sub-zero®
INDIA
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OPERATING INSTRUCTIONS

SZ-7033

sub-zero®

GENERAL DESCRIPTION

The **SZ-7033** is three setpoint temperature controller. It has unique features and user friendly parameters. It is designed for Heating as well as Cooling applications. In Heating mode first Relay can work in either Proportional or On-Off mode and other Relays work in On-Off mode.

Additionally the SZ-7033 offer several protection features that are easily understood by the examples given in the instruction manual.

The controller can be used for several applications with mesuring range as follow:

J type thermocouple : 0 °C to 700 °C
K type thermocouple : 0 °C to 999 °C
2 Wire RTD : -99 °C to 850 °C
3 Wire RTD : -99.9 °C to 99.9 °C

INDEX

INDEX

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
	Viewing Set Points	Function:To display setpoints. The Setpoints cannot be changed but can only be viewed in this mode.			
SET	Press and hold SET key for 0.5 second and release	The value of setpoint1 will be displayed and respective LED will flash. To view next set point press SET key. After third Set point, if you press SET key, the control goes into the normal mode.			
		SET mode			
	To change Set point1 to 3 (SET1 to SET3)	Function: To set Cutout value of relay 1 to 3			
SET	Press and hold SET key for 2 seconds and release.	Display will show " SEt 1 " & flash. To go to other setpoints, use up / down keys.			
1	Set point1	Function: To set Cutout value of first relay/SSR.	LSLt	HSLt	0
	To change the " SEt 1 " parameter, press SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
2	Set point2	Function: To set Cutout value of second relay.	LSLt	HSLt	0
	To change the " SEt2 " parameter, press SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory.			
3	Set point3	Function: To set Cutout value of third relay.	LSLt	HSLt	0
	To change the " SEt3 " parameter, press SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory.			
	To set other parameters.	Program mode			
prg	Hold down/prg key for 2 seconds.	Display will show " inPt " & flash. To go to other parameters, use up / down keys.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
1	Sensor Type	Function: To select the type of sensor.	tC-J	rtd3	tC-J
	To change the " inPt " parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory. tC-J : J type Thermocouple tC-H : K type Thermocouple rtd2 : 2 wire RTD rtd3 : 3 wire RTD Note : If sensor type is changed, following parameters will be changed to their factory set values. HSLt = 700(J) / 999(K) / 850(rtd2) / 99.9(rtd3) LSLt = 0(J/K)/-99(rtd2)/ -99.9(rtd3) CALb = 0 & All Set points = 0			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
2	Output Type	Function: To select the type of output for first output.(i.e. RELAY1)	rLY	SSr	rLY
	To change the "out" parameter, press the SET key.	Use UP/DOWN keys to get desired value . After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. rLY - Relay1 SSr - SSR			
3	Relay mode	Function: To set relay mode as per application.	HEAt	CooL	HEAt
	To change the "H-C" parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. HEAt - Heating (Forward) CooL - Cooling (Reverse) Note : If "H-C" parameter is selected as "Cool", "CtrL" parameter will be set to "onoF"			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
4	Control Action	Function: To set Control Action of Output for first output.	onoF	ProP	ProP
	To change the "CtrL" parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. onoF - On- Off mode ProP - Proportional Note : If "H-C" parameter is selected as "Cool", Control action cannot be selected as "ProP".			
5	Proportional Band	Function: To set Proportional Band .This parameter is activated in Proportional Mode only. This Parameter is only for RELAY1/SSR.	0.1°C	99.9°C	10.0°C
	To change the "Prbd" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This is the proportional band set in degrees. Contd.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
		Example: If Set point1 is 60°C & Proportional band(Prbd) is 10°C then, proportional action takes place between 50°C to 60°C.			
5.1	Hysterisis 1	Function: To set Hysterisis (differential) for RELAY1/ SSR. Activated in On-Off mode only.	0.1°C	99.9°C	2.0°C
	To change the"HYS 1" parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This parameter value is the differential between cut out and cut-in temperature.			
		Example: (In cooling mode): If the set point is 40.0°C and Hysterisis is set at 2.0°C, then when the system reaches 40.0°C, the Relay will cut out. Since the Hysterisis is 2.0°C, the Relay will cut in (restart) at 42.0°C (40.0°C+2.0°C). (In Heating mode): If the set pointis 40.0°C and Hysterisis is set at 2.0°C, then when the system reaches 40.0°C, the Relay will cut out. Since the Hysterisis is 2.0°C, the Relay will cut in (restart) at 38.0°C (40.0°C-2.0°C).			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
6	Cycle time	Function: To set cycle Time in seconds. Activated in Proportional mode only.	1 sec	99 sec	20 sec
