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sub-Zero®

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OPERATING INSTRUCTIONS

sub-Zero®

SZ-7521-P

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GENERAL DESCRIPTION

The Sub-Zero Series SZ-7521-P are aesthetically superior versions of their predecessors. The iconic display has been specially designed to be more user friendly and gives prompt visual indications of controller operating modes. The SZ-7521-P is a defrost controller.

They are specifically designed for refrigeration applications wherein the compressor cuts off at set point and is restarted as a temperature of set point plus differential.

Additionally the SZ-7521-P offer several protection features that are easily understood by the examples in the instructions below.

A number of parameters are displayed alphanumerically to set up the instrument for each specific application.

The SZ-7521-P can be used for several applications with a measuring range from -44°C to 99°C

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Set point	Function: To set the cut out point of the controller.
Press and hold the SET key for 2 seconds.	Display will change to set value and LED will flash. The set point value can now be changed by using the UP/DOWN keys. After setting the desired value, press the set key and you will see "_ _ _" which confirms that the set point has been stored in memory.

Min	Max	Fac.
P3+1	P2-1	0°C

SET

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To set other parameters.	
Press & Hold Down (prg) Key for 2 seconds.	Display will show P2 & flash To go to other parameters , use up / down keys.

prg

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P2 parameter	Function : To set maximum allowable high temperature limit.

			Use up/down keys to set desired value. Once set at a particular value, this will not allow the set point to go above this value and below P3 setting.
To change the P2 parameter, press the SET key.			
Min	Max	Fac.	
SP+1	99°C	99°C	

Ht

(Message on display)

Example : Setting this parameter at -25°C will not allow the set point to go above -25°C. Also, if the temperature reaches -25°C, the display will show Ht (High Temp.) indicting that the temperature has gone above the value in this parameter.

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P3 parameter	Function: To set minimum allowable low temperature set point

	Use UP/DOWN keys to set desired value. Once set at a particular value, this will not allow the set point to go below this value and above P2 setting.
To change the P3 parameter, press the SET key.	

Min	Max	Fac.
-44°C	SP-1	-44°C

Lt

(Message on display)

Example: Setting this parameter at -30°C will not allow the set point to go below -30°C. Also, if the temperature reaches -30°C, the display will show Lt (Low Temp.) indicating that the temperature has reached or gone below the value in this parameter

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P4 parameter	Function: To set the differential.

	Use UP/DOWN keys to set desired value. Differential between cut out and cut in temperature can be set between 1°C to 20°C.
To change the P4 parameter, press the SET key.	

Min	Max	Fac.	**Example** (in cooling mode) :If the set point is set at 10°C and differential is set at 2°C, then when the system reaches 10°C, the relay will cut out. Since the differential is 2, the relay will cut in (restart) at 12°C (10°C+2°C).
1°C	20°C	2°C	

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P5 parameter	Function: To set probe calibration.

	Use UP/DOWN keys to set desired value. In time it may be possible that the display may be offset by a degree or so. To compensate for this error, you may need to add or minus the degrees required to achieve the correct temperature. Setting value is from -10°C to + 10°C
To change the P5 parameter, press the SET key.	

Min	Max	Fac.	**Example:** The temperature on the display is 28°C, whereas the actual temperature is 30°C. You will need to set the P5 mode to 2, which means that once out of the programming mode, the display will show the temperature 30°C (28°C + 2°C).
-10°C	10°C	0°C	

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P6 parameter	Function: To set time delay between relay restart time.

	Use UP/DOWN keys to set desired value. This parameter is used to protect the compressor from restarting in a short period of time and can be set between 0 to 99 minutes.
To change the P6 parameter, press the SET key.	

Min	Max	Fac.	**Example:** If this parameter is set at 3 minutes, the relay will cut off at the set temperature, but will not restart for a minimum of 3 minutes, even if the differential is achieved earlier. This parameter is good to protect the life of the compressor or even in applications where the probe is placed at places where there are sudden & short changes in temperature like above a cold room door.
0	A2-1	3	
Units : Min			

❄ ☀

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P7 Parameter	Function : To set duration of defrost(in minutes).
To change the P7 parameter, press the SET key.	Use up/down keys to set desired value. This parameter is used for auto defrost cycle and specifies how long will a defrost last.

Min	Max	Fac.	Example : If this parameter is set to 15 min, and P8 parameter is set to 1 hr. The '1 hr' after power is applied to the controller, defrosting for 15 mins will take place. This cycle will repeat every 1 hr.
0 Min	99 Min	0 Min	

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P8 parameter	Function : To set the defrost frequency(in hours).
To change the P8 parameter, press the SET key.	Use the UP/DOWN keys to set desired value. This Parameter is used for auto defrost cycle and specifies, when each defrost cycle will be repeated.

