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Technical Document



AIR CONDITIONER OPERATOR'S MANUAL

GUARDIAN SERIES K3NA5C7DP52L (V)



Keep This Manual With Air Conditioner

CAUTION

BEFORE INSTALLING AND USING THIS AIR CONDITIONER, IT IS IMPORTANT THAT THIS MANUAL BE READ AND UNDERSTOOD THOROUGHLY



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TABLE OF CONTENTS

I.	Introduction.....	2
II.	Incoming Inspection.....	3
III.	Product Handling.....	3
IV.	Product Identification and Nameplate.....	4
V.	Principles of Operation.....	5-9
VI.	Pre-Installation Testing.....	10
VII.	Specific Model Data.....	11-14
	Mounting	
	Drawings and Dimensions	
	Technical Data	
	Major Component Replacements	
	Standard Features	
VIII.	Maintenance.....	15-16
IX.	Trouble Shooting.....	16-17
X.	Warranty.....	18

NOTE: Wiring Schematics are available on the specific model page of the Kooltronic website.

I. Introduction

Kooltronic Air Conditioners are designed to provide a cool, dehumidified environment for your electronic components. There are models to fit virtually all sizes and shapes of electronics enclosures, in capacities ranging from 1,000 to 30,000 BTU/H. Our “closed-loop” design also ensures that your components will not be exposed to hot, dirty operating conditions.

This Manual provides you with the necessary general information for properly installing and operating standard Kooltronic Air Conditioners. Technical data and mounting instructions are presented on pages 10 through 13.

II. Incoming Inspection

Kooltronic Air Conditioners are designed, built and packaged to withstand the shock and vibration normally associated with shipment by common carriers. Occasionally improper handling during shipping causes damage. Such handling could include unbanding of palletized shipments, failing to respect “**This Side Up**” arrows, rough handling, falling off conveyors, excessive vibration, crushing, etc. Therefore, a thorough inspection should be done upon receipt of all shipments. Any carton tears, dents, scratches, loose articles or evidence of oil are signs of damage and should be noted on the Freight Bill. Cartons should be opened promptly and the units inspected for CONCEALED DAMAGE. Kooltronic Air Conditioners must be delivered in the proper mounting position to assure that damage to the compressor has not occurred during shipping. Any Kooltronic Air Conditioner that is delivered removed from the banded pallet, lying down or double stacked should be refused.

An immediate claim **MUST** be filed with the freight carrier and an inspection requested. Retain all packing materials. Kooltronic cannot assume responsibility for Consignee’s failure to file a timely freight claim.

III. Product Handling:

- 1) Do not attempt to operate your Kooltronic Air Conditioner until you read and thoroughly understand this Manual. See section **VI PRE-INSTALLATION TESTING**.
- 2) Before operating the Kooltronic Air Conditioner be certain that it is placed in its correct mounting position. **This Air Conditioner is designed to operate in a vertical position only.** This placement must be done a minimum of 5 minutes prior to operating in order to allow the compressor oil to drain to the compressor sump area.

CAUTION

Kooltronic Air Conditioners must be operated in their proper mounting position. If attempts are made to operate a unit that is not in its designed mounting position, permanent compressor damage will occur. This action will void the warranty. To avoid compressor damage do not tip the unit more than 45° from its proper mounting position.

- 3) Before operating this unit, all electrical wiring must be checked to assure the proper connection to the correct power source. Minimum circuit ampacity should be at least 125% of the amperage found on the nameplate for the corresponding voltage. Do not exceed the maximum fuse size found on the nameplate.
- 4) We do not recommend that Air Conditioners be shipped to their final destination attached to an enclosure. In the event that the Air Conditioner needs to be shipped attached to an enclosure it is strongly recommended that proper support be provided for the Air Conditioner. Excessive vibration can occur if Air Conditioners are not properly supported when shipped on enclosures, increasing the potential for internal damage and voiding the warranty.
- 5) **PROCEDURE FOR PROPER PACKING AND SHIPMENT OF KOOLTRONIC AIR CONDITIONERS:**
 - Keep Air Conditioner in proper upright position indicated by arrow markers.
 - Pack Air Conditioner in an appropriate carton (preferably original carton if possible), with adequate internal protective packaging, making sure carton is marked and is kept in correct upright position.
 - For local, controlled transportation, strap carton to a secure part of truck to prevent falling or sliding, minimize vibration, etc.
 - For common carrier shipment, band unit(s) securely to a pallet. Unpalletted shipment risks severe damage which voids the warranty.

IV. Product Identification and Nameplate

Each Kooltronic Air Conditioner includes an identification nameplate. This nameplate provides:

- ① Model Number
- ② Serial Number
- ③ Electrical power characteristics
- ④ Maximum and minimum ambient operating temperatures
- ⑤ Cooling capacity
- ⑥ Type and amount of refrigerant required for recharging
- ⑦ Design Pressure
- ⑧ Maximum Fuse Size
- ⑨ Manufacturing Order Number
- ⑩ Filter
- ⑪ Underwriters Laboratories Inc. Listed or Recognized Marks and NEMA ratings
- ⑫ CE

We recommend you copy this information from your unit.

		Air Conditioner			
MODEL NUMBER ①		SERIAL NUMBER ②			
VOLTS ③	FREQ. ③	PH. ③	COOLING F.L.A. ③	AMBIENT TEMP. MIN.°F MAX.°F ④ ④	
COOLING BTU ⑤		REFRIGERANT Oz. ⑥			
DESIGN PRESSURE P.S.I.G. LOW HIGH ⑦ ⑦		MAX. FUSE SIZE ⑧		 LISTED 84H7 SPECIAL PURPOSE AIR CONDITIONER	
		MFG. ORDER NO. ⑨			
		FILTER P/N ⑩		 ⑪	
<p>SPECIAL PURPOSE AIR CONDITIONER NEMA/EEMAC/UL50 BY UNDERWRITERS LABORATORIES, INC. TYPE 3R, 12 & 4 INTERFACE TO THE ELECTRICAL ENCLOSURE ONLY</p> <p>NEMA/EEMAC/UL50 BY UNDERWRITERS LABORATORIES, INC. TYPE 1 SPECIAL PURPOSE AIR CONDITIONER EQUIPMENT COMPARTMENT ONLY OUTDOOR USE SERVICE AIR FILTER REGULARLY ALLOW 5 MIN. BEFORE RESTARTING AFTER SHUTDOWN UNAUTHORIZED SERVICE OR MODIFICATION VIOLATES WARRANTY ALL MOTORS ARE THERMALLY PROTECTED</p> <p>MANUFACTURED BY: KOOLTRONIC, INC. PENNINGTON, NJ</p>					
					

- ①②⑨ When ordering parts, specify the Model Number, Serial Number & MFG. Order Number.
- ③ Before operating, be sure that the power source matches these requirements.
- ④ Make sure that these parameters are met. Failure to do so may result in permanent damage to the unit.
- ⑥ Use of incorrect type or amount of refrigerant will adversely affect performance and may damage the unit.

