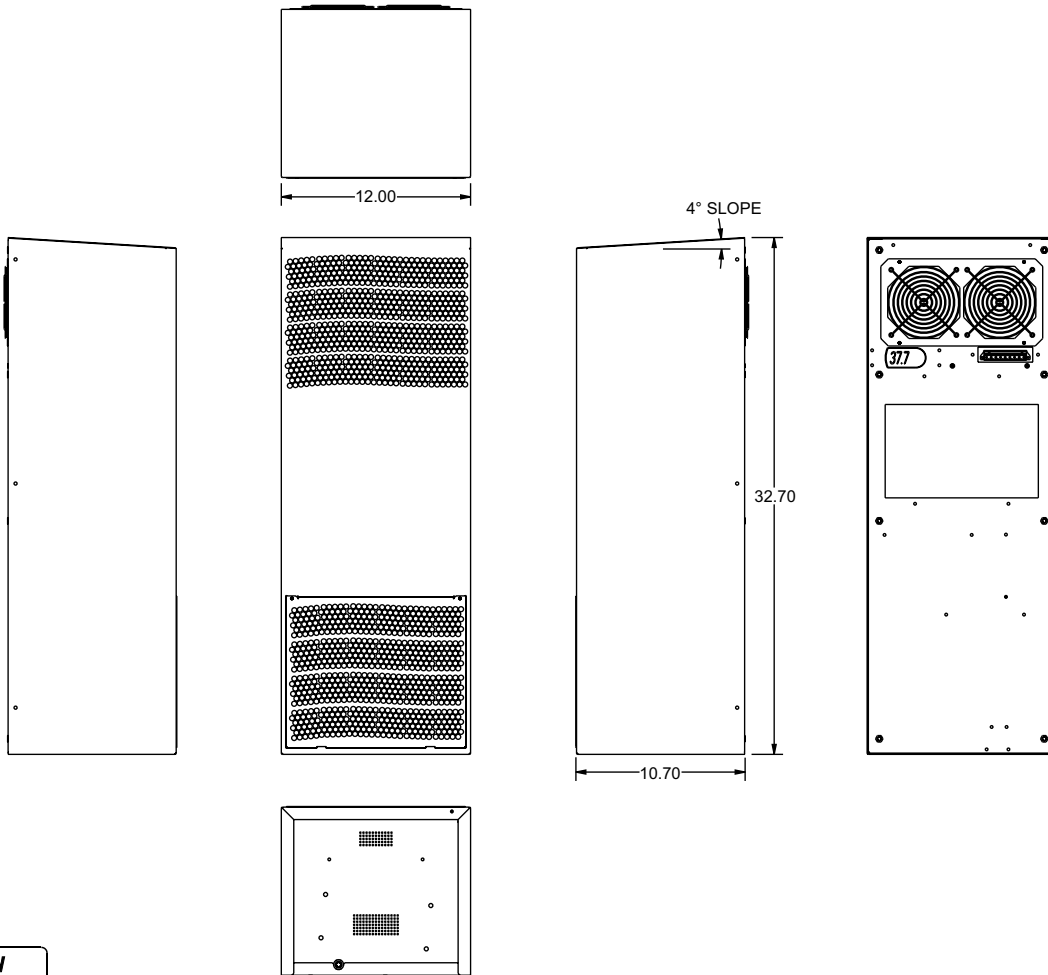


1. M6 Bolts
2. M6 Toothed Washers
3. M6 Flat Washers
4. Enclosure
5. Mounting Gasket
6. Cooling Unit

### 9. Cutout Dimensions



### 10. Dimensions (H x W x D)





## 11. Electrical Connection

The cooling unit is used where heat needs to be dissipated from electrical control cabinets or similar enclosures in order to protect heat sensitive components. The unit has two completely separate air circuits which ensure that the clean cabinet air does not come into contact with the ambient air which may well be dirty or polluted. Control cabinet air conditioners can dissipate large quantities of heat from sealed enclosures, such as control cabinets, into the ambient air and at the same time reduce the cabinet internal temperature to below that of the ambient air.

The control cabinet air conditioner can function without problems in extreme ambient conditions (e.g. dusty and oily air) with a standard operating temperature ranging between -4°F and 131°F. The stated cooling capacities are according to DIN 3168.