Min	Max	Fac.	Example : See P7 parameter.
1 Hr	31Hrs	1 Hr	

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P9 parameter	Function : Converting Defrost Parameter Unit.
To change the P9 parameter, press the SET key.	Use up/down keys to set desired value.

When this parameter is set to 0, it takes P7 and P8 value for defrost (Mins. for Duration & Hrs. for Frequency)

When this parameter is set to 1, it takes A1 & A2 value for defrost (Secs. for Duration & Mins. for Frequency) |

Min	Max	Fac.
0	1	0

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A1 Parameter	Function :To set duration of defrost(in seconds).
To change the A1 parameter, press the SET key.	Use up/down keys to set desired value. This parameter is used for auto defrost cycle and specifies how long will a defrost last.

Min	Max	Fac.	Example : If this parameter is set to 15 sec, and A2 parameter is set to 4 min. Then '4 min' after power is applied to the controller, defrosting for 15 sec will take place. This cycle will repeat every 4 min.
0 Sec	99 Sec	10 Sec	

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A2 Parameter	Function : To set the defrost frequency(in minutes).
To change the A2 parameter, press the SET key.	Use the UP/DOWN keys to set desired value. This Parameter is used for auto defrost cycle and specifies, when each defrost cycle will be repeated.

Example : See A1 parameter. |

Min	Max	Fac.
(P6+1)Min.	99Min.	4Min.

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LP parameter	Function : To lock keypad.
To change the LP parameter, press the SET key.	Use up/down keys to set desired value. This Parameter can lock the keypad so that tampering is not possible by by-standers.

0= keypad unlocked
1= keypad locked

When locked all parameters can only be viewed, but not modified. |

Min	Max	Fac.
0	1	0

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E1 Parameter	Function : Relay status on Probe Failure.
To change the E1 parameter, press the SET key.	Use UP/DOWN keys to set desired value. When set to 0 the relay status is ON. When set to 1, the compressor performs a duty cycle of 10 minutes ON and 4 minutes OFF. When set to 2 the relay status is OFF.

Min	Max	Fac.
0	2	1

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| E2 Parameter	Function : Type of Defrost.
To change the E2 parameter, press the SET key.	Use UP/DOWN keys to set desired value. 0 = Electrical Defrost (Comp is off) 1 = Hot gas Defrost (Comp is on) 2 = Air Dryer Defrost. (Compressor does not responds to defrost and cuts on/off at its own set point.)

Min	Max	Fac.
0	2	2

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FS Parameter	Function : To restores default settings of the controller.
To change the FS parameter, press the SET key.	When set to 1 all parameters are programmed to factory values. Useful to debug setting related problems.

Min	Max	Fac.
0	1	0

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EP Parameter	Function : To end programming.
To end programming press the SET key	Once the set key is pressed, the controller goes into the normal mode and displays the temperature and all settings are recorded.
Manual Defrost	This key will start a manual defrost cycle if pressed for 2 sec. Press again for 2 seconds it will come out of defrost mode and STOP defrost cycle.

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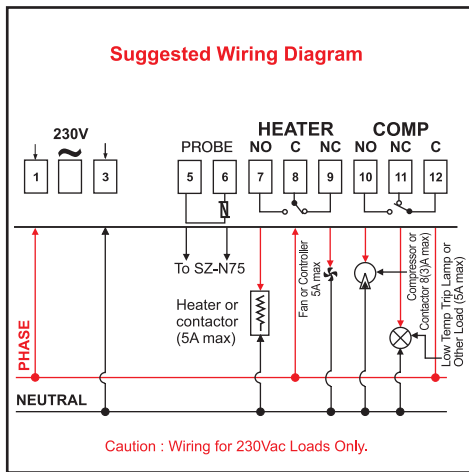### Operating messages and Icon status

Message	Description	Parameter
Ht	Temperature above the maximum limit of the set point.	P2
Lt	Temperature below the minimum limit of the set point.	P3
PP	Probe short circuit, circuit open or without probe, or temperature > 99°C or < -44°C	
❄ On/Off	Compressor Relay On/Off.	SP, P4
⎯○ On/Off	Keyboard locked/unlocked.	LP
❄ On	Defrosting in progress	P7, P8 / A1, A2
❄ ☀ Flashing	Time delay in progress	P6

