OPERATING INSTRUCTIONS
SZ-7523/24-P

sub-Zero ®

Operation

When operating in the field of refrigeration, temperature control is performed with a positive differential. The compressor stops when the Setpoint temperature is reached and restarts when the temperature reaches Setpoint plus the differential.

Two different defrost types can be selected : Electrical where the compressor is stopped or at cycle inversion (Warm gas, the compressor keeps working). It is also possible to select the interval between defrosts (and the interval count type) and a maximum time (time-out) after which defrost is interrupted. The same probe which controls the defrost cycle is used to control the evaporator fans. It is possible to set the temperature and time delay after the defrost and relation of fans with the compressor.

A series of "safety controls" (delay at start-up, minimum disable time, minimum time between activation) protects the compressors from close starts. In case of probe error or temperature alarm, the instrument signals the event through acoustic signal and by closing the relay contract. By pressing the mute key, the buzzer is silenced (SZ-7524-P).

These functions can be easily customized by setting some programming parameters. Other parameters allow to suit the instrument to various applications.

General Description

- 2 NTC probes for cold room temp. + Evap. coil temperature.
- Range : -50°C to +50°C (1 deg. res.)
- Relay outputs : Compressor + Heater + Evap. Fan.
- Digital inputs : Pressure cutout (SZ-7523-P)
- HP/LP/OSS trip protection for compressor.
- Compressor protection algorithm.
- Auto/Man defrosting facility (Time/Temp based).
- Buzzer Output (SZ-7524-P)

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)
Panel Cutout	29 X 70.5 MM
Mounting	Flush panel mounting with fasteners.
Frontal protection	IP 65.
Connections	Screw terminal blocks. ≤ 2.5 sq mm one wire/ terminal only.
Display	14.2 mm (0.56") LED
Data storage	Non-volatile EEPROM memory.
Power input	230Vac +/-10%,50-60Hz. Others on request.
Operating temp.	5°C to 50°C (non-condensing).
Storage temp	-20°C to 70°C (non-condensing).
Input	NTC Probe, SZ-N75.
Range	-50°C to 50°C
Resolution	1°C
Accuracy	+/- 1°C
Probe tolerance	+/- 0.3°C at 25°C

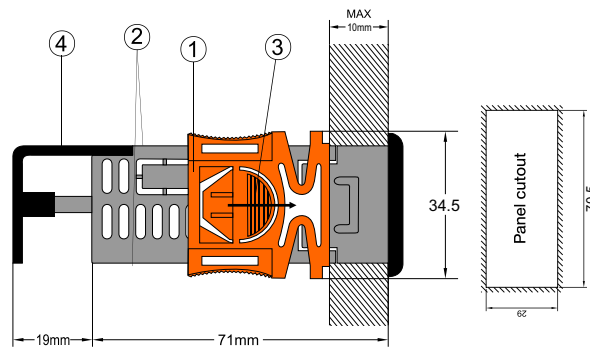## Front Panel View, Relay

Relay: 2 SPDT relay, 8(3)A, 250Vac. 1 SPST relay, 20A, 250Vac.	Relay: 3 SPDT relay, 8(3)A, 250Vac. Buzzer : SZ-B75. 10V,10mA

Installation and Dimensions

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 lid ④. 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 increase protection against water seepage.

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.

Operating Messages And Icon Status

Message	Mode	Description	Parameter
Ht	Flashing	Temp. above the maximum limit of the set point.	P2
Lt	Flashing	Temp. below the minimum limit of the set point.	P3
PP	Flashing	Probe short circuit, circuit open or without probe, or temperature > 99°C or <-50°C.	
▪ R1✳	ON/OFF	Comp. Relay on/off.	SP, P4
🔔	ON/OFF	Alarm (Ht, Lt, PP, HP/LP trip, heater fault)	
🔒	ON/OFF	Keypad locked/unlocked.	LP
❄	ON	Defrosting in progress.	E3, E4, E5
🕐	Flashing	Time delay in progress.	P6,L2
▪ R2	ON/OFF	Evap. fan Relay on/off.	L1, L4
▪ R1✳	Flashing	Comp. Relay in Timedelay.	P6
▪ R2	Flashing	Evap. Fan Relay in Timedelay.	L2
		HP/LP/OSS (pressure) has tripped and a signal has been sent through the Digital Input.(SZ-7523-P)	

Min = Minimum, **Max** = Maximum
Fac. = Factory Setting (Default)

1. Set Point : To set the cut out point.	**Min**	**Max**	**Fac.**

SET

1. Press and hold the "SET" key for 2 Seconds.
2. The set value will start flashing.
3. Use ▲ or ▼prg to set the desired range.
4. Press SET key & you will see "- - -" which confirms that the set point has been stored in memory.