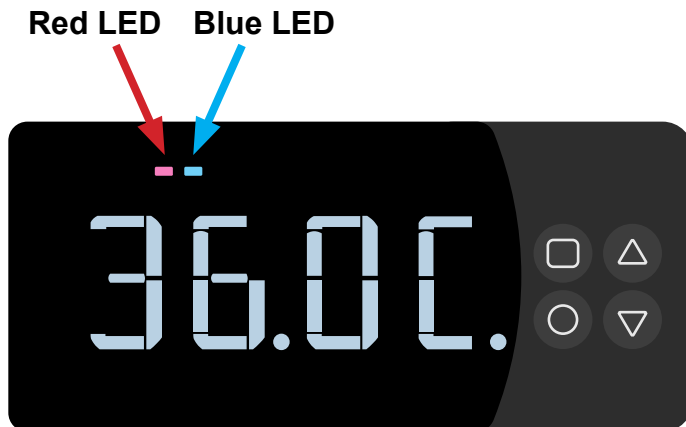
### Door Switch

The unit can be switched on and off via a door contact switch. When delivered the door contact terminals are bridged on the female connector. To connect the door contact switch remove the bridge and connect door contact switch. The contact must be closed when the cabinet door is closed.

## 12. DISP-1503 Controller

The cooling unit is intended to be used as a complementary accessory to larger industrial equipment. The unit is used where heat needs to be dissipated from electrical control cabinets or similar enclosures in order to protect heat sensitive components. It is not intended for household use. The unit has two completely separate air circuits which ensure that the clean cabinet air does not come into contact with the ambient air which may well be dirty or polluted. Enclosure cooling units can dissipate large quantities of heat from sealed enclosures such as electrical enclosures into the ambient air and at the same time reduce the cabinet internal temperature to below that of the ambient air.

The unit can function without problems in extreme ambient conditions (e.g. dusty and oily air) with a standard operating temperature ranging between +10°C and +55°C (+50°F and +131°F). Units can be ordered with an additional electrical cabinet heater. For the cooling capacities and environmental ratings please refer to the type plate data.



### Buttons

- Menu
- Set
- Up
- Down

### LED Functions

- Blue LED: Steady On - Cooling mode
- Blue LED: Blinking - min. comp. off time not elapsed
- Red LED: Blinking - Alarm

The display shows the temperature in the range of -30°C to +110°C (-22°F and +230°F). The temperature is displayed with a resolution of 0.1° between -9.9° and +110°, and 1° between -30° and -10°. On start-up, the screen shows the unit's internal temperature and this is considered the Home Menu of the controller.

### Programming Quick Reference

Description	Input
Test Function	Press <input type="triangle-up"/> and <input type="triangle-down"/> simultaneously for 3 seconds
Change Cooling Setpoint	Press <input type="checkbox"/> and then <input type="triangle-up"/> or <input type="triangle-down"/> to go to Ct_S and press <input type="radio"/> to select Press <input type="triangle-up"/> or <input type="triangle-down"/> to desired set point Press <input type="radio"/> for 3 seconds to lock set point
Change High Alarm	Press <input type="checkbox"/> and then <input type="triangle-up"/> or <input type="triangle-down"/> to go to HA_S and press <input type="radio"/> to select Press <input type="triangle-up"/> or <input type="triangle-down"/> to desired set point Press <input type="radio"/> for 3 seconds to lock set point
Change Celsius/Fahrenheit	Press <input type="checkbox"/> and then <input type="triangle-up"/> or <input type="triangle-down"/> to go to C_F and press <input type="radio"/> to select Press <input type="triangle-up"/> or <input type="triangle-down"/> to desired set point Press <input type="radio"/> for 3 seconds to lock set point
Change Heating Setpoint	Press <input type="checkbox"/> and then <input type="triangle-up"/> or <input type="triangle-down"/> to go to Ht_S and press <input type="radio"/> to select Press <input type="triangle-up"/> or <input type="triangle-down"/> to desired set point Press <input type="radio"/> for 3 seconds to lock set point
Change Low Alarm	Press <input type="checkbox"/> and then <input type="triangle-up"/> or <input type="triangle-down"/> to go to LA_S and press <input type="radio"/> to select Press <input type="triangle-up"/> or <input type="triangle-down"/> to desired set point Press <input type="radio"/> for 3 seconds to lock set point

**I) Operations from Home Screen**

- Pressing  $\Delta$  or  $\nabla$  for 1 second will go to Menu 1. This will show the status of DI1, DI2, S1, S2 and Onboard Sensor. Pressing  $\nabla$  or  $\Delta$  will toggle between sensors/digital inputs.
- Pressing  $\square$  will go to Menu 2.
- Any Alarms will appear on the Home Screen.
- If the Door Contact is Open, the Home Screen will show an OFF status.
- Pressing  $\Delta$  and  $\nabla$  simultaneously for 3 seconds will start Test Mode.