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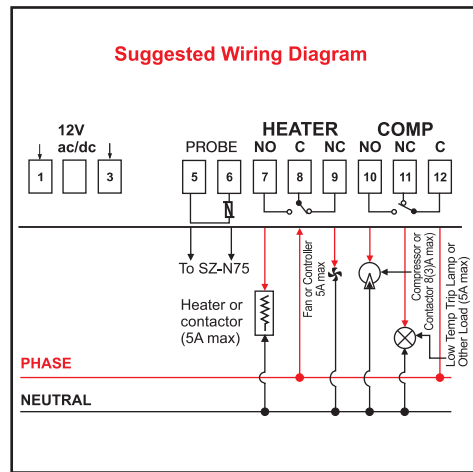
Technical data :

Housing	: Black ABS plastic.
Front cover	: Red Polycarbonate plastic.
Dimensions	: Front - 75 x 34.5 mm, Depth- 71 mm (w/o back lid).
Mounting	: Flush panel mounting with fasteners.
Protection	: Front panel is waterproof & I.P 65 rated .
Connections	: Screw terminal blocks. $\leq$ 2.5 mm^{2},one wire /Terminal only
Display	: 14.2 mm (0.56") LED.
Data storage	: Non-volatile EEPROM memory
Power input	: 230Vac,+/-10%,50-60Hz Standard. Others on request.
Operating temp.	: 5°C to 50°C(non-condensing).
Storage temp	: -20°C to 70°C(non-condensing).
Output	: 1 SPDT Comp. relay 8(3)A, 250Vac 1 SPDT Heater relay 5A,250Vac
Input	: NTC probe, SZ-N75
Range	: -44°C to 99°C
Resolution	: 1°C
Accuracy	: +/-1°C
Probe tolerance : +/-0.3°C at 25°C	

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Suggested Wiring Diagram

230V

PROBE	HEATER			COMP		
	NO	C	NC	NO	NC	C
1 ~ 3	5 6	7 8 9		10 11 12		

PHASE

To SZ-N75

Heater or contactor (5A max)

Fan or Controller 5A max

Compressor or Contactor 8(3)A max

Low Temp Trip Lamp or Other Load (5A max)

NEUTRAL

Caution : Wiring for 230Vac Loads Only.

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Suggested Wiring Diagram

12V ac/dc

PROBE	HEATER			COMP		
	NO	C	NC	NO	NC	C
1 3	5 6	7 8 9		10 11 12		

PHASE

To SZ-N75

Heater or contactor (5A max)

Fan or Controller 5A max

Compressor or Contactor 8(3)A max

Low Temp Trip Lamp or Other Load (5A max)

NEUTRAL

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PANEL

Side Lock

GASKET

CONTROLLER

26

Panel cutout

71mm

29mm

MAX 10mm

④ ② ① ③

19mm   71mm

34.5mm

PANEL

°C

-88

SZ-7521-P

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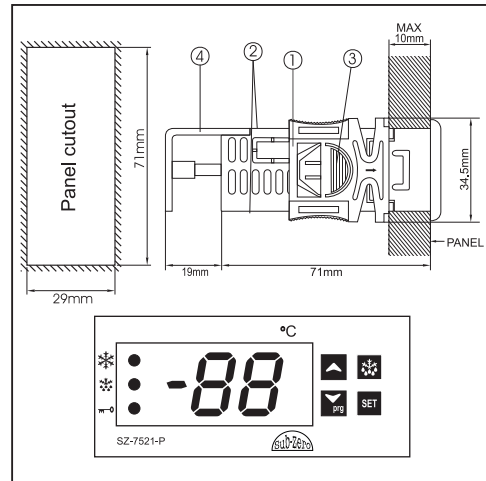**Installation :** Fixing and dimensions of panel models:
To fix the unit, slide the fastener ① through the guides ② as per the position shown in the figure. Move the fastener in the direction of the arrow, pressing tab ③ it permits to move the fastener in the opposite direction of the arrow. Once the controller has been connected, they should be covered with the Backlid ④ (Optional). Silicon sealant should be applied along the perimeter of the panel cut out or a rubber 'O' ring supplied before the unit is fitted to obtain IP65 grade.

Controller : Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

Probe : To give a correct reading, the probe must be installed in a place protected from thermal influences, which may affect the temperature to be controlled.

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CAUTION

WIRING: The probe and its corresponding wires should never be installed in a conduit next to control or power supply lines. The electrical wiring should be done as shown in the diagram. The power supply circuit should be connected to a protection switch. The terminals admit wires of upto 2.5sq mm.

WARNING: Improper wiring may cause irreparable damage and personal injury. Kindly ensure that wiring is done by qualified personnel only.

Maintenance : Cleaning: Clean the surface of the controller with a soft moist cloth. Do not use abrasive detergents, petrol, alcohol or solvents.
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Heating Controller
Humidity Controller
Pressure Controller

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03 / 04.05.17