	To change the "CYt1" parameter press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. Example: If Cycle Time is set to 10 sec, the duty cycle of Relay1/SSr ON-OFF in proportional band will be 10sec. ON time + OFF time = 10 sec			
7	Manual Offset	Function: To set manual offset for proportional band. Activated in Proportional mode only.	-99.9°C	99.9°C	0.0°C
	To change the "oFSt" parameter press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This parameter decides the position of Proportional band. Contd.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
		Example: If "oFSt" is 0.0°C,Set point1 is 60°C, Prbd = 10.0°C, then proportional band is 50°C to 60°C(Proportional action will take place between 50°C to 60 °C). But for the same settings of Set point1 and Prbd, if "oFSt" is set to 5.0°C, then proportional band will be 55 °C to 65°C.			
8	Hysterisis 2	Function: To set Hysterisis (differential) for RELAY2.	0.1°C	99.9°C	2.0°C
	To change the "HYS2" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory.			
9	Hysterisis 3	Function: To set Hysterisis (differential) for RELAY3.	0.1°C	99.9°C	2.0°C
	To change the "HYS3" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
10	Time Delay 1	Function: To set Time Delay for RELAY1/SSR. This parameter is activated in On-Off Mode only.	0 Min	20 Min	0 Min
	To change the "tdL1" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This parameter is used to protect the compressor from restarting in a short period of time. Example: If this parameter is set to 3 minutes, the Relay will cut off at the set temperature, but will not restart for 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.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
11	Time Delay 2	Function: To set Time Delay for RELAY2.	0 Min	20 Min	0 Min
	To change the "tdL2" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This parameter is used to protect the compressor from restarting in a short period of time.			
12	Time Delay 3	Function: To set Time Delay for RELAY3.	0 Min	20 Min	0 Min
	To change the "tdL3" Parameter, press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. This parameter is used to protect the compressor from restarting in a short period of time.			
13	Time delay for set point interchange	Function: To set the time for set point interchange.	0 Hr	12 Hr	0 Hr
	To change the "SPIn" Parameter press the SET Key	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. Contd.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
		Example: If "SPIn"is set to 4 Hrs, set points will interchange after every 4 Hrs. i.e if initially SET1 = 20°C SET2 = 40°C SET3 = 50°C After 4 hrs SET1 = 50°C SET2 = 20°C SET3 = 40°C After 8 hrs SET1 = 40°C SET2 = 50°C SET3 = 20°C Note: This parameter is applicable in Cooling mode only. If this parameter is set to 0 it will be disabled.			
14	Higher set limit	Function: To set maximum limit for set point as per the sensor selected.	Maximum Set point among 3 Set points	700°C (J) 999°C (K) 850°C (rtd2) 99.9°C (rtd3)	700°C
	To change the "HSLt" Parameter press the SET Key	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "----" which confirms that value has been stored in memory. Contd.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
		Example: Setting this parameter at 60.0°C will not allow set points to go above 60.0°C. Also, if the temperature reaches 60.0°C or above, the display will show "Ht "(High Temp) indicating that the temperature has gone above the range in this parameter.			
15	Lower set limit	Function: To set minimum limit for set point as per the sensor selected.	0°C (J) 0°C(K) -99°C (rtd2) -99.9° C (rtd3)	Minimum Set point among 3 Set points	0°C
	To change the "LSLt" Parameter press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory.			
		Example: Setting this parameter at 20.0°C will not allow set points to go below 20.0°C. Also, if the temperature reaches 20.0°C or goes below, the display will show "Lt "(Low Temp) indicating that the temperature has gone below the range in this parameter.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
16	Probe calibration	Function: To set Probe calibration.	-20°C/ -20.0 °C (rtd3)	20°C/ 20.0°C (rtd3)	0°C
	To change the "CALb" parameter press the SET key.	Use UP/DOWN keys to get desired value. After setting desired value press SET key & display will show "- - - -" which confirms that value has been stored in memory.			
		Example: The temperature on the display is 28.0°C, whereas the actual temperature is 30.0°C. You will need to set the "CALb" parameter to 2.0, which means that once out of the programming mode, the temperature will show 30.0°C (28.0°C + 2.0°C)			
17	Keypad Lock	Function: To lock keypad.	no	YES	no
	To change the "LOCK" parameter, press the set key	Use UP/DOWN keys to set desired range. After setting the desired range, press the set key and you will see "- - - -" which confirms that the value has been stored in memory. This parameter locks the keypad so that tampering is not possible by bystanders. no : keypad unlocked YES : keypad locked Contd.			