	Min	Max	Fac.
	-50°C	50°C	0°C

Parameter List

2. To set other Parameters.

prg

1. Press & hold the ▼prg key for 2 seconds.
2. Display will show "P2" & flash.
3. To go to other parameters, use ▲ or ▼prg keys.

3. P2 Parameter : To set maximum allowable high temperature limit.

Min	Max	Fac.
XX°C	50°C	50°C

1. To change the P2 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

Ht
(Message on display)

Once set at a particular value, this will not allow both set points to go above this value and below P3 value.

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 range in this parameter and at this point the alarm and buzzer will come on. (SZ-7524-P)

4. P3 Parameter : To set minimum allowable low temperature set point.

Min	Max	Fac.
-50°C	XX°C	-50°C

1. To change the P3 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

Lt
(Message on display)

Once set at a particular value, this will not allow the set point to go below this value and above P2 value.

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 gone below the range in this parameter and at this point the alarm and buzzer will come on.(SZ-7524-P)

5. P4 Parameter : To set the differential.

Min	Max	Fac.
1°C	20°C	2°C

1. To change the P4 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

Example: If the set point is set point is set at 10°C and differential is set at 2, then when the system reaches 10°C, the comp. relay will cutout. Since the differential is 2, the comp. Relay will cut-in at 12°C(10°C + 2°C).

6. P5 Parameter : To set cold room probe calibration.

Min	Max	Fac.
-10°C	10°C	0°C

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 range is from -10°C to +10°C.

1. To change the P5 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

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 temperature will show 30°C (28°C + 2°C).

7. P6 Parameter : To set time delay between compressor relay restart time.

Min	Max	Fac.
0 Min	20 Min	3 Min

This parameter is used to protect the compressor from restarting in a short period of time and can be set between 0 to 20 minutes.

1. To change the P6 parameter, press the "SET" key.
2. To go to desired value, use ▲or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

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 when there are power fluctuations and the compressor is switched off and on within a few seconds.

8. P7 Parameter : To set drip time for defrost water to drain out.

Min	Max	Fac.
0 Min	99 Min	1 Min

This is the time for which the fan, compressor, heater will stay off so that the defrost water can drip & drain out.

1. To change the P7 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

9. P8 Parameter : To set compressor relay status on probe (ambient probe) failure.

Min	Max	Fac.
0	1	1

1. To change the P8 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

    0 : Comp off.
    1 : 20 Minutes on and 4 minutes off.

3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

10. L1 Parameter : Evap. fan stop at coil probe temperature.

Min	Max	Fac.
-40°C	50°C	2°C

This setting is used to limit the max temperature beyond which the Evap. tan will cut off.

1. To change the L1 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

11. L2 Parameter : To set time delay between Evap. fan relay restart time.

Min	Max	Fac.
0 Min	20 Min	1 Min

1. To change the L2 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

Example: If the parameter is set to 3 minutes, the Evap.Fan relay will cutoff at the temperature set by L1 parameter but the fan will not come on for a minimum of 3 minutes even if L4 is achieved earlier.

12. L3 Parameter : Evap. Fan operation when compressor is off.

Min	Max	Fac.
0	1	1

1. To change the L3 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

    0 : Evap. Fan is off when compressoris off.
    1 : Evap. Fan will stay on when compressor is Off.

3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

13. L4 Parameter : Evap. Fan differential. (Hysterisis)

Min	Max	Fac.
1°C	20°C	2°C

1. To change the L4 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored in memory.

Example: If L1 parameter is set to 2°C, and the L4 is set to 2°C, then Evap. fan will cut off at 2 degrees and restart only at 0°C.

14. L5 Parameter : To set Evap. coil probe calibration.

Min	Max	Fac.
-10°C	10°C	0°C

1. To change the L5 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "- - -" which confirms that the value has been stored In memory.

In time it may be possible that the temp. on the LCD 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 range is from -10°C to + 10°C.

15. L6 Parameter : To set Evap. fan status during defrost.

Min	Max	Fac.
0	1	1

1. To change the L6 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

   1 : Evap. fan will stay off during defrost.
   0 : Evap. fan will stay on during defrost.

3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

16. E1 Parameter : To set type of defrost.

Min	Max	Fac.
0	1	0

1. To change the E1 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

   0 : Heater defrost in which case compressor Is off.
   1 : Hot gas defrost where compressor is on.

3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

17. E2 Parameter : To set type of computation for defrost time.

Min	Max	Fac.
0	1	0

1. To change the E2 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

   0 : Total of real time.
   For example if the unit goes into defrost at this moment, the calculation of time will start at that movement.
   1 : Sum of total compressor operating times. This means that for time calculation, the unit will add the total time the compressor has been in an ON mode. SZ-7523/24-P keeps a record of the hours worked +/-1 hour incase of a power failure.