**II) Operations from inside the Menus**

- Pressing  $\square$  from any menu will return to the Home Screen.
- Pressing  $\circ$  while in Menus 2/2 shows the parameter value.
- Pressing  $\circ$  for 3 seconds while showing a parameter, will save the parameter.
- Pressing  $\square$  while showing a parameter, will return to the respective menu.

All parameters are sorted in 2 separate menus below

**Menu 1**

Parameter	Description	Range
Sbrd	Onboard Sensor Reading	-
S1	S1 Sensor Reading	-
S2	S2 Sensor Reading	-
d1	Digital Input 1 Reading	0: Open 1: Closed
d2	Digital Input 2 Reading	0: Open 1: Closed

**Menu 2**

Parameter	Description	Input	Setting range
Ct_S	Control Setpoint	$\Delta$ or $\nabla$ to Increase/Decrease Temperature	Min: ccS1 Max: ccS2
HA_S	High Alarm Setpoint	$\Delta$ or $\nabla$ to Increase/Decrease Temperature	Min: HAS1 Max: HAS2
LA_S	Low Alarm Setpoint	$\Delta$ or $\nabla$ to Increase/Decrease Temperature	Min: LAS1 Max: LAS2
Ht_S	Heater Setpoint	$\Delta$ or $\nabla$ to Increase/Decrease Temperature	Min: HS1 Max: HS2
C_F	Celsius / Fahrenheit	$\Delta$ or $\nabla$ to change between °C and °F	C: Celsius F: Fahrenheit
IP_1	Input 1 Invert	$\Delta$ or $\nabla$ to changes between NC/NO door contact	0: NC 1: NO
StAt	System State	Read Only	OFF: Off IdL: Idle CL: Cooling Ht: Heating tSt: Test
OUtP	Relay Outputs	Read Only	H: Heater Relay A: Ambient Blower Relay C: Compressor Relay

**Alarm codes**

Alarm Code	Description
AL1 - HI	High Temp Alarm
AL2 - LO	Low Temp Alarm
AL3 - PrEP	Pressure Pipe Alarm
AL4 - AbS	Ambient Sensor Faulty
AL5 - PPS	Pressure Pipe Sensor Faulty
AL6 - ICES	Ice Sensor Faulty
AL7 - InS	Internal Sensor Faulty
NA	Not Available
AL9	...Check 'Digital Input 2' Table below
AL10 - ICE	Ice Algorithm Active
AL11 - SLOC I	Incorrect Sensor Location

**Digital Input 2 Table**

dIn2	Generic Error
PH_F	Phase Failure
Pr_S	Pressure Switch
FL_S	Float Switch

**Digital Input 2 Table**

- Test mode is started by simultaneously pressing  $\triangle$  and  $\nabla$  for 3 seconds from the Home screen.
- When Test run is active, tESt will be shown blinking on the display

Test procedure when Internal Temperature is between 10°C and 50°C C (50°F and 122°F)

0 to 30 seconds	Ambient Blower
30 seconds to 5:30 Minutes	Ambient Blower + Compressor
5:30 Minutes to 6:30 Minutes	Ambient Blower + Heater

### 13. DISP-1503 Wiring Diagram

		400V	460V
Power connector	1	-	L1
	2	L1	-
	3	L2	L2
	4	PE	PE
	Alarm/Door Connector	1	Alarm Contact (NC)
	2	Alarm Contact (COM)	Alarm Contact (COM)
	3	Alarm Contact (NO)	Alarm Contact (NO)
	4	Door Contact	Door Contact
	5	Door Contact	Door Contact
RS485 connector	1	A	A
	2	Gnd	Gnd
	3	B	B