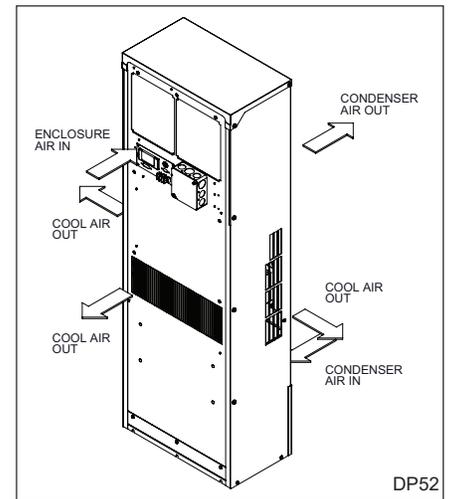
V. Principles of Operation

Kooltronic Air Conditioners are required when the equipment operating temperature must be kept near or lower than the ambient room temperature, and/or the cabinet must be sealed from dust, fumes, oil, corrosives and other contaminants. These Air Conditioners utilize a "Closed-Loop Cooling System" to ensure optimum performance of the installed components.

Closed-Loop cooling seals the electronic enclosure from hostile elements in the environment. Two separate circulation systems are employed. The internal system cools and dehumidifies the air inside the cabinet, totally isolating the sensitive electronics and other components from the environment. The external system uses circulating ambient air or water to discharge the heat removed from the electronics. The heat is dissipated from the enclosure by means of the vapor compression refrigeration cycle. This takes place in a hermetically-sealed refrigeration system, utilizing either an air-cooled or water-cooled condenser heat exchanger. The warm air inside the enclosure is drawn through the evaporator coil where it is cooled, dehumidified and returned.

Any enclosure moisture accumulated on the evaporator coil is collected in the condensate tray and removed through the drain tube to the condensate evaporator. Condensate evaporates in the condensate evaporator and is released to the ambient air by the condenser impeller.

The heat removed through the evaporator coil is transferred by the compressed refrigerant to the condenser coil. Ambient air is then passed through the condenser coil, where it absorbs the heat and is then discharged to the environment. When the Kooltronic Air Conditioner is properly sized it should operate constantly and maintain 75°F to 115°F enclosure temperature, depending on the ambient temperatures.



Digital controller with defrost management

XR40CX

CONTENTS

1. GENERAL WARNING	1
2. GENERAL DESCRIPTION	1
3. CONTROLLING LOADS	1
4. FRONT PANEL COMMANDS	1
5. MAX & MIN TEMPERATURE MEMORIZATION	1
6. MAIN FUNCTIONS	1
7. PARAMETERS	2
8. DIGITAL INPUT (ENABLED WITH P3P = N)	3
9. TTL SERIAL LINE – FOR MONITORING SYSTEMS	3
10. X-REP OUTPUT – OPTIONAL	3
11. INSTALLATION AND MOUNTING	3
12. ELECTRICAL CONNECTIONS	3
13. HOW TO USE THE HOT KEY	3
14. ALARM SIGNALS	3
15. TECHNICAL DATA	3
16. CONNECTIONS	4
17. DEFAULT SETTING VALUES	4

1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

1.2 SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.p.A." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. GENERAL DESCRIPTION

Model XR40CX, format 32 x 74 mm, is microprocessor based controller, suitable for applications on medium or low temperature refrigerating units. It has 2 relay outputs to control compressor and defrost, which can be either electrical or reverse cycle (hot gas). It is also provided with three NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature, the third one, optional, to connect to the HOT KEY terminals to signal the condenser temperature alarm or to display a temperature. The digital input can operate as fourth temperature probe.

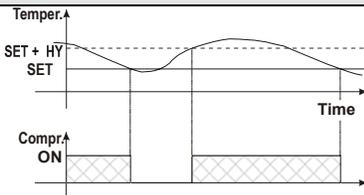
The HOT KEY output allows to connect the unit, by means of the external module XJ485-CX, to a network line ModBUS-RTU compatible such as the dixell monitoring units of X-WEB family. It allows to program the controller by means the HOT KEY programming keyboard.

The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "CO_n" and "CO_F".

3.2 DEFROST

Two defrost modes are available through the "tdF" parameter: defrost through electrical heater (tdF = EL) and hot gas defrost (tdF = in). Other parameters are used to control the interval between defrost cycles (IdF), its maximum length (MdF) and two defrost modes: timed or controlled by the evaporator's probe (P2P).

At the end of defrost dripping time is started, its length is set in the FSt parameter. With FSt = 0 the dripping time is disabled.

4. FRONT PANEL COMMANDS



SET : To display target set point; in programming mode it selects a parameter or confirm an operation.

(DEF) To start a manual defrost

(UP) : To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(DOWN) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

To switch the instrument off, if onF = oFF.

Not enabled.

KEY COMBINATIONS:

+ To lock & unlock the keyboard.

SET + To enter in programming mode.

SET + To return to the room temperature display.

4.1 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	ON	An alarm is occurring
	ON	Continuous cycle is running
	ON	Energy saving enabled
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

5. MAX & MIN TEMPERATURE MEMORIZATION

5.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the key.
2. The "Lo" message will be displayed followed by the minimum temperature recorded.
3. By pressing the key again or by waiting 5s the normal display will be restored.

5.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the key.
2. The "Hi" message will be displayed followed by the maximum temperature recorded.
3. By pressing the key again or by waiting 5s the normal display will be restored.

5.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

1. Hold press the SET key for more than 3s, while the max. or min temperature is displayed. (rSt message will be displayed)
2. To confirm the operation the "rSt" message starts blinking and the normal temperature will be displayed.

6. MAIN FUNCTIONS

6.1 HOW TO SEE THE SETPOINT

- SET**
1. Push and immediately release the **SET** key: the display will show the Set point value;
 2. Push and immediately release the **SET** key or wait for 5 seconds to display the probe value again.

6.2 HOW TO CHANGE THE SETPOINT

1. Push the **SET** key for more than 2 seconds to change the Set point value;
2. The value of the set point will be displayed and the "°C" or "°F" LED starts blinking;
3. To change the Set value push the or arrows within 10s.
4. To memorise the new set point value push the **SET** key again or wait 10s.

6.3 HOW TO START A MANUAL DEFROST

- Push the DEF key for more than 2 seconds and a manual defrost will start.

6.4 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:

1. Enter the Programming mode by pressing the **Set +** \blacktriangledown keys for 3s (the "°C" or "°F" LED starts blinking).
 2. Select the required parameter. Press the "SET" key to display its value
 3. Use "UP" or "DOWN" to change its value.
 4. Press "SET" to store the new value and move to the following parameter.
- To exit:** Press **SET + UP** or wait 15s without pressing a key.
- NOTE:** the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5 THE HIDDEN MENU

The hidden menu includes all the parameters of the instrument.