Description of parameters and functions.

Sr.No.	Parameter	Parameter setting method.	Range		
			Min	Max	Fact. Set
		When locked all the parameters can only be viewed, but cannot be modified and when you enter the parameter it will display "LOCK" and then it will show the value of parameter.			
18	Reset parameter	Function: To restore default settings.	no	YES	no
	To change the "rESt" parameter press the SET key.	When set to "YES ", all parameters are programmed to factory set values. Useful to debug setting related problems.			
19	END parameter.	Function: To end programming.			
	To end programming, press SET key.	Once the set key is pressed, the control goes into the normal mode.			

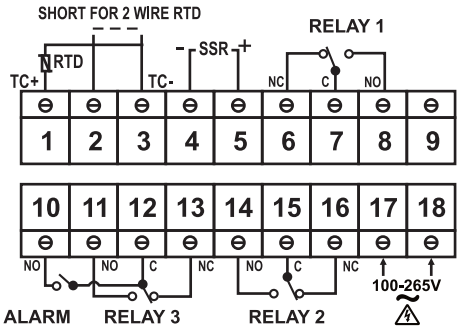
Operating messages

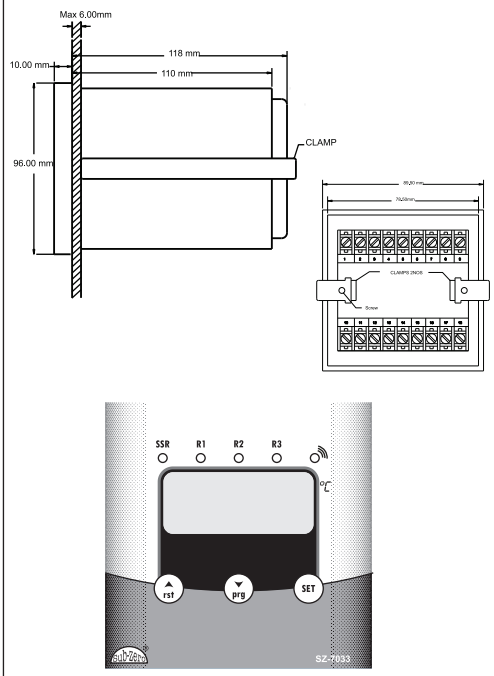
Message	Description
Ht	Temperature equal or above the maximum limit of the set points. ("HSLt ")
Lt	Temperature equal or below the minimum limit of the set points. (" LSLt ")
SF	Probe circuit open or without probe or temperature out of given range.

Technical Data

Housing	: Black, ABS Plastic
Dimensions	: Front - 96x96 mm Depth- 110 mm
Mounting	: Panel with clamps.
Connection	: Screw terminal blocks. ≤ 1.5mm2 one wire/terminal only.
Data Storage	: Non-Volatile EEPROM Memory
Storage temp	: -20°C to 70°C(non-condensing)
Accuracy	: ± 0.1% of full scale / ± 1°C(which ever is greater)
Power Input	: 100 to 265 VAC
Operating Temp	: 5°C to 50°C(non-condensing)
Sensor Type	: J,K, RTD(2 wire),RTD(3 wire) type thermocouple
Resolution	: 0.1°C for 3 wire RTD & 1°C for 2 wire RTD , J, K.
Display	: 4 digits display,size 0.56" (7 segments)
LED status	: 1. SSR On/Off 2. Relay1 On/Off 3. Relay2 On/Off 4. Relay3 On/Off 5. ALARM On/Off
Control Action for Relay1 /SSR	: 1. Proportional 2. On-Off
Relay Mode	: Heating / Cooling.
Input	: Tc J or Tc K or RTD 2/3 wires
Output	: 3 SPDT Relay , 5A/250Vac 1 SPDT Alarm Relay , 5A/250Vac SSR selectable for first Relay
Probe Fail Action	: Relay OFF
Contacts	: C-NO-NC for 3 relays, C-NO for ALARM Relay.

CONNECTION DIAGRAM





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.

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 1.5sq 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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