**Part List**

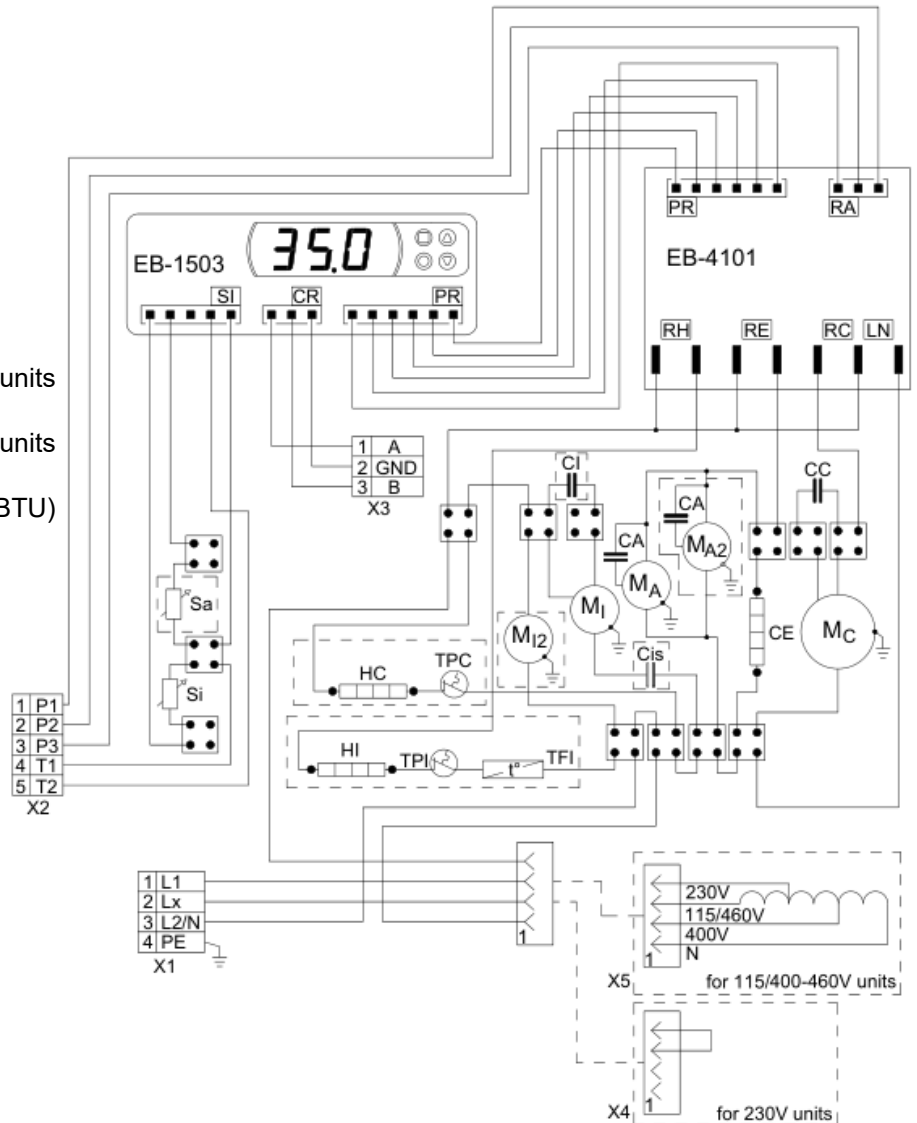
- X1: Power connector
- X3: RS485 connector
- X5: Auto transformer
- Ci: Capacitor for Mi
- Ca: Capacitor for Ma
- Cc: Capacitor for Mc
- Sa: Ambient temp sensor
- TPI: Thermal protector (185°F)
- HC: Compressor heater
- CE: Condensate heater
- X2: Signals/Alarms connector
- X4: 230V jumper
- Mi: Internal fan
- Ma: Ambient fan
- Mc: Compressor
- Si: Internal temp sensor
- Hi: Internal heater
- TFI: Thermal fuse (215.6°F)
- TPC: Thermal protector (185°F)