6.5.1 HOW TO ENTER THE HIDDEN MENU

1. Enter the Programming mode by pressing the **Set +** \blacktriangledown keys for 3s (the "°C" or "°F" LED starts blinking).
 2. Released the keys, then push again the **Set +** \blacktriangledown keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter.
- NOW YOU ARE IN THE HIDDEN MENU.**
3. Select the required parameter.
 4. Press the "SET" key to display its value
 5. Use \blacktriangle or \blacktriangledown to change its value.
 6. Press "SET" to store the new value and move to the following parameter.
- To exit:** Press **SET + \blacktriangle** or wait 15s without pressing a key.

NOTE1: if none parameter is present in Pr1, after 3s the "noP" message is displayed. Keep the keys pushed till the Pr2 message is displayed.

NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5.2 HOW TO MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA.

Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing "SET + \blacktriangledown ".

In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

6.6 HOW TO LOCK THE KEYBOARD

1. Keep pressed for more than 3 s the **UP + DOWN** keys.
2. The "POF" message will be displayed and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a key is pressed more than 3s the "POF" message will be displayed.

6.7 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the \blacktriangle and \blacktriangledown keys, till the "Pon" message will be displayed.

6.8 THE CONTINUOUS CYCLE

When defrost is not in progress, it can be activated by holding the " \blacktriangle " key pressed for about 3 seconds. The compressor operates to maintain the "ccS" set point for the time set through the "CCt" parameter. The cycle can be terminated before the end of the set time using the same activation key " \blacktriangle " for 3 seconds.

6.9 THE ON/OFF FUNCTION

With "onF = off", pushing the ON/OFF key, the instrument is switched off. The "OFF" message is displayed. In this configuration, the regulation is disabled.

To switch the instrument on, push again the ON/OFF key.

WARNING: Loads connected to the normally closed contacts of the relays are always supplied and under voltage, even if the instrument is in stand by mode.

7. PARAMETERS

REGULATION

Hy Differential: (0,1 \pm 25,5°C / 1 \pm 255 °F) Intervention differential for set point. Compressor Cut IN is Set Point + differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.

LS Minimum set point: (-50°C+SET/-58°F+SET): Sets the minimum value for the set point.

US Maximum set point: (SET+110°C/ SET+230°F). Set the maximum value for set point.

Ot Thermostat probe calibration: (-12,0 \pm 12,0°C; -120 \pm 120°F) allows to adjust possible offset of the thermostat probe.

P2P Evaporator probe presence: n= not present: the defrost stops by time; y= present: the defrost stops by temperature.

OE Evaporator probe calibration: (-12,0 \pm 12,0°C; -120 \pm 120°F) allows to adjust possible offset of the evaporator probe.

P3P Third probe presence (P3): n= not present, the terminal operates as digital input; y= present, the terminal operates as third probe.

O3 Third probe calibration (P3): (-12,0 \pm 12,0°C; -120 \pm 120°F) allows to adjust possible offset of the third probe.

P4P Fourth probe presence: (n = Not present; y = present).

o4 Fourth probe calibration: (-12,0 \pm 12,0°C) allows to adjust possible offset of the fourth probe.

Ods Outputs activation delay at start up: (0 \pm 255min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.

AC Anti-short cycle delay: (0 \pm 50 min) minimum interval between the compressor stop and the following restart.

rt Percentage of the second and first probe for regulation (0 \pm 100; 100 = P1, 0 = P2): it allows to set the regulation according to the percentage of the first and second probe, as for the following formula (rt(P1-P2)/100 + P2).

CCt Compressor ON time during continuous cycle: (0,0 \pm 24,0h; res. 10min) Allows to set the length of the continuous cycle: compressor stays on without interruption for the CCt time. Can be used, for instance, when the room is filled with new products.

CCS Set point for continuous cycle: (-50 \pm 150°C) it sets the set point used during the continuous cycle.

CO n Compressor ON time with faulty probe: (0 \pm 255 min) time during which the compressor is active in case of faulty thermostat probe. With CO n=0 compressor is always OFF.

COF Compressor OFF time with faulty probe: (0 \pm 255 min) time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.

DISPLAY

CF Temperature measurement unit: °C=Celsius; °F=Fahrenheit. **WARNING:** When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, Ot, ALU and ALL have to be checked and modified if necessary.

rES Resolution (for °C): (in = 1°C; dE = 0.1 °C) allows decimal point display.

Lod Instrument display: (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by the instrument: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.

rEd X-REP display (optional): (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by X-REP: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.

dLy Display delay: (0 \pm 20,0m; risul. 10s) when the temperature increases, the display is updated of 1 °C/1°F after this time.

dtr Percentage of the second and first probe for visualization when Lod = dtr (0 \pm 100; 100 = P1, 0 = P2): if **Lod = dtr** it allows to set the visualization according to the percentage of the first and second probe, as for the following formula (dtr(P1-P2)/100 + P2).

DEFROST

dFP Probe selection for defrost termination: nP = no probe; **P1** =thermostat probe; **P2** = evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.

tdF Defrost type: EL = electrical heater; in = hot gas

dtE Defrost termination temperature: (-50 \pm 50 °C/ -58 \pm 122°F) (Enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.

ldF Interval between defrost cycles: (0 \pm 120h) Determines the time interval between the beginning of two defrost cycles.

MdF (Maximum) length for defrost: (0 \pm 255min) When **P2P = n**, (not evaporator probe: timed defrost) it sets the defrost duration, when **P2P = y** (defrost end based on temperature) it sets the maximum length for defrost.

dSd Start defrost delay: (0 \pm 99min) This is useful when different defrost start times are necessary to avoid overloading the plant.

dFd Temperature displayed during defrost: (rt = real temperature; it = temperature at defrost start; SET = set point; dEF = "dEF" label)

dAd MAX display delay after defrost: (0 \pm 255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.

Fdt Drip time: (0 \pm 120 min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.

dPo First defrost after start-up: (y = immediately; n = after the ldF time)

dAF Defrost delay after continuous cycle: (0 \pm 23,5h) time interval between the end of the fast freezing cycle and the following defrost related to it.

ALARMS

ALC Temperature alarms configuration: (Ab; rE)

Ab= absolute temperature: alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the "SET+ALU" or "SET-ALL" values.

ALU MAXIMUM temperature alarm: (SET+110°C; SET+230°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.

ALL Minimum temperature alarm: (-50,0 \pm SET°C; -58 \pm 230°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.

AFH Differential for temperature alarm recovery: (0,1 \pm 25,5°C; 1 \pm 45°F) Intervention differential for recovery of temperature alarm.

ALd Temperature alarm delay: (0 \pm 255 min) time interval between the detection of an alarm condition and alarm signalling.

dAO Exclusion of temperature alarm at startup: (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARM (detected by the fourth probe)

AP2 Probe selection for temperature alarm of condenser: nP = no probe; **P1** =thermostat probe; **P2** = evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.

AL2 Low temperature alarm of condenser: (-55 \pm 150°C) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay.

Au2 High temperature alarm of condenser: (-55 \pm 150°C) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.