3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

Example: If E3 is set to 6 hrs and 3.1/2 hrs have passed after unit has started and power fails, then defrost cycle will start after 3 hours when power resumes.

18. E3 Parameter : To set defrost frequency.

Min	Max	Fac.
1Hr	31Hr	6Hr

This is the amount of time between two defrost cycles.

1. To change the E3 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

19. E4 Parameter : To set maximum defrost duration.

Min	Max	Fac.
0Min	99Min	30Min

This is the maximum amount of time allowed for a defrost. If set to 0, there will be no defrost cycle.

1. To change the E4 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

20. E5 Parameter : To set Defrost stop temperature. (Evap.coil probe)

Min	Max	Fac.
-50°C	40°C	8°C

This is the maximum temperature allowable at which the defrost process will stop.

1. To change the E5 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

21. E8 Parameter : To set Defrost duration during Coil probe failure (Only manual).

Min	Max	Fac.
1Min	10Min	5Min

1. To change the E8 parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

Example : If this is set to 5 min,then manual defrost for 5 min will take place during Coil probe Fail.

22. AL Parameter : To set power on time delay for Alarm. (SZ-7524-P)

Min	Max	Fac.
0Min	99Min	30Min

1. To change the AL parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

Example : If you set this parameter to 20, once the power is switched on, the alarm will not activate for 20 minutes after the power is switched on. This is most useful to avoid the nuisance alarms when the ambient are high when the machine is switched on after a long time. Note : After pressing Mute key, buzzer will come ON, after every 10 minutes till that fault gets cleared.

23. FS Parameter : To restore default settings of the controller.

Min	Max	Fac.
0	1	0

When set to 1 all parameters are programmed to factory values. Useful to debug setting related problems.

1. To change the FS parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.
3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory.

24. LP Parameter : To lock keypad.

Min	Max	Fac.
0	1	0

This parameter can lock the keypad so that tampering is not possible by by-standers.
1. To change the LP parameter, press the "SET" key.
2. To go to desired value, use ▲ or ▼ keys.

   0 : keypad unlocked.
   1 : keypad locked.

ON/OFF
(Keypad lock)

3. To set confirm value press "SET" key you will see "– – –" which confirms that the value has been stored in memory:

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

25. EP Parameter : To end programming.

Once the SET key is pressed, the control goes into the normal mode and displays the temperature and all settings are recorded.

SZ-7523-P
SZ-7524-P

To force a Manual Defrost, press this key for 4 seconds. The unit will go into defrost mode. If E4 parameter is set to 0, or Coil temp. is greater than defrost stop temp. this key will remain inactive.
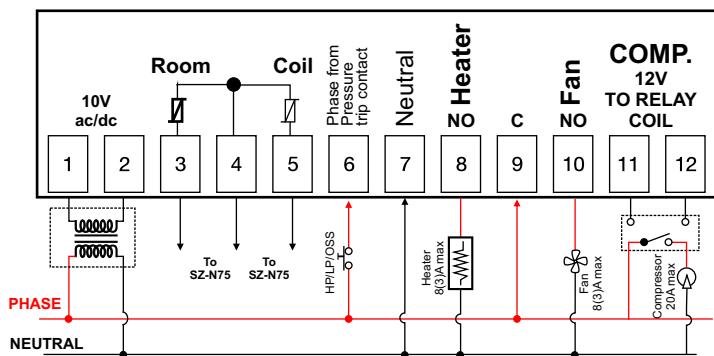
SZ-7524-P

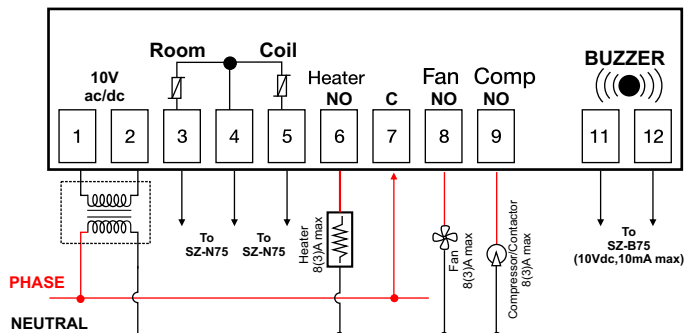This key will mute the buzzer & reset the alarm relay.

OPERATING INSTRUCTIONS

SZ-7523-P

Caution : Wiring for 230Vac Loads Only.

SZ-7524-P

Caution : Wiring for 230Vac Loads Only.

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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