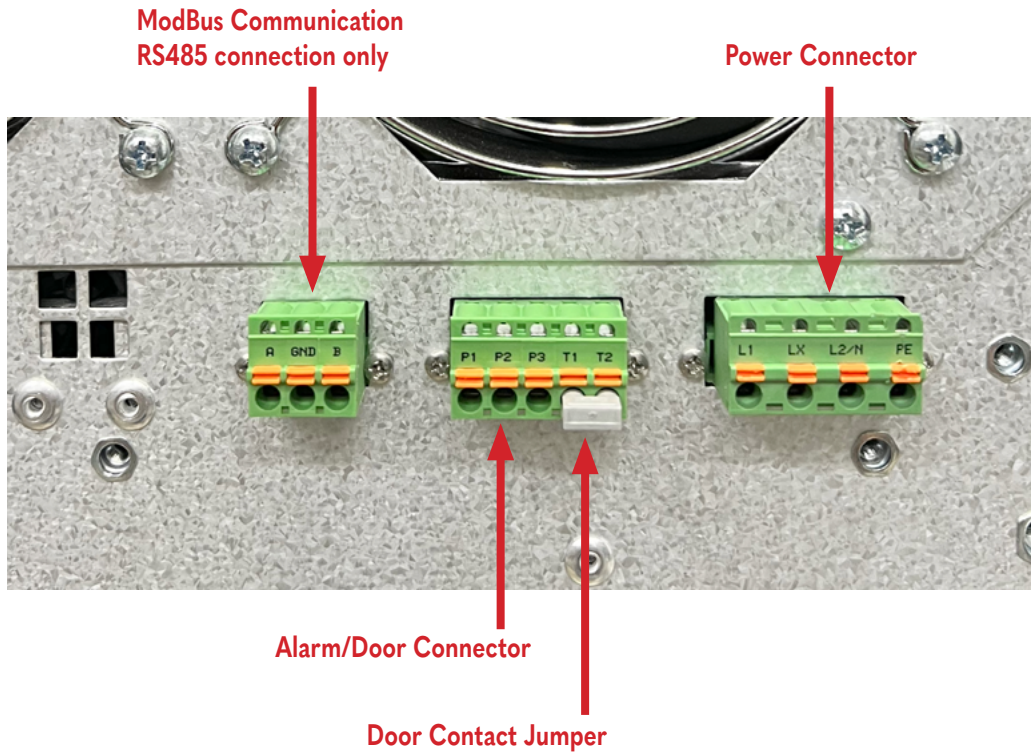
**X1 Electrical Supply Connection**

(see unit typeplate for unit voltage)  
 115/230V - 1:L1 (115/230V), 3:N  
 400V - 2:LX (400V), 3:L2 (400V)  
 460V - 1:L1 (460V), 3:L2 (460V)

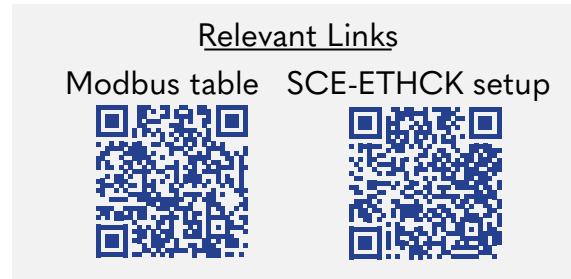
**Notes**

1. Use supply wires suitable for 167° F
2. Use copper conductors only
3. Optional components in dashed borders
4. X4 used for 230V units only
5. X5 used for 115/400-460V units only
6. MA2 used for 4kW (13650BTU) units only
7. MI2 used for 550-850W (1870-2890BTU) units with axial fans
8. CI not used in 300-850 (1000-2890BTU) units with axial fans
9. Cis used only for 750-1250W (2560-4260BTU) indoor units





## 14. Modbus Connection



Detailed instructions on Modbus communication can be found in the link below  
<https://www.saginawcontrol.com/instman/modbus-table.pdf>

### Further notes:

- From Modbus side, any setting can be with 0.1°C precision. From the display, the precision is 0.5°C. When having a setting, example 30.4°C, this will be rounded to 30.5°C when accessed via display.
- When system detects incorrect sensor mapping, it sends unit into idle and triggers an alarm on display. No alarm is shown on Modbus.
- When Ambient, Icing and Pressure are not enabled, the value displayed (Modbus/Seifert Software) is -50°C.
- When saving settings via communication, S is shown on display for 1 second.
- When system goes in Cooling Mode, C is shown on display for 1 second.
- When system goes in Heating Mode, H is shown on display for 1 second.
- When accessing the Display Settings of Menu 2/3/4, any settings from Modbus are ignored.
- When running a test with the door contact open, the display only shows TEST, since the unit will not be OFF.
- When running a test with Alarms, the Alarms and TEST are shown together.
- On Start-up, the communication is by default Modbus. It can be changed to Seifert Protocol by writing a code in register SET\_CHANGE\_PROTOCOL. After 10 seconds of no communication, system changed back to Modbus.
- When unit is not Modbus Address 1, the Master/Slave and Redundancy parameters are hidden from Menu3 when using Client Password. (MS1, MS2, MdL, rS1, rS2, rS3).
- Enabling the Pressure sensor from Modbus can only be done if the unit is not in cooling mode.
- The Blue LED is ON when the unit is cooling.
- A red LED is ON when the unit is heating.
- The red LED flashes when an alarm is present

## 15. Taking Into Operation

### Attention!

The unit can be damaged by lack of lubricant. To ensure that the compressor is adequately lubricated, the oil, which has been displaced during transport, must be allowed to flow back into it. The unit must therefore be allowed to stand for at least 30 minutes before being connected to the mains and taken into operation. Upon connection the internal fan will start working. If the temperature inside the enclosure is higher than the set value of the controller, both the compressor and external air fan start working. Once the air inside the enclosure reaches the set temperature, the compressor and external fan will stop.