AH2 Differential for temperature condenser alarm recovery: (0,1 \pm 25,5°C; 1 \pm 45°F)

Ad2 Condenser temperature alarm delay: (0 \pm 255 min) time interval between the detection of the condenser alarm condition and alarm signalling.

dA2 Condenser temperature alarm exclusion at start up: (from 0.0 min to 23.5h, res. 10min)

bLL Compressor off with low temperature alarm of condenser: n = no: compressor keeps on working; Y = yes, compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

AC2 Compressor off with high temperature alarm of condenser: n = no: compressor keeps on working; Y = yes, compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

DIGITAL INPUT

i1P Digital input polarity: oP: the digital input is activated by opening the contact; CL: the digital input is activated by closing the contact.

i1F Digital input configuration: EAL = external alarm: "EA" message is displayed; bAL = serious alarm "CA" message is displayed. PAL = pressure switch alarm, "CA" message is displayed; dor = door switch function; dEF = activation of a defrost cycle; AUS =not enabled; Htr = kind of action inversion (cooling – heating); FAn = not set it; ES = Energy saving.

did: (0 \pm 255 min) with i1F= EAL or i1F = bAL digital input alarm delay: delay between the detection of the external alarm condition and its signalling.

with i1F= dor: door open signalling delay

with i1F = PAL: time for pressure switch function: time interval to calculate the number of the pressure switch activation.

nPS Pressure switch number: (0 \pm 15) Number of activation of the pressure switch, during the "did" interval, before signalling the alarm event (I2F = PAL).

If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

odc Compressor status when open door: no; Fan = normal; CPR; F_C = Compressor OFF.

rrd Outputs restart after doA alarm: no = outputs not affected by the doA alarm; yES = outputs restart with the doA alarm;

HES Temperature increase during the Energy Saving cycle : (-30,0°C+30,0°C/-22+86°F) it sets the increasing value of the set point during the Energy Saving cycle.

OTHER

- Adr Serial address** (1+244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.
- PbC Type of probe:** it allows to set the kind of probe used by the instrument: **PbC** = PBC probe, **ntc** = NTC probe.
- onF on/off key enabling:** **nu** = disabled; **oFF** = enabled; **ES** = not set it.
- dP1 Thermostat probe display**
- dP2 Evaporator probe display**
- dP3 Third probe display - optional.**
- dP4 Fourth probe display.**
- rSE Real set point:** (readable only), it shows the set point used during the energy saving cycle or during the continuous cycle.
- rEL Software release** for internal use.
- Ptb Parameter table code:** readable only.

8. DIGITAL INPUT (ENABLED WITH P3P = N)

The free voltage digital input is programmable in different configurations by the "i1F" parameter.

8.1 DOOR SWITCH INPUT (i1F = dor)

It signals the door status and the corresponding relay output status through the "odc" parameter: **no**, **Fan** = normal (any change); **CPr**, **F_C** = Compressor OFF.
 Since the door is opened, after the delay time set through parameter "did", the door alarm is enabled, the display shows the message "dA" and the regulation restarts is **rtr = yES**. The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

8.2 GENERIC ALARM (i1F = EAL)

As soon as the digital input is activated the unit will wait for "did" time delay before signalling the "EAL" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

8.3 SERIOUS ALARM MODE (i1F = bAL)

When the digital input is activated, the unit will wait for "did" delay before signalling the "CA" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

8.4 PRESSURE SWITCH (i1F = PAL)

If during the interval time set by "did" parameter, the pressure switch has reached the number of activation of the "nPS" parameter, the "CA" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF.

If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

8.5 START DEFROST (i1F = dFr)

It starts a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the "MdF" safety time is expired.

8.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = Htr)

This function allows to invert the regulation of the controller: from cooling to heating and viceversa.

8.7 ENERGY SAVING (i1F = ES)

The Energy Saving function allows to change the set point value as the result of the SET+ HES (parameter) sum. This function is enabled until the digital input is activated.

8.8 DIGITAL INPUTS POLARITY

The digital input polarity depends on the "i1P" parameter.
i1P=CL: the input is activated by closing the contact.
i1P=OP: the input is activated by opening the contact

9. TTL SERIAL LINE - FOR MONITORING SYSTEMS

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, **XJ485-CX**, to connect the instrument to a monitoring system **ModBUS-RTU** compatible such as the **X-WEB500/3000/300**.

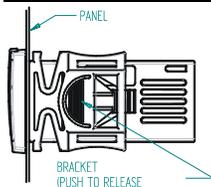
10. X-REP OUTPUT - OPTIONAL

As optional, an X-REP can be connected to the instrument, through the HOY KEY connector. The X-REP output **EXCLUDES** the serial connection.



To connect the X-REP to the instrument the following connectors must be used **CAB-51F(1m)**, **CAB-52F(2m)**, **CAB-55F(5m)**,

11. INSTALLATION AND MOUNTING



Instrument **XR40CX** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied.
 The temperature range allowed for correct operation is 0÷60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

12. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2,5 mm². Before connecting cables make sure the power supply complies with the instrument's

requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

12.1 PROBE CONNECTION

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

13. HOW TO USE THE HOT KEY

13.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is **ON**, insert the "Hot key" and push **▲** key; the "uPL" message appears followed a by flashing "End"
3. Push "SET" key and the End will stop flashing.
4. Turn OFF the instrument remove the "Hot Key", then turn it ON again.

NOTE: the "Err" message is displayed for failed programming. In this case push again **▲** key if you want to restart the upload again or remove the "Hot key" to abort the operation.

13.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a programmed "Hot Key" into the 5 PIN receptacle and then turn the Controller ON.
3. Automatically the parameter list of the "Hot Key" is downloaded into the Controller memory, the "dOL" message is blinking followed a by flashing "End".
4. After 10 seconds the instrument will restart working with the new parameters.
5. Remove the "Hot Key" ..

NOTE the message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "Hot key" to abort the operation.

14. ALARM SIGNALS

Message	Cause	Outputs
"P1"	Room probe failure	Compressor output acc. to par. "Con" and "COF"
"P2"	Evaporator probe failure	Defrost end is timed
"P3"	Third probe failure	Outputs unchanged
"P4"	Fourth probe failure	Outputs unchanged
"HA"	Maximum temperature alarm	Outputs unchanged.
"LA"	Minimum temperature alarm	Outputs unchanged.
"HA2"	Condenser high temperature	It depends on the "Ac2" parameter
"LA2"	Condenser low temperature	It depends on the "bLL" parameter
"dA"	Door open	Compressor according to rrd
"EA"	External alarm	Output unchanged.
"CA"	Serious external alarm (i1F=bAL)	All outputs OFF.
"CA"	Pressure switch alarm (i1F=PAL)	All outputs OFF

14.1 ALARM RECOVERY

Probe alarms "P1", "P2", "P3" and "P4" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe.
 Temperature alarms "HA", "LA", "HA2" and "LA2" automatically stop as soon as the temperature returns to normal values.
 Alarms "EA" and "CA" (with i1F=bAL) recover as soon as the digital input is disabled.
 Alarm "CA" (with i1F=PAL) recovers only by **switching off and on** the instrument.

14.2 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	In programming mode: none parameter is present in Pr1 On the display or in dP2, dP3, dP4: the selected probe is nor enabled
noA	None alarm is recorded.

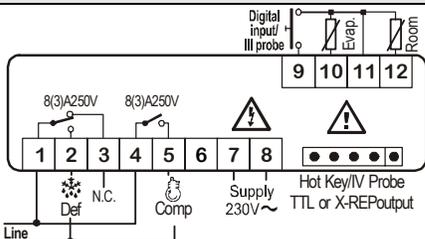
15. TECHNICAL DATA

- Housing:** self extinguishing ABS.
- Case:** XR40CX frontal 32x74 mm; depth 60mm;
- Mounting:** XR40CX panel mounting in a 71x29mm panel cut-out
- Protection:** IP20; **Frontal protection:** XR40CX IP65
- Connections:** Screw terminal block ≤ 2,5 mm² wiring.
- Power supply:** according to the model: 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac ±10%, 50/60Hz, 110Vac ±10%, 50/60Hz
- Power absorption:** 3VA max
- Display:** 3 digits, red LED, 14,2 mm high; **Inputs:** Up to 4 NTC or PTC probes.
- Digital input:** free voltage contact
- Relay outputs:** compressor SPST 8(3) A, 250Vac; or 20(8)A 250Vac defrost: SPDT 8(3) A, 250Vac
- Data storing:** on the non-volatile memory (EEPROM).
- Kind of action:** 1B; **Pollution grade:** 2; **Software class:** A.;
- Rated impulsive voltage:** 2500V; **Overvoltage Category:** II
- Operating temperature:** 0÷60 °C; **Storage temperature:** -30÷85 °C.
- Relative humidity:** 20÷85% (no condensing)
- Measuring and regulation range:** **NTC probe:** -40÷110 °C (-40÷230°F); **PTC probe:** -50÷150 °C (-58÷302°F)
- Resolution:** 0,1 °C or 1 °C or 1 °F (selectable); **Accuracy (ambient temp. 25°C):** ±0,7 °C ±1 digit

16. CONNECTIONS

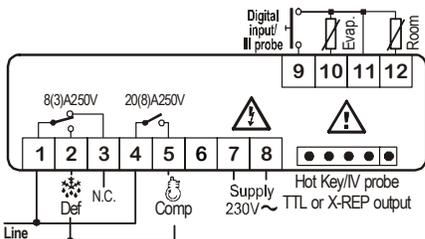
The X-REP output excludes the TTL output. It's present in the following codes: XR40CX-xx2xx, XR40CX-xx3xx;

16.1 XR40CX – 8A COMPRESSOR



12Vac/dc supply: connect to the terminals 7 and 8.
 24Vac/dc supply: connect to the terminals 7 and 8.
 120Vac supply: connect to the terminals 7 and 8.

16.2 XR40CX – 20A COMPRESSOR



12Vac/dc supply: connect to the terminals 7 and 8.
 24Vac/dc supply: connect to the terminals 7 and 8.
 120Vac supply: connect to the terminals 7 and 8.

17. DEFAULT SETTING VALUES

Label	Name	Range	°C/°F	
Set	Set point	LS+US	-5.0	---
Hy	Differential	0,1÷25,5°C/ 1÷ 255°F	2.0	Pr1
LS	Minimum set point	-50°C÷SET/-58°F÷SET	-50.0	Pr2
US	Maximum set point	SET÷110°C/ SET ÷ 230°F	110	Pr2
Ot	Thermostat probe calibration	-12÷12°C /-120÷120°F	0.0	Pr1
P2P	Evaporator probe presence	n=not present; Y=pres.	Y	Pr1
OE	Evaporator probe calibration	-12÷12°C /-120÷120°F	0.0	Pr2
P3P	Third probe presence	n=not present; Y=pres.	n	Pr2
O3	Third probe calibration	-12÷12°C /-120÷120°F	0	Pr2
P4P	Fourth probe presence	n=not present; Y=pres.	n	Pr2
O4	Fourth probe calibration	-12÷12°C /-120÷120°F	0	Pr2
Ods	Outputs delay at start up	0÷255 min	0	Pr2
AC	Anti-short cycle delay	0 ÷ 50 min	1	Pr1
rtr	P1-P2 percentage for regulation	0 + 100 (100=P1 , 0=P2)	100	Pr2
CCt	Continuous cycle duration	0,0÷24,0h	0,0	Pr2
CCS	Set point for continuous cycle	(-55,0÷150,0°C) (-67÷302°F)	-5	Pr2
COH	Compressor ON time with faulty probe	0 ÷ 255 min	15	Pr2
COF	Compressor OFF time with faulty probe	0 ÷ 255 min	30	Pr2
CF	Temperature measurement unit	°C ± °F	°C	Pr2
rES	Resolution	in=integer; dE= dec.point	dE	Pr1
Lod	Probe displayed	P1;P2	P1	Pr2
rEd²	X-REP display	P1 - P2 - P3 - P4 - SET - dtr	P1	Pr2
dly	Display temperature delay	0 + 20,0 min (10 sec.)	0	Pr2
dtr	P1-P2 percentage for display	1 ÷ 99	50	Pr2
tdF	Defrost type	EL=el. heater; in= hot gas	EL	Pr1
dFP	Probe selection for defrost termination	nP; P1; P2; P3; P4	P2	Pr2
dTE	Defrost termination temperature	-50 ÷ 50 °C	8	Pr1
ldF	Interval between defrost cycles	1 ÷ 120 ore	6	Pr1
MdF	(Maximum) length for defrost	0 + 255 min	30	Pr1
dSd	Start defrost delay	0÷99min	0	Pr2
dFd	Displaying during defrost	rt, it, SET, DEF	it	Pr2
dAd	MAX display delay after defrost	0 + 255 min	30	Pr2
Fdt	Draining time	0÷120 min	0	Pr2
dPo	First defrost after startup	n=after ldF; y=immed.	n	Pr2
dAF	Defrost delay after fast freezing	0 + 23h e 50'	0,0	Pr2
ALc	Temperat. alarms configuration	rE= related to set; Ab = absolute	Ab	Pr2
ALU	MAXIMUM temperature alarm	Set÷110,0°C; Set÷230°F	110	Pr1
ALL	Minimum temperature alarm	-50,0°C÷Set/ -58°F÷Set	-50,0	Pr1
AFH	Differential for temperat. alarm recovery	(0,1°C÷25,5°C) (1°F÷45°F)	1	Pr2
ALd	Temperature alarm delay	0 ÷ 255 min	15	Pr2
dAO	Delay of temperature alarm at start up	0 + 23h e 50'	1,3	Pr2
AP2	Probe for temperat. alarm of condenser	nP; P1; P2; P3; P4	P4	Pr2
AL2	Condenser for low temperat. alarm	(-55 + 150°C) (-67+ 302°F)	-40	Pr2
AU2	Condenser for high temperat. alarm	(-55 + 150°C) (-67+ 302°F)	110	Pr2
AH2	Differ. for condenser temp. alar. recovery	[0,1°C + 25,5°C] [1°F + 45°F]	5	Pr2
Ad2	Condenser temperature alarm delay	0 + 254 (min.) , 255=nU	15	Pr2
dA2	Delay of cond. temper. alarm at start up	0,0 + 23h 50'	1,3	Pr2
bLL	Compr. off for condenser low temperature alarm	n(0) - Y(1)	n	Pr2
AC2	Compr. off for condenser high temperature alarm	n(0) - Y(1)	n	Pr2
i1P	Digital input polarity	oP=opening;CL=closing	cL	Pr1
i1F	Digital input configuration	EAL, bAL, PAL, dor; dEF; Htr, AUS	EAL	Pr1
did	Digital input alarm delay	0÷255min	5	Pr1
Nps	Number of activation of pressure switch	0 ÷15	15	Pr2
odc	Compress status when open door	no; Fan; CPr; F_C	no	Pr2
rrd	Regulation restart with door open alarm	n - Y	y	Pr2
HES	Differential for Energy Saving	(-30°C÷30°C) (-54°F÷54°F)	0	Pr2
Adr	Serial address	0÷247	1	Pr2
PbC	Kind of probe	Ptc; ntc	ntc	Pr2
onF	on/off key enabling	nu, oFF; ES	nu	Pr1
dP1	Room probe display	--	--	Pr2
dP2	Evaporator probe display	--	--	Pr2
dP3	Third probe display	--	--	Pr1
dP4	Fourth probe display	--	--	Pr1
rSE	Valore set operativo	actual set	--	Pr1
rEL	Software release	--	--	Pr2
Ptb	Map code	--	--	Pr2