The unit is pre-set at 95°F, which is suitable for most of the electronic devices.

If Drainage required, use PVC 10mm (3/8 inch) ID Hose.

## 16. Repair

Failure	Condition	Cause	Solution
<b>Unit Does Not Cool</b>	Internal fan does not work	Power not connected.	Verify power supply
	Internal fan works, external fan and compressor do not work	Enclosure temperature is below setting temperature (St)	Verify values of parameter "St"
		Door switch contact is open	Verify door switch
		Controller does not work	Replace controller
	Internal fan works, external fan and compressor do not work Display shows alternating "OFF" and temperature	The sequence of the phases inside the power supply connector is incorrect	Change phases inside power supply connector
	External and internal fan work, compressor does not work	Compressor motor electrical failure	Verify external fan, verify ambient temperature, clean condenser
		Capacitor for compressor failed	Replace capacitor
Compressor works, external fan does not work	External fan needs to be replaced	Replace external fan	
<b>Enclosure Overheating</b>	Compressor and fans (external and internal) work all the time	Unit cooling undersized	Enclosure needs a bigger cooling unit
	Enclosure needs a bigger cooling unit	Thermal compressor protector triggered	Verify ambient temperature, clean condenser
		Refrigerant leakage	Contact dealer/service center
<b>Excessive Condensate</b>	Door enclosure open	Ambient air gets into the enclosure	Ensure door is closed, add a door switch and connect it to controller
	Door enclosure closed	Enclosure IP degree minimum IP54	Seal openings on enclosure
		Damaged/misplaced sealing strip	Repair strip accordingly





## 17. Maintenance & Cleaning

*Always switch power supply off before starting any maintenance on the unit.*

Any repairs that may be needed must only be done by qualified personnel. The cooling unit is a low maintenance type and for most environments, no filter is required. If an air filter is installed, check it periodically for dirt and clogs. Clean or replace filter when necessary.

### Disposal

The cooling unit contains R513a refrigerant and small quantities of lubricating oil. Replacement, repairs and final disposal must be done according to the regulations of each country for these substances.

## 18. Transportation & Storage

During transport and storage the cooling unit must be kept in the position marked on the box and at a temperature between -40°F and 158°F and a relative humidity of max. 95% (at 77°F). Check that the packaging has not been damaged during transport.

## 19. Parts Supplied

- 1 x Air Conditioner
- 1 x Instruction Manual with technical information
- 1 x Mounting Template in 1:1 scale
- 1 x Installation pack containing:
  - 8 x M6 Bolts
  - 8 x A6.4 Toothed Washers
  - 8 x A6.4 Washers
  - 1 x Female Connector with shorted wired positions for door contact

### Saginaw Control and Engineering

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## 20. Warranty / Limits of Liability

All goods manufactured by SCE shall be warranted to be free of defects in material or workmanship for a period of two years from the date of shipment. Should the product be proven to SCE to be defective, we shall option to repair or replace the product. At no time will SCE reimburse purchaser for unauthorized rework on any product.

Air Conditioners & Heat Exchangers are warranted on parts and service for a period of two years from the date of shipment by Saginaw Control and subject to the following conditions and exclusions:

All Goods must be installed and operated according to the following specifications: Maximum voltage variation no greater than plus or minus 10% of nominal rating; Maximum frequency variation no greater than plus or minus 3 Hz. from nominal rating; Must not exceed minimum and maximum rated temperatures; Must not exceed (BTU/Hr) rating; Filters must be cleaned regularly; Must be installed and grounded in accordance with all relevant electrical and safety codes, as well as the National Electric Code and OSHA rules and regulations; Must be installed in a stationery application, free of vibration.

Our warranty does not warranty product that has been modified, subjected to abuse, negligence in operation or maintenance, or if product is used in a manner that exceeds its designed capabilities and rating.

Warranty related claims will be returned to the factory for evaluation and final disposition of the claim, any replacement parts will be invoiced at standard pricing and credit issued for the returned product. If the product has been found to have been modified, subjected to abuse, negligence in operation or maintenance, or if product has been used in a manner that exceeds its designed capabilities and rating, credit may be reduced, denied or additional cost may be assessed and passed on to the purchaser, such as return freight.