² Only for models XR40CX-xx2xx, XR40CX-xx3xx;

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VI. *Pre-Installation Testing*

Before mounting the air conditioner to the enclosure, test for proper operation. This will verify the shipping integrity of the system. Please follow the steps below prior to installation.

CAUTION

The air conditioner must be standing in its proper mounting position for a minimum of five (5) minutes prior to testing. Failure to follow this procedure will cause permanent damage to the compressor. To avoid compressor damage do not tip the unit more than 45° from its proper mounting position.

1. The unit must sit in an upright position at a minimum room temperature of 65°F to allow the system to warm up. This is particularly important during winter months.
2. Refer to the nameplate for proper electrical voltage and current requirements. Connect the power cord to a properly grounded and fused electrical supply, leaving electrical power to the unit turned off.
3. Note the factory thermostat setting which is 75°F.
4. Turn the electrical power on.
5. Verify that the evaporator blower or fan is running.

NOTE: Models with Programmable Thermostat follow 7 through 9.

6. Observe the temperature on the digital display. The thermostat must be set a minimum of 10°F below this temperature for the compressor to operate (the factory setting is 75°F). Refer to page 6 for instructions on adjustment of the thermostat.
7. Operate the air conditioner for approximately ten (10) minutes. During this period no unusual noise or vibration should be evident. Both the evaporator and condenser fans or blowers should be delivering air through their respective discharge ports. The cool air discharged should be less than 70°F when the room temperature is between 70°F and 80°F. It is normal for the condenser blower to cycle on/off during this period.
8. Turn off the electrical power and disconnect the air conditioner from the power source.
9. If a cover plug was removed to adjust the unit, be sure to replace it in order to maintain the integrity of the closed-loop airflow system.

NOTE: Before shipment all Kooltronic Air Conditioners are subjected to a performance test.

VII. Specific Model Data

Mounting

Kooltronic Air Conditioners have been engineered to be installed easily. To avoid damaging your Air Conditioner, please read the following information before installation.

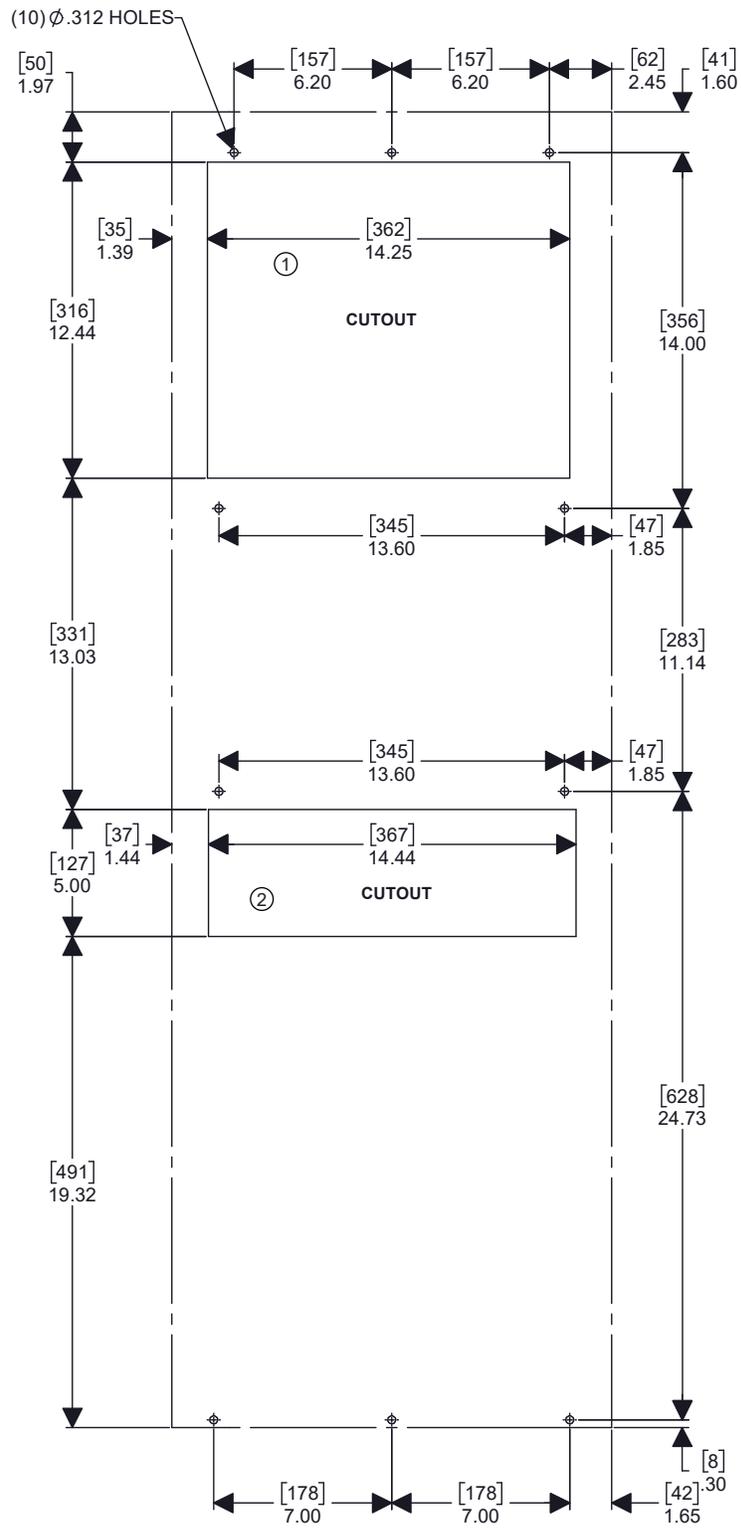
- Refer to page 13 for the location of all mounting holes and cutouts.
- Make sure the cutouts don't interfere with components inside your cabinet.
- Proper alignment of all air inlets and outlets is essential for optimum performance of the air conditioner.
- All externally-mounted air conditioners are fully gasketed to ensure proper sealing. This seal is necessary to maintain the integrity of the closed-loop system.
- Use all existing mounting holes to insure stability and a tight seal.
- Attach the supplied drain hose to the drain exit on the lower side panel of the air conditioner.
- The external drain hose must not be elevated above the exit port. Improper mounting will impede the flow of condensate and may cause internal malfunctions.

CAUTION

If the air conditioner is mounted to the cabinet door you must be sure that the door hinges will support the additional weight of the air conditioner. Also be certain that when the door is opened fully, the cabinet does not become unbalanced.

The actual weight of the unit can be found in the Technical Data on page 14.

Mounting



Dimensions, inches [mm], are for reference only and are subject to change.

K3NA5C7DP52L (V)

Technical Data - Current Models

Model	NEMA	BTU/H Capacity	BTU/H	Ambient Temp. °F	Running Amps		Approximate Weight	Approx. Weight lbs. kg.	
	RTG	60/50 Hz	95°F/95°F	Max./Min.	Volts	Hz	131°F/131°F	(lbs.)	
K3NA5C7DP52L	4	7000	6962	131	-20	480	60	4.36	180 81.6
K3NA5C7DP52LV	4X	7000	6962	131	-20	480	60	4.36	180 81.6

Rating shown is for operation at maximum ambient temperature.

Major Component Replacements - Current Models	
Part	K3NA5C7DP52L Part Number
Compressor	0665-146
Compressor Capacitor	0452-114
Start Assist	0382-11
Condenser Impeller	0194-50-02
Condenser Impeller Capacitor	0452-05
Evaporator Impeller	0194-15-01
Evaporator Impeller Capacitor	0452-73
Condenser Coil	0666-48
Evaporator Coil	0667-53
Transformer	0932-46
Programmable Thermostat	0750-137
Programmable Thermostat Sensor	0750-136-01
Condenser Pressure Switch	0712-18-18

Standard Features

- Baked Powder Finish (NEMA 4X models)
- Built-in Condensate Evaporator
- CFC-Free Refrigerant
- Closed-Loop Cooling
- Compressor Short Cycle Protector
- Epoxy-Coated Condenser and Evaporator Coils Filter
- Heavy-duty Steel Shell (NEMA 4X models)
- Internal Corrosion Protection (NEMA 4X models)
- Programmable Temperature Alarm
- Programmable Thermostat
- NEMA 4/4X Rating (UL50)
- IPX6 IEC (60529)
- External Junction Box for Permanent Wiring Connections
- Stainless Steel Shell (NEMA 4X models)
- UL/CUL Listed
- Low GWP Refrigerant

Accessories and Options

- Enclosure Heater
- Remote Monitoring
- Remote Thermostat Relay
- Replacement Filters
- Special motors, line cords or connectors
- Special paint finishes

GuardianX NEMA 4X model offered with these additional features

NEMA 4X Rating Maintained (UL50)
Internal Corrosion Protection
Stainless Steel Shell

VIII. Maintenance

Kooltronic Air-Cooled Air Conditioners require routine cleaning of the condenser coil and the air filters to assure unimpeded airflow through the condenser heat exchanger. It is not possible to recommend specific condenser coil or filter cleaning intervals, since the level and the nature of airborne particulate matter differs widely with each installation. It is generally sufficient to clean the condenser coil and/or the aluminum mesh filter when the outer surfaces appear covered with a thin layer of dust, lint or other foreign matter. The condenser coil can be washed or blown out with air, depending on the foreign matter involved (see below - **Filter and condenser coil service**). The aluminum mesh filter can be washed with warm water. Appropriate disposable replacement filters are available from Kooltronic.

If routine condenser coil or filter service is neglected or delayed, the air conditioner will not perform at its design capacity. The first indication of an excessively clogged condenser coil or air filter is usually a gradual increase of temperature within the equipment cabinet. If operation is continued under these conditions, the compressor will be shut off by the thermal overload device. The compressor will restart when its external temperature drops below the protector threshold setting and the compressor will continue to cycle on and off. Continued operation under these conditions will cause damage, shorten compressor life and void the warranty.

A. Filter and condenser coil service

The rear panel must be removed in order to clean the filters. After removal, the filters should be flushed under warm running water with clean side up. If the accumulated dirt is oily, washing in a detergent bath is recommended, followed by a warm water wash as above.

The exposed condenser coil must be cleaned by pressurized air or pressurized cleaning solution. Dirty liquid will be removed through the condenser coil drain pan.

B. Blowers

The design life of the blowers used in all Kooltronic Air Conditioners is substantially in excess of 20,000 hours. All Kooltronic condenser and evaporator blowers are equipped with automatic-reset thermal overload protectors.

CAUTION

Before opening the air conditioner, disconnect all power.

If field replacement of a blower motor is necessary, most blower assemblies, including the mounting plate, are readily removable. Each of the blower mounting plates is held to the air conditioner cabinet structure by screws and nuts. For installation of the replacement blower, electrical connections may be broken at the terminal block, or power leads may be cut and appropriately spliced together.

C. Compressor

All Kooltronic compressors are approved by UL and CSA, and require no maintenance. They are hermetically sealed and charged at the factory, and equipped with automatic-reset thermal overload protectors.

If the compressor fails, it is strongly recommended that the air conditioner be returned to Kooltronic for service.

D. Refrigerant Loss

Kooltronic Air Conditioners are subjected to a series of tests to detect refrigerant leaks, during and after manufacture. It is possible that shipping or other damage, or microscopic leaks over a long period, may result in the need for replenishment of refrigerant charge. **When it has been verified by a Certified EPA Technician that a refrigerant shortage does exist, the leak must be repaired. Then the unit may be evacuated and recharged in the field by a Certified EPA Technician only.**

CAUTION

Refer to the data on the unit nameplate which specifies the type of refrigerant and the amount of charge in ounces.

E. Relocation

If your Kooltronic Air Conditioner has to be moved to another location by truck, the following precautions should be taken:

- De-mount the air conditioner from the equipment, controller or enclosure.
- Conform to the applicable provisions of PROCEDURE FOR PROPER PACKING AND SHIPMENT OF KOOLTRONIC AIR CONDITIONERS in this manual under *Section III. "PRODUCT HANDLING"*.

IX. Trouble-Shooting

Each Kooltronic Air Conditioner is engineered for performance and built for reliability. They are designed to require only routine maintenance. If your air conditioner should require warranty service, please contact Kooltronic. If you require service out of warranty, we have compiled a trouble-shooting chart to assist your service personnel. If additional assistance is required contact Kooltronic at (609) 466-3400.

Problem	Cause	Solution
Unit does not run.	No Power.	Check Power Source and electrical connection. Check unit ON-OFF switch (UL Listed units only). Check unit power cord connection to terminal block.
After initial 15 minute energization of air conditioner, compressor and condenser fan do not run.	Return temperature is between Thermostat set point and differential (75°F to 86°F).	Normal Operation. Check return air temperature. Check sensor connection on Thermostat.
Unit not cooling. (Temperature difference between return and supply air is less than 10°F).	Failed Thermostat	Check Thermostat wire connections. Replace Thermostat.
Evaporator Blower is running.	Low Line Voltage.	Check Nameplate Voltage against supply Voltage.
Compressor and Condenser Blower do not run. Return temperature is above set point plus differential (90°F).	Failed Compressor. Check Compressor overload.	Check Compressor wire connections. Check Compressor Capacitor. Replace Compressor.

Problem	Cause	Solution
Unit not cooling. (Temperature difference between return and supply air is less than 10°F). Compressor and Condenser Blower are running. Evaporator Blower does not run.	Failed Evaporator Blower.	Check Blower wire connections. Check Blower Capacitor. Replace Evaporator Blower.
Unit not cooling. (Temperature difference between return and supply air is less than 10°F). Compressor and Evaporator Blower are running. Condenser Blower does not run.	Low Refrigerant charge. Failed Condenser Blower. Failed Condenser Blower	Check discharge and suction pressure for Refrigerant leak. Check Blower wire connections. Check Blower Capacitor. Replace Condenser Blower. Check Speed Controller Sensor. Replace Condenser Blower Thermostat Replace Speed Controller.
Unit not cooling. (Temperature difference between return and supply air is less than 10°F). Evaporator Blower, Condenser Blower and Compressor are running.	Condenser or Evaporator Coil clogged. Loss of Refrigerant. Ice on Evaporator Coil. Excessive condensate draining and loss of A/C sensible cooling performance.	Clean Coil. Locate and repair leak. Clean Evaporator Coil. Check discharge and suction pressure for Refrigerant leak. Check for any obstruction of Evaporator airflow. Check and seal all openings. Eliminate the frequency of door openings.
Unit overcooling. Evaporator Blower, Condenser Blower and Compressor are running.	Failed Thermostat. Failed Relay.	Check Thermostat wire connections. Replace Thermostat. Replace Relay.
Compressor cycling more than 10 cycles per hour.	Short circuiting of air between A/C discharge and inlet openings.	Provide baffle in the enclosure separating A/C outlet and inlet.
Excess vibration.	Defective motor in Blower. Defective wheel in Blower. Bad Compressor.	Replace motor. Replace wheel. Replace Compressor.

X. Standard Warranty

KOOLTRONIC products are warranted to be free of defects in workmanship, materials and components. The following warranty periods apply from date of shipment:

- Air moving devices/components and hermetic system components: 1 year
- Spare parts, except filters: 90 days
The above warranty applies when the equipment is operated under the following conditions:
- Ambient temperature not in excess of 125°F (52°C) in normal atmosphere or as stated on product nameplate
- Voltage variation no greater than $\pm 10\%$ from nameplate rating
- Frequency variation no greater than $\pm 3\text{Hz}$ from nameplate rating
- Maximum cooling load no higher than air conditioner nameplate rating
- Waiting five minutes before restarting air conditioner after intentional or accidental shutoff
- Compliance to all other installation, maintenance and operating instructions, as supplied
- The purchaser assumes the responsibility of grounding the unit and installing it in accordance with local electrical and safety codes, as well as the National Electric Code (NEC) and OSHA
KOOLTRONIC cannot assume responsibility for misapplication of its products or the erroneous selection of an inappropriate product by a non-authorized KOOLTRONIC representative. Our applications engineers will gladly assist in the selection of the proper product, provided all required details of the application are furnished.

THIS WARRANTY CONSTITUTES THE ENTIRE WARRANTY WITH RESPECT TO THE PRODUCT AND IS IN LIEU OF ALL OTHERS, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND IN NO EVENT IS KOOLTRONIC RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

RETURN AUTHORIZATION (RA) PROCEDURE

- All returns require a Return Authorization number whether the return is for warranty or non-warranty repair, rotation of stock, damage or any other reason. Returns without an RA number will be refused.
- Customer must call KOOLTRONIC After Sale Kare (ASK), Pennington, New Jersey (609 • 466 • 3400) to obtain an RA number, or email ask@kooltronic.com.
- The following information is required when an RA is requested:
 - Original customer Purchase Order number and date
 - Date product was received by customer
 - Number of parts to be returned
 - Product description, model and serial number
 - Reason for return
 - Action requested
 - Contact name, telephone, FAX numbers and e-mail address
- Pack unit in a suitable container for shipment, preferably the original packaging if available. All Air Conditioners must be returned in an upright position properly secured to a pallet. Improper packaging may void warranty claim. If an Air Conditioner is received laying down or shipped via UPS or similar small parcel service the warranty will be void.
- Mark carton prominently with KOOLTRONIC's Return Authorization Number.
- Enclose all pertinent documents.
- Freight charges on all products returned to KOOLTRONIC shall be paid by the customer. Unauthorized collect shipments will be refused.
- If a unit is repaired under Warranty, KOOLTRONIC will pay the freight charges both ways within the Continental USA at KOOLTRONIC's negotiated rates. Warranty repaired units will be returned to customer at KOOLTRONIC expense only within the Continental USA.
- All authorized returns are subject to a restocking fee.

KOOLTRONIC assumes no liability beyond the repair or replacement of its own product. This Warranty does not cover:

- Labor or reimbursement of labor for evaluation, removal, installation, repair, or cost of any warranted part, unless authorized in writing by KOOLTRONIC
- Use of equipment for other than its designed purpose or operating conditions
- Operation in harsh, oily, corrosive or other abnormal environmental conditions, without the proper filtration, sealing, protective coatings and/or weather protection
- Damage to hermetic system resulting from continuous operation with dirty or clogged air filters or improper or negligent maintenance
- Use of refrigerant other than designated
- Customer modification or abuse
- Shipping damage, including hidden damage, or other accidents (Claims for shipping damage are the responsibility of the customer. Timely claims must be filed by the customer with the freight carrier)
- Cracked or broken hermetic tubing, brazed joints or other internal damage caused by shipping or mishandling
- Damage caused by shipping units attached to an enclosure
- Any and all conditions resulting from noncompliance with the preceding operating conditions
- Returned freight must be paid by customer
- This standard warranty does not apply to custom products. Consult your KOOLTRONIC representative for limitations